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Varietal evaluation on tuberose (*Polianthes tuberosa* L.) under Konkan agro climatic conditions

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Abstract

Evaluation of tuberose varieties for cut flower, loose flower and bulb production under Konkan condition was carried out at institutional farm of College of Horticulture, Dapoli, Dr. Balasaheb sawant Konkan Krishi Vidyapeeth during 2017 to 2020. Assessment of eight varieties viz., Local Single, Phule Rajni, Prajwal, Arka Nirantara, Suhasini, Hyderabad Double, Shrinagar and Local Double was carried out in Randomized Block Design with three replications. During the period of investigation, Prajwal variety recorded maximum plant height (74.56 cm), maximum number of leaves (22.77), maximum leaf area (71.09 cm²) and LAI (2.37) in vegetative parameters. The early commencement of flowering (78.92 days) was observed in Local Single, however the days required for 50 percent flowering (85.87 days) was earliest in Phule Rajani. The highest spike length (100.42 cm), rachis length (36.19 cm), floret length (7.04 cm) and number of florets per spike (15.87) in Prajwal variety. The maximum number of spikes per plant (1.91), per plot (36.69), flower yield per plot (3.53 kg) and per hectare (14.06 t/ha) while maximum number of bulbs per plant (3.58), and per hectare (13.28 t/ha) was registered by Prajwal followed by Suvasini and Hyderabad double. This shows that overall performance among 8 varieties evaluated Prajwal was found to be superior for growth and yield attributing characters. Similarly, B:C ratio was recorded highest (2.40) by prajwal variety followed by Suvasini (1.99) and Hyderabad double (1.91).

Keywords: Tuberose, Variety

Introduction

Tuberose (*Polianthes tuberosa* L.) popularly known as Rajanigandha, Nishigandha, Gulchhadi & Sugandharaj etc. (Anon, 1982.)^[1] belongs to family Amaryllidaceae (Baker, 1888)^[4] and its native is Mexico (Trueblood, 1973)^[16]. Tuberose has been cultivated since ancient times and this crop occupies a unique position in the world trade due to peak demand in the market and possess huge economic potential as cut flower and loose flower. There are single as well as double type of tuberose which impregnate the atmosphere with their sweet fragrance therefore it is used in perfume industry (Sadhu and Bose, 1973)^[12]. It is multipurpose flowering plant which can be use in different forms and occasions. Its flowers can be use for extraction of concrete and absolute. It is commercial flower crop grown in many states of India, particularly in the West Bengal, Tamilnadu, Maharashtra & Karnataka which are major tuberose growing states among these West Bengal has maximum area and production (Anon., 2017)^[2]. In India, tuberose is grown on an area of about 20,000 ha. and in Maharashtra, the area under tuberose is 198 ha. In Maharashtra important tuberose growing areas are Kolhapur, Nashik, Pune, Parbhani, Nagpur, Beed, Palghar etc. In Konkan region major cities like Mumbai, Thane, Palghar and Panaji (Goa State) are the major markets for flowers. Also tourism has enhanced the development of small towns like Ratnagiri, Chiplun, Dapoli and Alibaug etc. which has created healthy demand for tuberose flowers. These markets are well connected by Konkan railway so the major problem of transportation is solved today. This indicates better future for tuberose cultivation in Konkan region. Agro-climatic conditions and soils of Konkan region are suitable for commercial cultivation of tuberose therefore it can be commercial flower crop of this region in near future. Considering the importance of these aspects the research was undertaken with the objective to evaluate the performance of tuberose varieties for cut flowers and loose flower under Konkan condition.

Material and Methods

The experiment was conducted at the Nursery no.4 block of floriculture at College of Horticulture, Dapoli, Dr. Balasaheb Sawant Krishi Vidyapeeth, during 2017-18 - 2018-19 and

2019-20 respectively. The experiment was carried out in Randomized Block design with three replications. The treatment consisted of eight varieties of tuberose viz., Local Single, Phule Rajani, Prajwal, Arka Nirantara, Suvasini, Hyderabad double, Shringar, Local double. Tuberose bulbs of size 2.5-3.0 cm were utilized as planting material in the experimental block. The tuberose bulbs of eight varieties were procured from NARP, Ganeshkhind, Pune to conduct the research on studies on varietal response under Konkan agro climatic condition. The statistical analysis of the data was done by standard methods of analysis of variance as given by Panse and Sukhatme (1985) [10].

Results and Discussion

The various varieties of tuberose were studied for three consecutive years 2017-18, 2018-19 and 2019-20 to check the performance with respect to growth, flowering and yield parameters which is greatly influenced by the environmental conditions in which they are grown and genetic makeup of those varieties.

During the period of investigation, Prajwal variety recorded maximum plant height (74.00 cm) whereas minimum plant height (38.73 cm) was observed in variety Pune single, Prajwal variety recorded significantly maximum number of leaves (22.92 whereas minimum number of leaves (17.17) were observed in variety Local Single, maximum leaf area (70.42 cm²) was observed in Prajwal variety while minimum leaf area (38.00 cm²) was registered in Local Single variety, maximum leaf area index (2.35) was observed in Prajwal variety while minimum leaf area index (1.27) was observed in Local Single variety, dry matter of leaves (8.92 g) and dry matter of spike (13.78 g) was produced in Prajwal and was significantly superior over all other varieties under study.

Maximum plant height in Prajwal variety may be due to its genetic character and the prevailing environment of Konkan must be suitable for developing maximum vigour of the plant. These results are in agreement to those reported by the Mahawer *et al.* (2013) [8] who obtained maximum plant height in Prajwal variety among the eight varieties evaluated at AICRP project at Udaipur. Similar trend was also reported by the AICRP project, Ganeshkhind. Plant vigour is better in prajwal variety as compared to performance of other varieties evaluated in tuberose. The results are in accordance with those reported by the sateesha (2004) [13] who obtained maximum number of leaves in Prajwal variety among the various varieties evaluated which was statistically at par with Shringar, Vaibhav and Suvasini. Krishnamoorthy (2014) [6] who assessed tuberose varieties at Pudukkottai district of Tamilnadu for growth and yield characters who reported that variety Prajwal noted maximum leaf area index (99.4 cm²). Similar trend was also observed by Asatkar *et al.* (2018) [3] and Naik *et al.* (2018) [9] respectively. Singh & Dakho (2017) [14] in tuberose who reported maximum dry weight produced by cv. Calcutta Double (2.84 g).

Minimum days for commencement of flowering (78.39 days) was observed in Local Single and maximum days for commencement of flowering (90.94 days) was observed in Suvasini, however, minimum days required for 50 percent flowering (85.95 days) was observed in Phule Rajani and maximum days required for 50 percent flowering (95.37 days) was observed in Suvasini. The highest spike length (100.71

cm) registered in Prajwal variety whereas minimum spike length was registered in Phule Rajani (74.95 cm), maximum rachis length (36.53 cm) was registered in Prajwal variety while minimum rachis length (25.64 cm) was reported in Arka nirantara variety, Number of florets per spike were maximum (15.67) in Prajwal variety while minimum number of florets per spike (11.85) were recorded in local double variety and maximum diameter of floret (5.43 cm) was registered in Prajwal variety and minimum diameter of floret (4.41 cm) was obtained in Local Single variety and length of floret was maximum in Prajwal variety (7.12 cm) and minimum in Hyderabad Double (6.03 cm).

Singh *et al.* (2018) [15] who reported that cultivar Pune Local Single recorded earliest flowering which was statistically at par with cv. Sikkim selection, Mexican Single and Calcutta Single. Naik *et al.* (2018) [9] who studied eight tuberose genotypes at Arabhavi, Karnataka and reported maximum spike length in Prajwal (103.27 cm). The prajwal variety recorded maximum number of florets per spike this might be due to its genetic character. These results are in close conformity with the Rachana *et al.* (2013) [11] who reported that among the ten tuberose genotypes studied at TNAU, Coimbatore; Prajwal showed the highest number of florets/spike (43.00). Also Krishnamoorthy (2014) [6] who reported that in tuberose cv. Prajwal recorded maximum number of florets per spike (44). Madhumati *et al.* (2018) [7] who observed that in tuberose the maximum rachis length was observed in Prajwal variety (33.40 cm) whereas minimum rachis length was observed in GKTC-4 variety (23.93 cm). Madhumati *et al.* (2018) [7] reported that in tuberose the maximum floret diameter was recorded in Prajwal (3.92 cm) which was at par with Shringar (3.86 cm) whereas minimum floret diameter (2.37 cm) was recorded in Calcutta single. Krishnamoorthy (2014) [6] on four tuberose varieties at KVK, Pudukkottai district of Tamil Nadu who reported that Prajwal variety of tuberose recorded maximum length of floret (6.50). The maximum number of spikes per plant (1.90) and spike yield per plot (38.00) were noted in variety Prajwal Whereas minimum number of spikes per plant were registered in Local Single variety and spike yield per plot (1.31 and 26.17). Maximum flower yield per plot (4.39 kg) and flower yield per hectare (244 q) was maximum in variety Prajwal while minimum in variety Local Single (1.08 Kg and 59.97 q) respectively. The maximum number of bulbs per plant (1.88) was noted in variety Prajwal and minimum in Local Single (1.33), similarly bulbs yield per plot (3.54 kg) in variety Prajwal and minimum in Local Single (1.30 Kg) and Bulbs yield per hectare (196.74 q) was registered by Prajwal and minimum in Local Single (72.18 q). This shows that overall performance among 8 varieties evaluated, Prajwal was found to be superior for growth and yield attributing characters. It was found that Prajwal variety was superior in yield of loose flowers which ultimately generated maximum net returns (Rs.5,39,633/-) followed by Hyderabad double (Rs1,94,921/-) also the B:C ratio was recorded highest (2.40) by prajwal variety.

While similar trend was obtained by Naik *et al.* (2018) [9] who observed that among eight tuberose genotypes showed significant difference with respect to loose flower per plant. The genotype Prajwal recorded maximum loose flower yield per plant (169.95 g).

Table 1: Effect of varieties on vegetative parameters in tuberose

Treatments	Plant height (cm)	Average number of leaves	Average leaf area (cm ²)	Leaf area index	Dry matter of leaves (g)	Dry matter of spikes (g)
	Pooled	Pooled	Pooled	Pooled	Pooled	Pooled
Local Single	38.73	17.17	38.00	1.27	5.01	8.25
Prajwal	74.00	22.92	70.42	2.35	8.92	13.78
PhuleRajani	67.60	21.73	48.14	1.60	8.23	7.61
Arka Nirantara	59.29	18.15	43.17	1.44	6.63	6.99
Suvasini	71.98	22.17	53.17	1.77	8.53	12.71
Hyderabad Double	61.66	20.25	47.05	1.57	7.95	8.38
Shringar	60.33	18.83	45.92	1.53	7.67	7.30
Local Double	51.23	18.10	42.05	1.40	6.13	11.70
S.Em ±	1.22	0.54	0.42	0.01	0.20	0.19
CD at 5%	3.51	1.55	1.21	0.04	0.58	0.54
Cv	5.17	6.49	1.98	1.98	6.07	4.19

Table 2: Effect of varieties on flowering parameters in tuberose

Treatments	Days for commencement of flowering	Days required for 50% flowering	Spike length (cm)	Number of florets per spike	Rachis Length (cm)	Diameter of floret (cm)	Floret Length (cm)
	Pooled	Pooled	Pooled	Pooled	Pooled	Pooled	Pooled
Local Single	78.39	86.79	86.81	12.74	28.09	4.41	6.12
Prajwal	83.92	89.47	100.71	15.67	36.53	5.43	7.12
PhuleRajani	81.13	85.95	74.95	13.85	35.31	5.25	6.25
Arka Nirantara	86.83	90.32	77.14	12.71	25.64	4.47	6.53
Suvasini	90.94	95.37	94.41	13.44	34.99	4.80	6.63
Hyderabad Double	88.71	91.67	88.78	14.26	36.07	4.69	6.03
Shringar	89.08	90.40	73.65	12.38	30.19	4.79	6.45
Local Double	88.18	92.25	93.79	11.85	35.10	4.57	6.48
S.Em ±	0.56	0.46	0.65	0.22	0.54	0.12	0.12
CD at 5%	1.63	1.34	1.88	0.64	1.55	0.34	0.35
Cv	1.41	0.77	1.56	4.02	2.79	5.99	4.37

Table 3: Effect of varieties on yield parameters in tuberose

Treatments	Number of spikes per plant	Number of spikes per plot	Flower yield Kg plot ⁻¹	Flower yield q ha ⁻¹	Number of bulbs plant ⁻¹	Bulbs yield plot ⁻¹ (kg)	Bulbs yield ha ⁻¹ (q)
	Pooled	Pooled	Pooled	Pooled	Pooled	Pooled	Pooled
Local Single	1.31	26.17	1.08	59.97	1.33	1.30	72.18
Prajwal	1.90	38.00	4.39	244.0	1.88	3.54	196.74
PhuleRajani	1.72	33.83	2.25	125.0	1.73	2.03	112.87
Arka Nirantara	1.45	29.33	2.21	123.0	1.46	1.42	79.03
Suvasini	1.63	29.00	3.38	188.0	1.64	1.36	75.29
Hyderabad Double	1.62	32.00	3.22	178.8	1.62	2.35	130.45
Shringar	1.48	32.33	1.72	95.66	1.48	1.61	89.71
Local Double	1.41	29.67	2.79	155.2	1.43	1.33	73.83
S.Em ±	0.04	0.97	2.63	4.58	0.03	1.87	3.79
CD at 5%	0.10	2.94	0.11	13.22	0.10	0.07	11.49
Cv	5.23	5.70	0.34	7.36	5.56	0.21	6.32

Table 4: Economics of varietal response on tuberose

Treatment	Yield of flower (q ha ⁻¹)	Total Input cost (Rs)	Gross return (Rs)	Net Return (Rs)	B:C ratio
Local Single	59.97	385087	211999	-173088	0.55
Prajwal	244	385087	924720	539633	2.40
Phule Rajani	125	385087	389272	4185	1.01
Arka Nirantara	123	385087	376256	-8831	0.97
Suvasini	188	385087	522703	137616	1.35
Hyderabad Double	178.8	385087	580008	194921	1.50
Shringar	95.66	385087	277725	-107362	0.72
Local Double	155.2	385087	447802	62715	1.16

Conclusion

The present investigation helps to conclude that among the eight varieties of tuberose evaluated in Konkan region, Prajwal was found to be superior for loose flowers production and maximum net returns with higher B: C ratio.

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