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Varietal Evaluation of Tuberose for Commercial Traits

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Aims: To evaluate the tuberose varieties for growth, yield and smart farming application.
Study Design: The experiment was laid out in Randomized block design with three replications.
Place and Duration of Study: Department of Floriculture and Landscaping, College of Agriculture, Padannakkad, Kasargod during 2019-2020.
Methodology: Ten genotypes of tuberose *viz.* A. Shringar, A. Niranthara, A. Prajwal, A. Sugandhi, A. Suvasini, A. Vaibhav, Culcutta Single, Culcutta Double, Bidhan Ujwal and Phule Rajani were assessed for further evaluation in smart farming. Treatments were replicated thrice. The accessions were screened for vegetative, floral, quality and post-harvest parameters.
Results: The result of the study showed that out of the ten genotypes of tuberose *A. Prajwal* has been found suitable for commercial farming with highest plant height (54.27 cm), minimum days to 50% flowering (108.38 days), longest floret (6.97 cm), highest diameter of floret (3.53 cm), longest spike (111.80 cm), maximum yield per unit area (2125. 50 gm^{-2}) and good aroma. Tuberose needs an improved package of practices for better yield in smart farming systems.

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Conclusion: The genotype A. Prajwal was found superior for growth and yield characteristics and will, therefore, be considered for further research and development.

Keywords: Tuberose; accessions; A. Prajwal; smart farming.

1. INTRODUCTION

"Floriculture is a fast-emerging major venture in the world. Now a days, floriculture is lucrative profession with more returns per unit area than other agricultural or horticultural crops. In India, commercial floriculture has increased its credibility by diversification in agriculture and also evolved as a foreign exchange earner. India is bestowed with varied agro-climatic zones conducive for production of sensitive and delicate floriculture products" (Bindiya et al. 2018).

Tuberose (*Agave amica* (Medik.) L. Family: Amaryllidaceae) is one of the most popular tropical ornamental bulbous flowering plants grown on a commercial scale throughout different states of India. They are much adored by the aesthetic world for their colour, elegance and fragrance. Tuberose occupies an important position among the commercially cultivated flowers in India due to its popularity as loose flower as well as cut flower. Loose flowers have great demand for making garland, veni, worshipping and offerings in religious functions and auspicious days. The long-lasting flower spikes are largely used for the vase decoration and preparation of bouquets. The aromatic oil extracted from the fragrant white flowers have great demand for essential oil industry, which fetches a very good price in the international market" (Dimri 2017, Kerala Agricultural University 2016).

"Climatic factor plays a critical role for successful production of tuberose. Tropical to subtropical and temperate climates are best suited for its cultivation. Tuberose prefer to grow in open sunny location. It grows in 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 condition" (Krishnamoorthy 2014, Prakash et al. 2015).

"The quality and production of any crop or variety largely influenced by its genetic constitution 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. Therefore, in order to select suitable and high yielding cultivar for a particular region it is very much necessary to collect and evaluate all the available genotypes" (Mahoviya 2003, Ramachandrudu and Thangam 2009).

"Smart farming is a comprehensive system designed to optimize production. Using the key elements of information, technology, and management, smart farming can be used to increase production efficiency, improve product quality, enhance the efficiency of crop chemical use, conserve energy and protect the environment" (Ranchana et al. 2015). This experiment is carried out as a pre-evaluation study to further evaluate smart farming techniques in tuberose for its commercial cultivation.

2. MATERIALS AND METHODS

A genetic screening of different varieties of tuberose (*Agave amica* (Medik.)) were carried out at College of Agriculture, Padannakkad, Kasargod during 2019-2020. The experiment was laid out in Randomized block design with ten accessions (Plate 1.) viz. A. Shringar, A. Niranthara, A. Prajwal, A. Sugandhi, Culcutta Single, Bidhan Ujwal Phule Rajani (single type), A. Vaibhav (semi-double), A. Suvasini, Culcutta Double (double type). Treatments were replicated thrice. 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). Five plants were randomly selected and tagged from each treatment and replication for the purpose of recording observation.

3. RESULTS AND DISCUSSION

The study indicated that genotypic differences among varieties and variation in environmental factors significantly influence vegetative and floral characters of tuberose. Varietal influence on vegetative and floral characters are listed in Table 1 and Fig. 1.

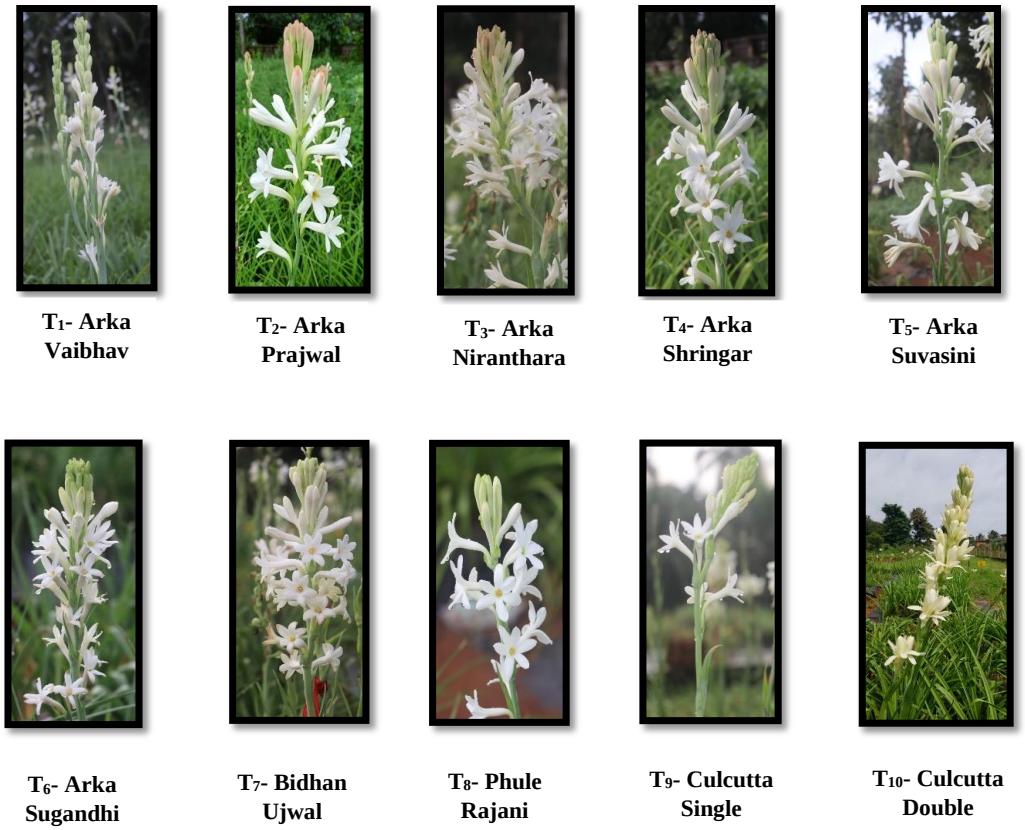

Plate 1. Tuberose varieties used for the experiment

Table 1. Varietal influence on vegetative and Floral traits of tuberose

Treatments	Plant height (cm)	Days to 50 % flowering	Length of floret (cm)	Diameter of floret (cm)	Length of spike (cm)	Loose flower yield per unit area (g/m^2)
T1	47.35	110.09	5.68	2.43	91.17	1545.73
T2	54.27	108.38	6.97	3.53	111.80	2125.50
T3	38.60	124.61	6.69	2.60	92.53	1024.67
T4	35.39	108.83	6.07	2.51	75.20	1029.33
T5	48.33	111.23	5.28	2.79	109.07	2626.26
T6	32.00	109.03	5.59	2.21	65.87	1049.80
T7	31.60	108.62	5.65	2.67	65.73	1026.50
T8	45.07	126.15	5.78	2.65	76.60	986.00
T9	46.48	122.93	7.03	2.38	106.00	849.47
T10	40.54	126.03	5.78	3.14	101.07	2086.58
C.D (0.05)	3.75	2.83	0.41	0.44	13.73	564.41
SEm (±)	1.25	0.95	0.14	0.15	4.59	188.50

The maximum plant height was observed in variety Arka Prajwal (54.27 cm) and minimum in Bidhan Ujwal (31.60 cm). The variation among the plant height might be due to the differences in the genetic makeup and the diversified origin of the cultivar, which results into 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), Dimri (2017) in tuberose.

Fig. 1 Tuberose varietal influence on plant height, spike length, floret length and diameter of floret

Duration from planting to flowering indicates the early or delayed flowering habitat of a cultivar, which is an important parameter for selecting a variety for a particular area. Early flower emergence is favourable for tuberose growers as it leads to early availability of flowers in market. Minimum number of days for 50 per cent flowering was observed in variety Arka Prajwal (108.38) followed by variety Bidhan Ujwal (108.62). The variation among blooming period is also reported by Ramachandrudu and Thangam (2009), Singh et al. (2018) in tuberose and Simmy (2012) in gladiolus.

"Flower related parameters like length of floret, diameter of floret and weight florets plays an important role when the quality of flower is concerned. For the better appearance of spike, it should have floret with bigger diameter. As the diameter of the floret increases tendency of crowding by overlapping will increases this will further enhance the beauty of spike. For the preparation of garlands, veni etc. longest florets are more attractive. In the present experiment maximum length of floret was observed in variety Culcutta Single (7.03 cm) which was statistically on par with Arka Prajwal and Arka Niranthara (6.97 and 6.69 cm, respectively). Maximum diameter of floret was observed in variety Arka Prajwal (3.53 cm) followed by Culcutta Double and Arka Suvasini (3.14 and 2.79 cm, respectively). Similar finding in tuberose" was observed by Bindiya et al. (2018).

"Longer spike length is a desirable character for cut flower. In the present study maximum length of spike was observed in variety Arka Prajwal (111.80 cm) followed by Arka Suvasini (109.07 cm) which was on par. The longest spike in Arka Prajwal 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 difference in genetic makeup.

Maximum loose flower yield per unit area were recorded by the variety Arka Suvasini followed by Arka Prajwal which was on par (2626.26 and 2125.50 gm^{-2}, respectively). Increased floret size and weight of individual florets leads to increased yield of loose flower. This is supported with the findings of Mahoviya (2003) in tuberose.

4. CONCLUSION

Out of the ten genotypes of tuberose *A. Prajwal* has been found suitable for commercial farming with highest plant height, minimum days to 50% flowering, longest floret, highest diameter of floret, longest spike, maximum loose flower yield per unit area and good aroma. Tuberose needs an improved package of practices for better yield in smart farming systems. In view of these, further evaluation of *A. Prajwal* for standardization of manuring, drip irrigation, fertilization, spacing and mulching for precision

farming is undergoing at Department of Floriculture and Landscaping at College of Agriculture, Vellayani, Thiruvananthapuram.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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