ISSN Print: 2664-844X
ISSN Online: 2664-8458
NAAS Rating (2025): 4.97
IJAFS 2025; 7(9): 373-376
www.agriculturaljournals.com
Received: 17-06-2025
Accepted: 20-07-2025

Harsh Anil Lanjewar
M.Sc. Scholar, Department of Floriculture and Landscaping, College of Horticulture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Maharashtra, India

NV Dalvi
Professor (CAS) and Head, College of Horticulture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Maharashtra, India

PC Haldavanekar
Ex. Associate Dean, College of Horticulture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Maharashtra, India

SG Mahadik and
Associate Professor (CAS), Department of Agricultural Botany, College of Agriculture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Maharashtra, India

YR Parulekar
Vegetable Specialist, Vegetable Improvement Scheme, Central Experimental Station, Wakavali, Maharashtra, India

Corresponding Author:
Harsh Anil Lanjewar
M.Sc. Scholar, Department of Floriculture and Landscaping, College of Horticulture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Maharashtra, India

Response of Indian plumeria (*Plumeria alba* L.) cuttings to size and time of planting

Harsh Anil Lanjewar, NV Dalvi, PC Haldavanekar, SG Mahadik and YR Parulekar

DOI: https://www.doi.org/10.33545/2664844X.2025.v7.i9e.767

Abstract
The present investigation entitled Response of Indian plumeria (*Plumeria alba* Linn.) cuttings to size and time of planting was carried out at Hi-tech unit of College of Horticulture, Dapoli during September 2024-June 2025. The cuttings were selected with three different sizes *viz*. 20 cm (T_1), 30 cm (T_2), 40 cm (T_3) and six different months during every first fortnight. These months include September (M_1), October (M_2), November (M_3), December (M_4), January (M_5) and February (M_6). The experiment was carried out in Factorial Randomized Block Design with three replications. There were two factors *viz*. size of cutting and time of planting at every first fortnight.
The recorded parameters were significantly influenced by size of cutting and time of planting. The treatment combination, T_3M_6 (cutting of size 40 cm planted in the first fortnight of February) showed superior performance in terms of days required for sprouting (16.10), sprouting percentage (100%), survival percentage (88.68%), plant height (21.48 cm), leaf area (139.77 cm^2), girth at collar (6.63 mm) and number of leaves (15.43).

Keywords: *Plumeria*, cutting size, time of planting

Introduction
The Indian Plumeria (*Plumeria alba* Linn.), commonly referred as Pandhara Chafa or frangipani, member of Apocynaceae family with chromosome count of 2n = 36. Plumerias are native to South America extending to Brazil, Mexico, the Caribbean and Central America, they can successfully grown in both tropical and subtropical regions. *Plumeria alba* is small to medium-sized tree that usually reaches a height of 3 to 6 meters when cultivated but can grow up to 8 meters in its natural habitat. It is small, latex-producing tree or shrub characterized by thick, fleshy branches that spread widely. The leaves are shaped like lances or flattened blades and are clustered near the ends of branches, ranging from 6 cm to 22 cm in length and 2 cm to 7 cm in width and have a distinct obovate form, with the tip being rounded instead of pointed. These flowers usually have five petals and are white with a yellow center, though they may also appear in shades of pink, yellow and red. It is commonly propagated through stem cuttings, which makes it easy to cultivate and reproduce. The plant thrives in well-drained soil, full sunlight and requires moderate watering. For healthy growth, it requires well-drained soil that is not overly dry or excessively wet. As the intensity of light increases, the plant's water requirement also rises; however, overwatering can lead to root rot and potentially kill the plant. To avoid this, the planting medium should be allowed to dry between watering cycles. It is cultivated on a commercial scale, primarily for its essential oil, which is used in production of perfumes, soaps and various cosmetic products. In some cases, its wood is utilized for crafting drums and other musical instruments, while its blossoms are often used in making leis and fragrant products. *Plumeria alba* is rich in numerous bioactive substances, including sterols, polysaccharides, tannins, triterpenoids and iridoid glycosides. The aerial parts of the plant such as leaves, stems and other above ground components contain steroids, flavonoids and alkaloids. Compounds such as amyrins, sitosterols, copotein, iridoids like isoplumericin, plumeride, plumeride coumarate and plumeride coumarate glucoside have been identified in the plant. The young leaves and bark consist of plumieride and fulvoplumierin, which are compounds made up of terpenoids, sterols, plumieride and resinic acid.

By identifying the different cutting lengths of plumeria and applying evidence based methods, growers can enhance success rates and resource efficiency. Effective propagation strategies can significantly increase plant propagation, boost nursery profitability and improve overall productivity and resourse management.

Materials and Methods

The current study was conducted during the September 2024 to June 2025 at the Hi-tech unit of College of Horticulture, Dapoli, Dist. Ratnagiri in Maharashtra. Throughout the experimental duration, meteorological data was collected. The experiment was carried out in Factorial Randomized Block Design. There were two factors *viz*. size of cutting 20 cm (T1), 30 cm (T_2) 40 cm (T3) and different time of planting. These months include September (M1) October (M2), November (M3), December (M4), January (M5) and February (M6). Cuttings in each treatment were planted in polybags. Planting media was made by soil and FYM in 1:1 ratio. Uniform size of polybags were used ("9 × 11") for 20 cm, 30 cm and 40 cm cuttings. Semi-hardwood cuttings were collected on 1st fortnight of every month from September to February. The cuttings were given a slant cut by using sharp secateurs and immediately the basal end of the cutting was dipped in Keradix powder. To reduce transpiration, all the leaves on the cuttings were removed and the treated cuttings were planted in polybags according to their size. NPK were applied in the form of water-soluble complex fertilizers *viz*. 19:19:19 @ 10 g per plant. The observations, *viz*. days required for sprouting, sprouting percentage, survival percentage, plant height, leaf area, girth at collar and number of leaves were recorded at 120 days after planting except days required for sprouting. The data on individual characters underwent analysis of variance, a commonly employed method in Factorial Randomized Block Design, as described by Panse and Sukhatme (1995) [5].

Results and Discussion

Number of days required for sprouting

The data presented in table 1 shows the number of days required for sprouting found to be significant between size of cutting and time of planting. The treatment combination T3M6 (cutting of size 40 cm planted in first fortnight of February) showed earliest sprouting (16.10 days) and delayed sprouting were noticed in T1M2 (cutting of size 20 cm planted in the first fortnight of October). It is presumed that longer size of cutting possesses higher reserves of carbohydrates and nutrients. When these cuttings are planted during February fortnight, the major stored carbohydrates are utilized, which may be responsible for the early emergence. Similar findings were obtained by Savant *et al*. (2021) [8] in Indian Plumeria where minimum number of days for sprouting was observed in maximum length of cutting when planted in the first fortnight of February.

Table 1: Effect of size of cutting and time of planting on days required for sprouting of Indian plumeria (*Plumeria alba* Linn.)

Number of days required for sprouting							
Treatment	**M_1 (Sept.)**	**M_2 (Oct.)**	**M_3 (Nov.)**	**M_4 (Dec.)**	**M_5 (Jan.)**	**M_6 (Feb.)**	**Mean**
T_1 (20 cm)	27.11	27.40	26.42	26.37	25.50	22.70	25.92
T_2 (30 cm)	22.30	21.68	22.00	22.17	20.10	18.60	21.14
T_3 (40 cm)	19.87	18.13	18.11	18.97	18.10	16.10	18.21
Mean	23.09	22.40	22.18	22.50	21.23	19.13	21.76
		SEm±		CD @ 5%		Result	
T		0.12		0.37		SG	
M		0.18		0.53		SG	
(T x M)		0.31		0.91		SG	

Sprouting percentage

The data presented in table 2 shows the interaction between size of cutting and time of planting on sprouting percentage, a significantly maximum sprouting percentage (100%) was observed in treatment combination T_3M_6, which involved size of cutting 40 cm planted in the first fortnight of February and minimum sprouting percentage (72.27%) was found in T_1M_1, which involved cutting of size 20 cm planted in the first fortnight of September. This may be due to the fact that maximum length of cuttings contains more stored nutrients and energy, when planted during the warmer months, they may encourage early sprouting due to increased metabolic activity and growth. Similar findings were obtained by Chatse *et al*. (2019) [2] and Khan *et al*. (2007) [3] in Hibiscus (*Hibiscus rosa-sinensis* L.) and *Morus alba* respectively, where minimum number of days for sprouting was observed in maximum length of cutting when planted in the month of combining February.

Table 2: Effect of size of cutting and time of planting on sprouting percentage (%) of Indian plumeria (*Plumeria alba* Linn.)

Sprouting Percentage (%)							
Treatment	**M_1 (Sept.)**	**M_2 (Oct.)**	**M_3 (Nov.)**	**M_4 (Dec.)**	**M_5 (Jan.)**	**M_6 (Feb.)**	**Mean**
T_1 (20 cm)	72.27	75.03	74.32	73.00	75.02	79.33	74.83
T_2 (30 cm)	82.47	82.72	83.03	81.74	85.59	94.70	85.04
T_3 (40 cm)	90.25	93.73	93.64	93.19	96.38	100.00	94.53
Mean	81.66	83.83	83.66	82.64	85.66	91.34	84.80
		SEm±		CD @ 5%		Result	
T		0.60		1.79		SG	
M		0.85		2.53		SG	
(T x M)		1.47		4.38		SG	

Survival percentage

The data presented in table 3 shows survival percentage of Indian Plumeria (*Plumeria alba* Linn.). The data was found to be significant with size of cutting and time of planting where maximum survival percentage (88.68%) was observed in T_3M_6 (cutting of size 40 cm planted in the first fortnight of February). However, minimum survival percentage (42.67%) was found in T_1M_4 (cutting of size 20 cm planted in the first fortnight of December). Similar results were found by Kathiravan *et al*. (2009) and Parthibhan *et al*. (2014) [6] in *Jatropha curcas* Linn. where highest survival percentage was found in maximum length of cutting.

Table 3: Effect of size of cutting and time of planting on survival percentage (%) of Indian plumeria (*Plumeria alba* Linn.) at 120 days after planting

Survival Percentage (%)							
Treatment	**M_1 (Sept.)**	**M_2 (Oct.)**	**M_3 (Nov.)**	**M_4 (Dec.)**	**M_5 (Jan.)**	**M_6 (Feb.)**	**Mean**
T_1 (20 cm)	43.07	45.37	44.46	42.67	43.25	50.35	44.86
T_2 (30 cm)	60.48	62.55	61.52	61.28	65.35	70.46	63.61
T_3 (40 cm)	68.25	77.45	77.45	72.54	80.54	88.68	77.49
Mean	57.27	61.79	61.14	58.83	63.05	69.83	61.98
		SEm±		CD @ 5%		Result	
T		0.97		2.88		SG	
M		1.37		4.08		SG	
(T x M)		2.37		7.06		SG	

Plant height

The data presented in table 4 shows maximum plant height (21.48 cm) observed in T_3M_6 (cutting of size 40 cm the first fortnight of February). However, minimum plant height (5.90 cm) was recorded in T_1M_2 and T_1M_5 20 cm planted in the first fortnight of October and January respectively. This may be due to the fact that larger size of cuttings better suited for rapid vertical growth due to stored resources. They have the ability to allocate energy toward both shoot and root development. These cuttings, when planted during the warmer month (February), is favourable for their growth, resulting in tall plants. Similar findings were obtained by Ahmad *et al*. (2011) [1] in Gladiolus and Savant *et al*. (2021) [8] in Indian Plumeria.

Table 4: Effect of size of cutting and time of planting on plant height (cm) of Indian plumeria (*Plumeria alba* Linn.) at 120 days after planting

Plant height (cm)							
Treatment	**M_1 (Sept.)**	**M_2 (Oct.)**	**M_3 (Nov.)**	**M_4 (Dec.)**	**M_5 (Jan.)**	**M_6 (Feb.)**	**Mean**
T_1 (20 cm)	5.97	5.90	6.10	6.08	5.90	8.77	6.45
T_2 (30 cm)	13.03	13.80	15.38	15.80	16.03	16.06	15.02
T_3 (40 cm)	19.43	19.41	19.50	19.50	20.40	21.48	19.95
Mean	12.81	13.04	13.66	13.79	14.11	15.44	13.81
		SEm±		CD @ 5%		Result	
T		0.25		0.75		SG	
M		0.36		1.07		SG	
(T x M)		0.62		1.85		SG	

Average leaf area (cm^2)

The data presented in table 5 shows maximum average leaf area (139.77 cm^2) at 120 days after planting was recorded in T_3M_6 (cuttings of size 40 cm planted in the first fortnight of February) and minimum average leaf area (75.05 cm^2) was observed in T_1M_1 (cuttings of size 20 cm planted in the first fortnight of September). Maximum size of cutting are more likely to exhibit pronounced apical dominance, inhibiting the formation of lateral branches and resulting in larger leaves when planted during the active growing season due to their increased physiological potential for growth. Similar findings were obtained by Raibole *et al*. (2023) [7] in Indian Plumeria where maximum average leaf area (cm^2) was observed in maximum length (40 cm) of cutting when planted in the first fortnight of February.

Table 5: Effect of size of cutting and time of planting on leaf area (cm^2) of Indian plumeria (*Plumeria alba* Linn.) at 120 days after planting

Average leaf area (cm^2)							
Treatment	**M_1 (Sept.)**	**M_2 (Oct.)**	**M_3 (Nov.)**	**M_4 (Dec.)**	**M_5 (Jan.)**	**M_6 (Feb.)**	**Mean**
T_1 (20 cm)	75.05	76.41	75.45	77.39	77.93	85.02	77.88
T_2 (30 cm)	88.41	104.96	107.70	102.98	112.23	122.44	106.45
T_3 (40 cm)	119.80	131.33	131.23	130.20	134.52	139.77	131.14
Mean	94.42	104.23	104.79	103.52	108.23	115.74	105.16
		SEm±		CD @ 5%		Result	
T		1.32		3.94		SG	
M		1.87		5.58		SG	
(T x M)		3.24		9.66		SG	

Collar girth (mm)

The data in table 6 shows maximum girth at collar region (6.63 mm) was observed in T_3M_6 (cutting of size 40 cm planted in the first fortnight of February). However, minimum girth at collar region (4.93 mm) was recorded in T_1M_1 (cutting of size 20 cm planted in the first fortnight of September). This may be attributed to the fact that larger cuttings may have more developed vascular system, including xylem and phloem, which transport water and nutrients within the plant. A well-developed vascular system can enhance resource thicker stem. Similar results were reported by Kumar and Saralch (2019) [4] in *Popolus deltoids*, that larger cutting sizes exhibited a higher girth at the collar region.

Table 6: Effect of size of cutting and time of planting on collar girth (mm) of Indian plumeria (*Plumeria alba* Linn.) at 120 days after planting

Collar girth (mm)							
Treatment	**M_1 (Sept.)**	**M_2 (Oct.)**	**M_3 (Nov.)**	**M_4 (Dec.)**	**M_5 (Jan.)**	**M_6 (Feb.)**	**Mean**
T_1 (20 cm)	4.93	5.35	5.10	5.03	5.42	5.89	5.29
T_2 (30 cm)	5.36	5.47	5.55	5.38	5.83	6.37	5.66
T_3 (40 cm)	5.98	6.25	6.19	6.08	6.17	6.63	6.22
Mean	5.42	5.69	5.61	5.50	5.81	6.30	5.72
		SEm±		CD @ 5%		Result	
T		0.04		0.13		SG	
M		0.06		0.18		SG	
(T x M)		0.11		0.32		SG	

Number of leaves

The data in table 7 shows that at 120 days after planting, maximum number of leaves (15.43) was recorded in T_3M_6 (cutting of size 40 cm planted in the first fortnight of February). While, minimum number of leaves (4.40) was observed in T_1M_1 (cutting of size 20 cm planted in the first fortnight of September). This is due to maximum size of cuttings may contain more stored nutrients and possess several nodes. These nodes have the capacity to produce leaves and if there are more number of nodes on cutting will produce maximum number of leaves. When planted in the month of February, the cuttings may have benefitted from congenial climatic conditions prevailing. At the end of experiment, these cuttings achieve maximum development and resulting in highest number of leaves. Similar results were found by Kathiravan *et al*. (2009) in *Jatropha curcas* L. found that cuttings with maximum length produced maximum number of leaves.

Table 7: Effect of size sof cutting and time of planting on number of leaves of Indian plumeria (*Plumeria alba* Linn.) at 120 days after planting

Number of leaves							
Treatment	**M_1 (Sept.)**	**M_2 (Oct.)**	**M_3 (Nov.)**	**M_4 (Dec.)**	**M_5 (Jan.)**	**M_6 (Feb.)**	**Mean**
T_1 (20 cm)	4.40	7.67	7.60	7.53	8.00	8.07	7.21
T_2 (30 cm)	8.03	9.87	9.60	9.73	9.87	11.96	9.84
T_3 (40 cm)	10.33	12.43	12.53	12.33	13.80	15.43	12.81
Mean	7.59	9.99	9.91	9.86	10.56	11.82	9.95
		SEm±		CD @ 5%		Result	
T		0.07		0.22		SG	
M		0.10		0.31		SG	
(T x M)		0.18		0.53		SG	

Conclusion

According to the findings of this study, size of the cutting and time of planting for propagation of Indian plumeria had significant effect on various parameter. Treatment combination T_3M_6 i.e. (cutting of size 40 cm planted in the first fortnight of February) was shown to be most effective in terms of days required for sprouting, sprouting percentage, survival percentage, plant height, number of leaves, leaf area, girth at collar region, number of roots, root volume, fresh weight of roots, dry weight of roots, dry weight of shoots, absolute growth rate as well as relative growth rate under Konkan agro-climatic condition.

References

1. Ahmad I, Khattak AM, Ara N, Amin NU. Effect of planting dates on the growth of gladiolus corms in Peshawar. Sarhad J Agric. 2011;27(2):195-199.
2. Chatse DB, Thorat SB, Kedar DP, Khedkar SP. Studies on standardization of season for stem cutting in Hibiscus. J Agril Biol Environ Sci. 2019;6:49-51.
3. Khan GS, Ahmad I, Nawaz MF. Sprouting percentage and growth behaviour of Morus alba as affected by size of cuttings and polythene tunnel. Pak J Agric Sci. 2007;44(2):321-328.
4. Kumar S, Saralch HS. Effect of transplanting time and cutting size on growth parameters of *Populus deltoides* under nursery conditions. Int J Econ Plants. 2019;6(1):21-24.
5. Panse VG, Sukhatme PV. Statistical methods for agricultural workers. Rev ed. New Delhi: ICAR; 1995. p.97-156.
6. Parthiban KT, Subbulakshmi V, Paramathma M, Devanand PS. Standardizing cutting size for clonal multiplication of Jatropha curcas. Agric Sci Digest. 2014;34(2):147-150.
7. Raibole CU, Dalvi NV, Salvi BR, Mane AV, Parulekar YR. Studies on the size of cutting and month of planting for propagation of Indian plumeria under Konkan agro-climatic condition (*Plumeria alba* Linn.). J Pharm Innov. 2023;12(12):1273-1276.
8. Savant AN, Dalvi NV, Salvi BR, Borkar PG, Parulekar YR, Khandekar RG, *et al*. Optimization of size of cutting and month of planting for propagation of Indian Plumeria (*Plumeria alba* L.). J Eco-friendly Agric. 2021;16(2):141-145.