



Evaluation of *Tabernaemontana divaricata* Accessions for Loose Flower Production

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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

Crepe jasmine or East Indian rosebay or pinwheel flower, *Tabernaemontana divaricata* originated from India is a popular large shrub or a small tree grown in tropical and sub-tropical gardens for its beautiful glossy foliage and mild fragrant waxy white, ornamental flowers. It produces flowers

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throughout the year, except in winter but profusely during summer season. Rather than the opened flowers, the unopened flower buds are commonly used as an alternate to *Jasminum sambac* buds in off-season. The present investigation was carried out at the Department of Floriculture and Landscape Architecture, Horticulture college and Research Institute, Tamil Nadu agriculture university, Coimbatore during 2022-2023. Randomized Block Design was used with three replications with the objective of investigating promising genotypes of *Tabernaemontana divaricata*, collected based on the type of petals from different locations for loose flower production. In the study totally 12 accessions were collected and named from Acc. No. 1 to 12. They are evaluated for their vegetative and floral parameters such as plant height, leaf length, leaf width, no. of branches, plant spread in EW & NS direction. Floral parameters include bud length, bud diameter, stalk length and no. of petals/flower. Out of the collected accessions, Acc. No. 2 & 5 are suitable for veni arrangement and Acc. No.10 & 11 are suitable for garland making. Buds of acc. No.4 & 6 are similar to *Jasminum sambac* and *J. auriculatum* buds.

Keywords: Evaluation; floral parameters; loose flower; *Tabernaemontana divaricate*; vegetative parameters.

1. INTRODUCTION

Crepe jasmine or East Indian Rosebay or Pinwheel flower, *Tabernaemontana divaricata* is a white flowering plant which belongs to the family Apocynaceae. It is originated from India and is a popular large shrub or a small tree grown in tropical and sub-tropical gardens for its beautiful glossy foliage and mild fragrant waxy white, ornamental flowers. It produces flowers throughout the year, except in winter but profusely during summer season.

It is an evergreen, dichotomously branched shrub or small tree of about 2.5m tall and above. The leaves are stipulate, simple, opposite, glossy, dark green above and light green beneath. The waxy white colour flowers are borne in terminal or axillary cyme. There are many forms of flowers viz., single, semi-double or double, round petals. The flowers are milky white with a funnel or salver-shaped corolla with 5 imbricate lobes having a light-yellow centre, followed by paired, boat-shaped follicles having recurved barks.

The *Tabernaemontana divaricata*, or Crepe Jasmine, holds significance not only for its visual charm but also for its diverse uses. Its flowers have found applications in traditional medicine due to their reported medicinal properties. In some cultures, extracts from the flowers are believed to possess anti-inflammatory, analgesic, and antipyretic qualities. These properties have led to their utilization in remedies for various ailments.

In terms of medicinal evaluation, studies have explored that some of the important alkaloids are

found in the plant. In folk medicine, *Tabernaemontana* plants have been used to treat high blood pressure, discomfort, and inflammation, as well as for topical wound healing. *T.divaricata* plays several roles, including CNS, cardiovascular, gonadotropic, anti-tumour, anti-infectious, and anti-oxidative action, as well as the recent augmentation of cholinergic activity in the nervous system. *T.divaricata* could be a valuable therapeutic agent for several neurodegenerative diseases such as Alzheimer's, vascular dementia, and delirium, because cholinergic deficiency is likely a cause of many disorders [1].

From an ornamental perspective, the evaluation of *T. divaricata* horticultural uses has been significant. Its distinctive pinwheel-shaped flowers and glossy leaves make it a sought-after choice for landscaping and garden decoration. Horticulturalists and enthusiasts value its adaptability to different growing conditions and its ability to add aesthetic appeal to various outdoor spaces. Moreover, it is used as an alternate for Jasmine buds, as they resemble each other especially during off season.

Overall, the evaluation of *T. divaricata* underscores its dual significance as a potential source of traditional medicine and as an attractive ornamental plant. Further research and scientific exploration are essential to fully understand and unlock its benefits in both realms.

In this article, evaluation was done with various facets of *Tabernaemontana divaricata*, exploring its botanical characteristics, cultural significance, horticultural uses and its suitability for loose flower production.

2. MATERIALS AND METHODS

2.1 Location

The present study was carried out during 2022-23, at the department of Floriculture and Landscape Architecture of the Horticulture College and Research Institute, Tamil Nadu Agriculture University, Coimbatore. It is located at 11°02'N latitude and 76°57'E longitude at an altitude of 426.72 m am.s.l. The soil in the experiment field is clayey soil. The weather condition at Coimbatore during the study was moderately warm with hot early summer months during March – May. In open field conditions, the maximum temperature fluctuated between 25 and 35°C with a mean of 30°C. Minimum temperature ranged between 17 and 23.5°C with a mean of 20°C. The annual rainfall was 750mm and relative humidity ranged between 60 and 90% with a mean of 75%.

2.2 Plant Material

Twelve types of Crepe jasmine (*Tabernaemontana divaricata*) were collected from different locations (Table 1) of Tamil Nadu and Kerala and used for the study. The collected plants were around two-year old. Acc. No. 2 and 6 are commercially cultivated in various locations for their flower buds and Acc. No. 1 is used in landscaping. Acc. No. 3, 4, 5, 7 to 12 is categorized under 'Unexploited', since they are not under commercial cultivation. The collected genotypes were compared within one another.

2.3 Methods

The plants had been raised from the cuttings taken from the matured mother plants. All plants

were subjected to the same cultivation procedures, irrigation, and fertilization. For all twelve genotypes, the plant spacing was 2x1.5 m. The study includes the evaluation of morphological and floral parameters. The data collected were subjected to Analysis of Variance as per Panse and Sukhatme [2]. The CD values were worked out and the results were interpreted. Analysis was carried out with AGRES software package.

3. RESULTS AND DISCUSSION

The results obtained from the present investigation were summarized in Tables 2, 3 and 4.

3.1 Growth Parameters

The data on plant height, leaf length, leaf width, no. of branches per plant, plant spread in East-West and North-South direction are recorded at different stages of plant after planting to main field.

In single types (Acc. No.2, 3, 4, 6), at 90 DAP, plant height was found to be highest in Acc. No.2 (83.1 cm) and lowest in Acc. No.6 (63.0 cm). Acc. No. 1, the dwarf type recorded a plant height of 27.0 cm. In terms of leaf width, Acc. No.6 (6.5 cm) has the highest recording and Acc. No.3 & 4 (3.63 & 3.83 cm) has the lowest and they both are on par with each other. Acc. No. 1 had the leaf width of 0.90 cm. Leaf length is more in Acc. No.6 (13.0 cm) and less in Acc. No.4 (9.13 cm). Acc. No. 1 has the leaf length recording of 3.83 cm. For number of branches per plant, Acc. No.3 (11.0) has the highest number of branches and Acc. No. 4 (7.67) has the lowest number of branches. Acc. No. 1 has a

Table 1. Accession number, types and area of collection

Accession No.	Types	Area of collection
Acc No. 1	Single (Dwarf plants)	Thondamuthur, Coimbatore
Acc No. 2	Single (Blunt buds)	Thiyagarayanagar, Chennai
Acc No. 3	Single (Variegated leaves)	Thimmavaram, Chengalpet
Acc No. 4	Single (Pointed buds)	Kollam, Kerala
Acc No. 5	Semi-double (Two-whorled flowers)	Thondamuthur, Coimbatore
Acc No. 6	Single (Round petals)	Periyakrishnapuram, Salem
Acc No. 7	Double (Pointed buds)	Kalpakkam, Chengalpet
Acc No. 8	Double (Wavy petals)	Vadavalli, Coimbatore
Acc No. 9	Double (Scented flowers)	Madhavaram, Chennai
Acc No. 10	Double (Saucer shaped flowers)	Medavakkam, Chennai
Acc No. 11	Double (Greenish buds)	Mettupalayam, Coimbatore
Acc No. 12	Double (Fringed petals)	Thoppampatti, Coimbatore

recording of 16.7 for number of branches per plant. In regard to plant spread, Acc. No.3 (75.6 cm) has the maximum plant spread and Acc. No.4 (35.0 cm) has the minimum plant spread in East-West direction. Acc. No. 1 had an EW plant spread of 19.6 cm. In terms of North-South direction, Acc. No.2 (73.3 cm) has the maximum and Acc. No.4 (38.6 cm) has the minimum plant spread. Acc. No. 1 had a NS plant spread of 19.6 cm.

In double types (Acc. No. 5, 7, 8, 9, 10, 11, 12), at 90 DAP, Acc. No.11 (92.6 cm) had the highest plant height and Acc. No.7 (35.3 cm) had the lowest plant height. Leaf width is more in Acc. No. 8, 10 & 11 (5.50, 5.70, 5.60 cm) and they were all on par with each other. Leaf width was less in Acc. No.7 (2.73). For leaf length, the recording is high in Acc. No.8 & 11 (12.6 & 12.3 cm) and they are similar to each other. Leaf length is low in Acc. No.7 (6.80 cm). Number of branches per plant is maximum in Acc. No.11 (11.3) and minimum in Acc. No.7 (4.66). In regards to plant spread, Acc. No.11 (71.3 cm) is highest and Acc. No.7 (17.0 cm) is lowest in East-West direction. For North-South direction, Acc. No.11 (77.3 cm) has the maximum and Acc. No.7 (21.6 cm) has the minimum plant spread.

Plant height is a genetically controlled factor, as it varies among the genotypes and it is also influenced by the growing environmental conditions, production technology and cultural practices. Similar variation in plant height within the cultivars was also observed in Crossandra by

Priyanka et al., [3]. The difference in the number of branches is attributed to the genetic makeup of the genotypes. Increased number of branches leads to the production of the greater number of leaves and in turn it will enhance the flower yield by improving the source and sink relationship. Similar findings were observed by Gupta et al., [4] in dahlia and Chowdehuri et al., [5] in different China aster genotypes.

3.2 Floral Parameters

The *Tabernaemontana divaricata* genotypes were also evaluated for floral parameters.

For single types, the length of bud is more in Acc. No.6 (3.83 cm) and less in Acc. No.2 (2.56 cm). Acc. No. 1 (Dwarf type) has the bud length of 2.00 cm The bud diameter is largest in Acc. No.6 (0.83 cm) and less in both Acc. No.2 & 3 (0.43 cm). Bud diameter is 0.33 cm in Acc. No. 1. Stalk length is big in Acc. No.6 (2.46 cm) and small in both Acc. No.2 & 3 (1.9 cm). Acc. No. 1 has a stalk length of 1.53 cm. Petals counts are equal in all single types Acc. No. 1, 2, 3, 4, 6 (5).

For double types, the bud length is high in Acc. No.12 & 8 (3.66 & 3.63 cm) and less in Acc. No.7 (2.03 cm). The diameter of the bud is bigger in Acc. No.12 (1.76 cm) and smaller in Acc. No.7 (0.43 cm). Stalk length is more in Acc. No.12 & 8 (2.00 & 1.80 cm) and less in Acc. No.7 (1.10 cm). The number of petals is more in Acc. No.12 (99) and less in Acc. No.8 & 11(13.6 & 13.3).

Table 2. Acc. No. with plant height, leaf width and leaf length at time interval

	Plant height (cm)		Leaf width (cm)		Leaf length (cm)	
	At 60 DAP	At 90 DAP	At 60 DAP	At 90 DAP	At 60 DAP	At 90 DAP
Acc. No. 1	22.3	27.0	0.66	0.90	3.17	3.83
Acc. No. 2	70.7	83.1	3.43	4.30	11.2	12.0
Acc. No. 3	57.6	68.3	3.06	3.63	9.80	10.6
Acc. No. 4	57.3	64.0	3.16	3.83	8.43	9.13
Acc. No. 5	64.3	71.5	3.36	3.73	10.0	10.3
Acc. No. 6	57.7	63.0	5.96	6.50	12.6	13.0
Acc. No. 7	32.0	35.3	2.26	2.73	6.60	6.80
Acc. No. 8	56.0	64.6	5.00	5.50	12.4	12.6
Acc. No. 9	31.0	36.7	3.16	3.30	8.13	8.46
Acc. No. 10	52.6	61.6	4.93	5.70	10.9	11.3
Acc. No. 11	82.0	92.6	5.16	5.60	11.5	12.3
Acc. No. 12	49.6	54.0	3.10	3.57	8.86	9.73
Grand Mean	52.8	60.1	3.60	4.10	9.47	10.02
Sed	3.630	4.198	0.173	0.170	0.327	0.262
CD(.05)	7.570	8.706	0.358	0.353	0.679	0.544

Table 3. No of branches/plant, Plant Spread in EW direction (cm) and Plant Spread in NS direction (cm)

	No of branches /plant		Plant Spread in EW direction (cm)		Plant Spread in NS direction (cm)	
	At 60 DAP	At 90 DAP	At 60 DAP	At 90 DAP	At 60 DAP	At 90 DAP
Acc. No. 1	13.6	16.7	15.1	19.6	11.8	19.6
Acc. No. 2	5.00	9.00	48.7	58.5	55.0	73.3
Acc. No. 3	8.00	11.0	60.6	75.6	58.0	70.6
Acc. No. 4	5.00	7.67	27.0	35.0	29.8	38.6
Acc. No. 5	4.33	5.66	29.4	38.7	25.0	34.3
Acc. No. 6	7.66	10.0	53.4	67.6	56.3	70.6
Acc. No. 7	3.66	4.66	12.1	17.0	16.0	21.6
Acc. No. 8	7.00	10.0	42.3	52.6	59.1	72.7
Acc. No. 9	4.00	5.33	13.2	18.3	15.5	23.6
Acc. No. 10	4.66	7.66	38.6	49.3	47.7	59.3
Acc. No. 11	8.66	11.3	55.3	71.3	63.3	77.3
Acc. No. 12	5.00	6.00	27.0	35.0	29.6	36.3
Grand Mean	13.66	8.75	35.24	44.9	38.9	49.86
Sed	0.688	0.95	4.680	5.34	4.747	5.43
CD(.05)	1.426	1.97	9.707	10.82	9.844	11.26

Table 4. Floral parameters of the different types of *Tabernaemontana divaricata*

Acc. Nos.	Bud Length (cm)	Bud Diameter (cm)	Stalk Length (cm)	No of Petals/ Flower
Acc. No. 1	2.00	0.33	1.53	5.00
Acc. No. 2	2.56	0.43	1.90	5.00
Acc. No. 3	2.63	0.43	1.90	5.00
Acc. No. 4	2.66	0.53	1.50	5.00
Acc. No. 5	2.56	0.56	1.76	9.66
Acc. No. 6	3.83	0.83	2.46	5.00
Acc. No. 7	2.03	0.43	1.10	15.0
Acc. No. 8	3.63	0.90	1.80	13.6
Acc. No. 9	2.06	0.53	1.16	14.6
Acc. No. 10	3.40	0.83	1.76	20.0
Acc. No. 11	3.53	0.83	1.53	13.3
Acc. No. 12	3.66	1.76	2.00	99.3
Grand Mean	2.88	0.70	1.70	17.5
Sed	0.088	0.067	0.093	0.374
CD(.05)	0.182	0.139	0.192	0.775



Acc. No.1



Acc. No.3

Fig. 1. Accessions for Landscaping



Acc. No.2

Fig. 2. Accessions for loose flower (Single type)



Acc. No.5

Fig. 3. Veni arrangement



Acc. No.4

J. auriculatum buds

Fig. 4. Buds of *Jasminum auriculatum*



Acc. No.6

J. sambac buds

Fig. 5. Buds of *J. sambac*



Acc. No.11

Fig. 6. Accessions for Double types

Muthuswamy [6] reported that wide variations existed among the genotypes of *J. auriculatum* for economically important traits viz., flower bud length, corolla tube length, flower bud diameter, etc. Variations in floral quality parameters among jasmine genotypes were also reported earlier by Safeena et al., [7].

4. CONCLUSION

From the above study, it is noted that each *Tabernaemontana divaricata* accession has its own uniqueness and specific characteristic, which makes them suitable for variety of applications. Acc. No. 1 (Fig. 1) can be

recommended for landscaping for its dwarf nature and glossy white flowers. Also, Acc. No. 3 (Fig. 1) for its beautiful variegated leaves is a better option for landscape. Acc. No. 2 (Fig. 2), 5 (Fig. 3) can be used for veni arrangement as they have smaller buds compared to the double types. Buds of Acc. No. 4 (Fig. 4) and 6 (Fig. 5) are similar to the buds of *Jasminum auriculatum* and *J. sambac*, so they can be used during their off-seasons. Acc. No. 10, 11 (Fig. 6) can be recommended for making garland, because of their bigger stalk length and bolder buds compared to other accessions.

FUTURE SCOPE

As the flowers of this plant are similar to *Jasminum sambac* and *J. auriculatum* and has a year-round flowering, this can be used in substitute for *Jasminum* flowers. Also, the shelf life of *Tabernaemontana* flowers is more compared to *Jasminum* flowers. Thus, these flowers have a great market value as a loose flower.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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