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Evaluation of different genotypes of Tuberose (*Agave amica*) under GLBC condition

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Abstract
The current study, titled "Evaluation of different genotypes of tuberose (*Agave amica*) under GLBC condition", was undertaken at the Department of Floriculture and Landscaping, Kittur Rani Channamma College of Horticulture, Arabhavi, Mudalagi Taluk, Belagavi District, Karnataka, India, during July 2024 to April 2025. The experiment was conducted in a Randomized Complete Block Design with the primary objective of assessing the performance of twelve genotypes of tuberose with respect to their growth behaviour, flowering traits and yield potential. The genotype Arka Prajwal consistently outperformed compare to others, recording maximum plant height, a greater number of leaves, greater leaf area, earliness in spike emergence, 50 per cent flowering and first harvest. The second-best performance was noticed in the genotype Arka Vaibhav.

Keywords: Tuberose, evaluation, flower yield and quality

Introduction
Tuberose (*Agave amica*) is popularly known as Rajanigandha, Nishigandha, Gulchhadi and Sugandharaj etc. (Anon, 1982) [1]. It was earlier placed under the family Amaryllidaceae (Baker, 1888) [4] but is now classified under Asparagaceae family and is native to Mexico (Trueblood, 1973) [20]. Tuberose has been cultivated since ancient times and occupies a unique position in the world trade due to its high demand and significant economic potential both as a cut flower and a loose flower. There are single and double types of tuberose that fill the atmosphere with their sweet fragrance making them valuable in the perfume industry (Sadhu and Bose, 1973) [17]. The florets are valued for their fragrance in bouquets and boutonnieres. Tuberose is also important in perfumery, aromatherapy and cosmetics, with its essential oil used in high-value products. Traditionally, the bulbs (containing the alkaloid lycorine) have medicinal uses such as treating pimples in infants, gonorrhoea and in some regions the flowers are eaten or added to beverages The genus contains three types of flowers. One is the single flower type, which is female fertile and used in perfumery industry and in breeding programs as the female parent. The other two are semi-double and double flower types, generally used as cut flowers. There are about fifteen species under the genus, of which twelve species have been reported from Mexico and Central America. Of these, nine species have white flowers, one is white tinged with red and two are red. Except for *Agave amica*, all the others are found growing wild.

Materials and Methods
Climatic condition
Arabhavi falls under Zone III of Region II in the agro-climatic classification of Karnataka and benefits from the influence of both the South-West and North-East monsoons. The region receives an average annual rainfall of about 530 mm, the majority of which occurs during June and July. Irrigation facilities are provided through the Ghataprabha Left Bank Canal (GLBC), extending from July to mid-March.

Design and layout of experiment
The experiment was laid out in Randomized Complete Block Design (RCBD) which had twelve treatments with three replication each with the spacing 30 x 30 cm, each plot accommodated 24

plants. Twelve Tuberose genotypes Arka Prajwal, Arka Vaibhav, Arka Keerthana, Arka Nirantara, Arka Suvasini, Arka Sugandhi and Arka Shringar were procured from the Indian Institute of Horticultural Research (IIHR), Bengaluru. The genotypes Mexican Single, Bidhan Ujwal, Bidhan Jyothi, Sayadrivaman and Bidhan Snigdha were obtained from the Ph.D. research material maintained at IIHR, Bengaluru.

Transplanting

Well-conditioned bulbs were planted on flat beds at a spacing of 30 × 30 cm, followed by light irrigation immediately after planting to ensure proper establishment. Gap filling was carried out wherever necessary to maintain the required plant population.

Statistical analysis

The data collected during the study were subjected to statistical analysis using standard methods of analysis of variance (ANOVA) as described by Panse and Sukhatme (1985) [15]. The standard error of the mean (S.E.m) was calculated and the critical difference (C.D.) was determined at the 5% level of significance to compare treatment means.

Results and Discussion

Vegetative parameters

Plant height (cm)

Plant height was recorded at monthly intervals. Plant height varied significantly among the genotypes. During the period of research, significantly maximum plant height at 120 days after planting was recorded in Arka Prajwal (62.46 cm) while minimum plant height was recorded in Arka Sugandhi (37.13 cm). This variation in plant height might be due to the genotypic differences which resulted in phenotypic expression of the traits and variations in different environmental conditions. Similarly noticed by Bharathi *et al*. (2023) [5], Ayushman and Fatmi (2024) [3] in tuberose and Jamali *et al*. (2025) [11] in gladiolus.

Number of leaves per plant

Maximum number of leaves were recorded in genotype Arka Prajwal (77.60) while minimum number of leaves were recorded in the genotype Arka Sugandhi (32.86). This variation could be attributed primarily to genetic differences that influence vegetative growth patterns and leaf initiation rate. In addition, environmental factors such as light intensity, temperature and soil fertility may have interacted with the genetic potential to influence leaf production. Similar observations were reported by Ranchana *et al*. (2013) [16] and Dalvi *et al*. (2021) [7] in tuberose.

Leaf area (cm^2)

Leaf area largely determines a plant's photosynthetic capacity and thus drives assimilate production, spike development and final yield. The genotype Arka Prajwal (131.92 cm^2) recorded maximum leaf area while the minimum was observed in Arka Sugandhi (63.54 cm^2). The variation likely from genetic differences affecting cell size, cell number and lamina expansion. Vigorous genotypes tend to have larger leaf areas due to greater cell growth, higher chlorophyll content and better leaf orientation for light capture. The results obtained are in accordance with those reported by the Lalthawmliana *et al*. (2017) [13] and Dalvi *et al*. (2021) [7] in tuberose.

Chlorophyll content

SPAD values offer a quick, non-destructive measure of chlorophyll content and photosynthetic efficiency in tuberose and the genotypes showed significant variation in these values. Maximum SPAD reading was observed in genotype Arka Prajwal (78.36), while the minimum was noted in genotype Arka Sugandhi (13.36). The leaf chlorophyll content is a genetic character that differs according to the genotypes. Variation in chlorophyll content was previously observed by Kumar *et al*. (2022) [12] in chrysanthemum.

Table 1: Vegetative parameters of different genotypes of Tuberose.

Genotypes	Plant height (cm)	Number of leaves per plant	Leaf area (cm^2)	Chlorophyll content (SPAD values)
G_1: Arka Prajwal	62.46	77.60	131.92	78.36
G_2: Arka Vaibhav	58.21	62.93	115.26	58.46
G_3: Arka Keerthana	42.78	34.55	66.07	30.93
G_4: Arka Nirantara	58.13	51.26	106.78	47.07
G_5: Arka Suvasini	50.70	46.26	86.60	46.07
G_6: Arka Sugandhi	37.13	32.86	63.54	13.36
G_7: Arka Shringar	49.65	44.68	86.30	44.75
G_8: Mexican Single	45.85	36.40	66.70	32.08
G_9: Bidhan Ujwal	47.84	41.66	76.75	34.70
G_{10}: Bidhan Jyothi	46.80	38.40	76.74	32.70
G_{11}: Sayadrivaman	37.84	33.10	65.37	15.16
G_{12}: Bidhan Snigdha	48.54	44.33	83.40	36.57
Mean	48.83	45.34	85.45	36.46
S. Em±	0.93	1.37	1.61	0.60
CD @ 5%	2.75	4.04	4.74	1.76

*All the values are taken 120 days after planting

Flowering parameters

Days taken for emergence of spike

The genotype Arka Prajwal (83.89 days), while the maximum number of days taken for spike emergence was observed in Arka Sugandhi (110.77 days). The variation largely arises from genetic differences regulating vegetative growth duration and the shift to the reproductive phase. Faster-growing genotypes initiate buds earlier, while environmental conditions and nutrition further influence spike emergence. Similarly noticed in tuberose by Harshavardhan *et al.* (2023) [9] and Ayushman and Fatmi (2024) [3].

Days to 50% flowering

Days to 50% flowering is an important phenological parameter in tuberose, as it indicates the time required for the crop to reach peak blooming, which is crucial for planning harvests and

market supply. In the present study, the earliest 50% flowering was recorded in Arka Prajwal (109.29 days), while the maximum number of days to 50% flowering was observed in Arka Sugandhi (144.66 days). This variation is mainly due to genetic differences affecting floral bud initiation, spike development and floret opening. Genotypes with higher photosynthesis and faster assimilate translocation reach 50% flowering earlier. These results are in line with the findings of Hasna *et al*. (2024) [10] and Ayushman and Fatmi (2024) [3] in tuberose.

Duration of flowering (days)

The maximum flowering duration was recorded in Arka Vaibhav (24.79 days), while the minimum was noted in Arka Sugandhi (10.82 days). This variation can be largely ascribed to genotypic differences in spike morphology, rate of floret anthesis and floral longevity. These results are in accordance with the findings of Ranchana *et al*. (2013) [16] in tuberose, Archana *et al*. (2019) [2] and Kumar *et al*. (2022) [12] in chrysanthemum.

Table 2: Flowering parameters of different genotypes of Tuberose.

Genotypes	Days taken for emergence of spike	Days to 50 (%) flowering	Duration of flowering (days)	Days taken for first harvesting
G_1: Arka Prajwal	83.89	109.29	17.31	92.20
G_2: Arka Vaibhav	97.21	119.74	24.79	107.70
G_3: Arka Keerthana	105.00	136.30	11.05	118.50
G_4: Arka Nirantara	95.78	117.40	16.66	104.13
G_5: Arka Suvasini	97.33	127.26	15.66	109.20
G_6: Arka Sugandhi	110.77	144.66	10.82	123.63
G_7: Arka Shringar	97.59	129.14	16.44	109.81
G_8: Mexican Single	101.28	135.32	11.77	116.54
G_9: Bidhan Ujwal	99.61	135.12	16.38	112.10
G_{10}: Bidhan Jyothi	100.25	130.37	12.48	112.41
G_{11}: Sayadrivaman	110.15	141.33	14.16	123.41
G_{12}: Bidhan Snigdha	98.27	130.10	14.18	110.44
Mean	99.76	129.67	15.14	111.67
S. Em±	4.26	2.18	0.76	1.43
CD @ 5%	12.52	6.39	2.25	4.20

Days taken for first harvesting

In the present study, the earliest harvesting was recorded in Arka Prajwal (92.20 days), while Arka Sugandhi took the maximum time to reach first harvest (123.63 days). This variation could be primarily attributed to genetic differences governing vegetative growth rate, spike initiation and floral development. Genotypes that exhibited faster spike emergence and earlier 50% flowering reached harvest maturity sooner. Similar findings of Chawla *et al*. (2021) [6] in chrysanthemum.

Flower and quality parameters

Rachis length (cm)

Rachis length is an important trait influencing the floral display in tuberose, as it determines the arrangement and spatial distribution of florets along the spike. In the present study, the longest rachis was observed in Arka Vaibhav (49.40 cm), while the shortest was recorded in Sayadrivaman (14.16 cm). The superior rachis length in Arka Vaibhav can be attributed to the presence of a higher number of florets per spike, which necessitates greater rachis elongation to accommodate them. In contrast, the reduced rachis length in Sayadrivaman may be due to the compact arrangement of florets on the spike, restricting its elongation. These results are in accordance with the findings of Bharathi *et al*. (2023) [5] in tuberose.

Number of florets per spike

Number of florets per spike is an important character in tuberose as it directly contributes to the aesthetic value, spike weight and ultimately the yield potential of the crop. In the present study, maximum florets per spike were recorded in Arka Vaibhav (54.26), while the minimum number of florets was observed in Arka Sugandhi (24.91). This variation could be primarily due to genetic differences among genotypes, which influence floret initiation, bud differentiation and spike architecture. The findings support those of Safia *et al*. (2024) [19] in gladiolus.

Flower diameter (cm)

Maximum flower diameter was observed in Arka Suvasini (4.80 cm), whereas the minimum was recorded in Arka Sugandhi (3.09 cm). This variation could be attributed mainly to genetic differences influencing floret size, petal expansion and assimilate partitioning towards floral organs. Genotypes with more number of corolla, vigorous growth, higher leaf area and efficient photosynthetic activity likely accumulated more assimilates, which were diverted towards larger floral structures. These results are in accordance with the findings of Safeena *et al*. (2019) [18] in gerbera.

Corolla length (cm) and Corolla tube length (cm)

Significant variation was observed among the genotypes with respect to corolla length and corolla tube length. Maximum corolla length and corolla tube length was recorded in Arka Nirantara (2.64 cm and 4.69 cm, respectively), whereas the minimum was noted in Bidhan Ujwal (1.56 cm) and Sayadrivaman (3.38 cm), respectively. The observed variation may be mainly due to genetic differences regulating floral morphology, cell elongation in the corolla tube and assimilate allocation towards floral organs. Similar patterns were observed by Bharathi *et al*. (2023) [5] in tuberose.

Table 3: Flower and quality parameters of different genotypes of Tuberose.

Genotypes	Rachis length (cm)	Number of florets per sike	Flower diameter (cm)	Corolla length (cm)	Corolla tube length (cm)	Shelf life (days)	Physiological loss in weight (%)
G_1: Arka Prajwal	39.95	49.00	4.31	2.34	4.25	3.50	8.31
G_2: Arka Vaibhav	49.40	54.26	4.69	2.17	3.91	2.96	13.79
G_3: Arka Keerthana	26.60	32.02	3.02	2.17	3.72	2.09	32.09
G_4: Arka Nirantara	34.33	43.33	4.25	2.64	4.69	2.75	15.95
G_5: Arka Suvasini	32.95	35.00	4.80	2.45	4.38	3.01	11.54
G_6: Arka Sugandhi	21.26	24.91	3.09	2.11	3.47	1.29	42.50
G_7: Arka Shringar	31.29	39.80	4.00	1.93	3.49	2.53	21.56
G_8: Mexican Single	26.27	31.54	3.26	2.14	4.36	2.16	39.17
G_9: Bidhan Ujwal	29.16	37.93	3.49	1.56	3.44	2.48	22.96
G_{10}: Bidhan Jyothi	27.33	35.20	4.05	2.22	4.34	2.68	29.56
G_{11}: Sayadrivaman	14.16	29.45	3.73	2.21	3.38	1.65	36.00
G_{12}: Bidhan Snigdha	30.32	39.45	4.09	2.16	4.38	2.31	22.70
Mean	30.25	37.66	3.90	2.18	3.98	2.45	24.68
S. Em±	1.25	1.93	0.05	0.07	0.04	0.03	0.69
CD @ 5%	3.68	5.67	0.17	0.22	0.13	0.09	2.04

Shelf life (days)

Significant variation was observed among the genotypes with respect to shelf life, a key post-harvest quality determining flower freshness and aesthetic value. Maximum shelf life was recorded in Arka Prajwal (3.50 days), whereas the minimum was noted in Arka Sugandhi (1.29 days). The variation could be primarily attributed to genetic differences influencing floret senescence rate, membrane stability and post-harvest metabolic activity. Genotypes with better carbohydrate reserves, thicker petals and higher water retention capacity generally exhibited longer shelf life, while those with thinner petals and rapid moisture loss showed reduced longevity. These results are in accordance with the findings of Naik *et al*. (2018) [14] and Bharathi *et al*. (2023) [5] in tuberose.

Physiological loss in weight (%)

Significant variation was observed among tuberose genotypes, that reflecting moisture loss and metabolic changes. Minimum PLW was recorded in Arka Prajwal (8.31%), while the maximum was noted in Arka Sugandhi (42.50%). The differences likely stem from genotypic traits such as cuticular thickness, water uptake efficiency and cell membrane integrity that reduce moisture loss, with genotypes having thicker petals, higher water-holding capacity and slower respiration showing lower PLW; environmental factors like temperature, humidity and nutrients may also play a role. These results support the findings of Naik *et al*. (2018) [14].

Conclusion

Evaluation of twelve tuberose genotypes under GLBC condition showed significant variability in growth, flowering, yield and quality traits. Arka Prajwal consistently outperformed others, recording minimum days to 50% sprouting, maximum plant height, leaves, leaf area, plant spread, stem girth, earliness in spike emergence, 50% flowering, first harvest, superior spike and corolla traits, vase and shelf life, reduced PLW, highest chlorophyll, Arka Vaibhav ranked second with excellence in early sprouting, growth, flowering duration, spike yield and length, rachis length, vase life and chlorophyll content. Arka Nirantara was third, showing early sprouting, vegetative growth, earliness in spike emergence and flowering, longer flowering duration, higher rachis and spike yield.

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References

1. Anonymous. *Polianthes tuberosa* L. In: The wealth of India: a dictionary of Indian raw materials and industrial products. Vol. 8. New Delhi: CSIR; 1982.
2. Archana D, Prasanth P, Seenivasan N, Joshi V. Evaluation of chrysanthemum cultivars for pot mums. J Pharm Phytochem. 2019;8(6):1522-1525.
3. Ayushman, Fatmi U. Varietal performance of tuberose (*Polianthes tuberosa* L.) under Prayagraj agro-climatic conditions. Int J Environ Clim Change. 2024;14(4):481-486.
4. Baker JG. Handbook of the Amaryllideae, including the Alstroemerieae and Agaveae. London: G Bell; 1888.
5. Bharathi TU, Kumar R, Nair SA, Umamaheswari R, Sonavane P, Kalaivanan D, *et al*. Evaluation of tuberose genotype IIHR 17-23SP-08 (IC0642158) for flower yield, quality and response to biotic stress. J Hortic Sci. 2023;18(1):60-66.
6. Chawla SL, Patel RB, Dhaduk BK, Patil S, Bhatt D. Varietal assessment of chrysanthemum (*Dendranthema grandiflora*) under south Gujarat agro-climatic conditions. Curr Hortic. 2021;9(2):64-67.
7. Dalvi NV, Salvi BR, Pawar CD, Salvi VG, Dhekale JS, Joshi MS, *et al*. Varietal evaluation of tuberose (*Polianthes tuberosa* L.) under Konkan agroclimatic conditions. J Pharm Innov. 2021;10(10):444-447.
8. Gorivale MAA. Performance of tuberose (*Polianthes tuberosa* L.) varieties in Konkan region. Int J Curr Microbiol App Sci. 2020;11(1):1910-1918.
9. Harshavardhan S, Karthikeyan S, Chitra R, Kalaiyarasi R, Rajagopal B, Rajamani K. Varietal evaluation of single-petalled tuberose (*Agave amica* Medik.) germplasm for growth and flowering attributes. Int J Environ Clim Change. 2023;13(10):2245-2251.
10. Hasna PM, CRR, Baby G, Manjusha AVM. Varietal evaluation of tuberose for commercial traits. J Adv Biol Biotechnol. 2024;27(12):153-157.
11. Jamali AR, Hajano A, Jamali S, Kaleri AA, Talpur A, Kalhoro A, *et al*. Performance of different gladiolus (*Gladiolus grandiflorus* L.) varieties on growth and flowering attributes under agro-ecological conditions of Tandojam. Annu Methodol Arch Res Rev. 2025;3(4):414-

421.
12. Kumar A, Sumanth BT, Uppar D, Ramesh SK. Evaluation of chrysanthemum (*Dendranthema grandiflora* Tzvelev) varieties for growth, quality and yield under eastern dry zones of Karnataka. Int J Res Agron. 2022;7(3):223-226.
13. Lalthawmliana A, Keditsu R, Buchem YA, Bagang L. Evaluation of tuberose (*Polianthes tuberosa* L.) cultivars under the foothill conditions of Nagaland. J Ornam Hortic. 2017;20(1-2):69-74.
14. Naik BC, Kamble BS, Tirakannanavar S, Parit S. Evaluation of different genotypes of tuberose (*Polianthes tuberosa* L.) for growth, flowering and yield characters. Int J Curr Microbiol App Sci. 2018;7(7):4135-4141.
15. Panse VG, Sukhatme PV. Statistical methods for agricultural workers. 4th rev ed. New Delhi: Indian Council of Agricultural Research; 1985. p. 152-174.
16. Ranchana P, Kannan M, Jawaharlal M. Evaluation of tuberose (*Polianthes tuberosa*) genotypes (double) for yield and genetic variability. J Ornam Hortic. 2013;16(1-2):10-14.
17. Sadhu MK, Bose TK. Tuberose for most artistic garlands. Indian Hortic. 1973;18(3):17-20.
18. Safeena SA, Thangam M, Singh NP. Evaluation of different cultivars of tuberose (*Polianthes tuberosa* L.) under humid agro-climatic conditions of Goa. J Hortic Sci. 2019;14(2):109-114.
19. Safia NE, Manjusha MR, Alaka SB, Ashitha MR, Deepa Rani CV. Varietal assessment of gladiolus (*Gladiolus* spp.) for growth, flowering characteristics, yield and economics under highland agroclimatic conditions of Wayanad, Kerala. J Exp Agric Int. 2024;46(10):467-473.
20. Trueblood EWE. “Omixochitl” the tuberose (*Polianthes tuberosa*). Econ Bot. 1973;27:157-173.