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ASSESSMENT OF PRUNING COMBINED WITH CHEMICAL DEFOLIATION FOR IMPROVED FLOWER PRODUCTION IN *JASMINUM SAMBAC*

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ABSTRACT

Jasminum sambac, widely valued for its fragrance and cultural importance, is a commercially significant crop in India, particularly in the perfume and floral industries. Enhancing flower yield and quality requires efficient crop management practices such as pruning and defoliation. The present study was conducted during 2023–24 at Dr. Y.S.R. Horticultural University, Anantharajupeta, to evaluate the influence of pruning time and different defoliation methods on flowering and yield in jasmine. The experiment was laid out in a factorial randomized block design with 10 treatments, including manual and chemical defoliants (NaCl, KNO_3, paraquat dichloride, and ethephon) applied during December and January, each replicated thrice. Observations were recorded for growth and yield parameters including bud initiation, days to first harvest, bud diameter, bud length, pedicel length, flower weight, and cumulative yield. Results revealed that paraquat dichloride at 1000 ppm applied in December (M_1C_3) induced the earliest bud initiation and flowering, shortest time to harvest, maximum bud size, longest pedicel, highest flower weight and superior cumulative yield. Treatments imposed in December consistently outperformed those in January across all growth and yield traits. Among defoliants, paraquat dichloride and KNO_3 proved most effective, while NaCl recorded delayed responses. The findings indicate that strategic pruning combined with chemical defoliation during December significantly enhances flower quality and productivity in *Jasminum sambac*, offering a practical alternative to labor-intensive manual defoliation.

Keywords **:** Pruning, defoliation, Jasmine, Flower yield, chemical defolaints

Introduction

Jasminum sambac, commonly known as mogra or Arabian jasmine, belongs to the Oleaceae family and holds cultural and commercial significance in India. Widely used in perfumes, cosmetics, religious rituals, and floral decorations, it's especially popular among South Indian women for hair adornment. Its rich, distinctive fragrance often called the "queen of fragrance" comes from natural isolates and synthetic aroma compounds. Flowering & Growth, Arabian jasmine blooms year-round in tropical and subtropical climates, with peak flowering during late spring to early autumn. It produces flowers from both terminal and axillary buds, so increasing branch numbers directly boosts yield. Pruning rejuvenates older plants by removing weak or overcrowded shoots, encouraging vigorous new growth and enhancing flower production. It also improves energy efficiency and ensures consistent annual blooming. Defoliation improves bud quality and harvesting efficiency but is labour-intensive. Chemical defoliants like potassium nitrate, sodium chloride, ethephon and thiazuron offer a practical alternative. Ideal defoliants should be eco-

friendly, effective at low doses, and leave no harmful residues especially important given rising labour costs.

Materials and Methods

The experiment was carried out at Floriculture block, Dr. Y.S.R. Horticultural University, College of Horticulture, Anantharajupeta during 2023-24. The existing Jasmine plants are 8 years old. The experiment was laid out in two factorial randomized block design with 10 treatments in 3 replications. T_1: Pruning+ Bahar treatment + NaCl @ 1% (December), T_2: Pruning+ Bahar treatment + KNO3 @ 5% (December), T3: Pruning+ Bahar treatment + Paraquat dichloride @ 1000 ppm (December), T4: Pruning+ Bahar treatment + Ethephon @ 1440 ppm (December), T5: Pruning+ Bahar treatment + Manual defoliation (December), T6: Pruning+ Bahar treatment + NaCl @ 1% (January), T7: Pruning+ Bahar treatment + KNO3 @ 5% (January), T8: Pruning+ Bahar treatment + Paraquat dichloride @ 1000 ppm (January), T9: Pruning+ Bahar treatment + Ethephon @ 1440 ppm (January), T10: Pruning+ Bahar treatment + Manual defoliation (January). Pruning was done to a height of 45cm above ground level in all the plants. Basins were made around the plants by digging 15-20 cm of soil and exposing the roots partially to impose stress in accordance with the treatments planned during December, 2023 and January, 2024. Observations were recorded for three plants per each treatment. The collected data was statistically analysed to determine the mean values of the following characteristics i.e., days taken for bud initiation, days taken for first harvest, bud diameter (cm), bud length (cm), pedicel length (cm), flower weight (g), and cumulative flower yield (kg/plant).

Results and Discussion

Days taken for bud initiation

Early initiation of buds was observed in the plants treated with paraquat dichloride @ 1000ppm, followed by the plants treated with KNO_3 @ 5%. Early bud initiation was observed in the plants that were defoliated during the month of December and the interaction effect also showed best results in M_1C_3 (December month and paraquat dichloride @1000ppm). Plants treated with Nacl @ 1% have shown late initiation of buds (Table1). While early bud initiation has been demonstrated when the spray is applied in the necessary quantities throughout December, early defoliation in less-than-ideal weather conditions may postpone or prevent the beginning of flower buds. Naik *et al*., 2019 also demonstrated the same outcomes in Jasminum sambac. Early pruning resulted in noticeably faster flower bud initiation, which is consistent with the results of Adhikari *et al*. (2015) in guava.

Days taken for first harvest

The plants treated with paraquat dichloride@ 1000 ppm (11.33) were early to harvest followed by the plants treated with KNO_3 @5% (12.72 days). Treatments imposed during the month of December has given the early harvest (11.22 days). In the interaction effect early harvest was obtained in M_1C_3 (December+ paraquat dichloride @ 1000ppm). Similar results were found by Khanchana *et al*. (2019) and Krishnamurthi *et al*. (1967) in *Jasminum sambac*, suggesting that the available ideal temperatures and daylight circumstances contributed to the abundant flowering.

Table 1: Influence of time of pruning, defoliation on days taken for bud initiation and days taken for first harvest of *Jasminum sambac*.

	Days taken for bud initiation			Days taken for first harvest		
	M_1	**M_2**	**Mean**	**M_1**	**M_2**	**Mean**
C_1	30.44	40.22	35.33	12.56	12.89	12.72
C_2	39.89	43.22	41.56	12.11	14.78	13.44
C_3	27.33	35.67	31.50	11.22	11.44	11.33
C_4	37.22	41.00	39.11	13.22	15.33	14.28
C_5	34.89	38.89	36.89	13.44	13.97	13.71
Mean	33.95	39.80		12.51	13.68	
	M	**C**	**MxC**	**M**	**C**	**MxC**
S. Em±	1.39	2.20	3.12	0.27	0.42	0.60
C.D. @ 5%	4.17	6.60	NS	0.80	1.26	NS

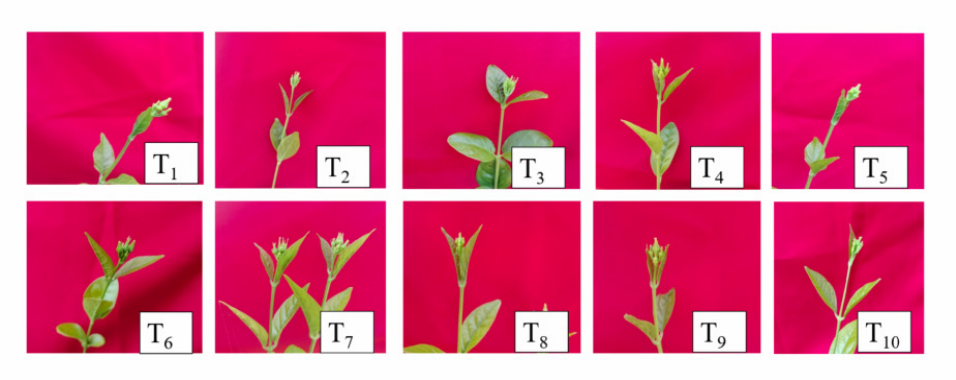

Plate 1 : Bud initiation in different treatments

Bud diameter

The range of average bud diameters for the various defoliants sprayed was 1.03 (C_3) to 0.87 (C_2). In comparison to M_2 (0.92), M_1 (0.96) had the largest bud diameter during the two distinct months that the treatment was administered. When taking into account the impact of interaction, the mean values of bud diameter ranged from 1.05 (M_1C_3) to 0.83 (M_2C_2). Auxins and cytokinins, two plant hormones that control bud growth and development, may be impacted by paraquat treatment. Paraquat-induced stress may cause hormonal changes that encourage the formation of bigger buds as the plant recovers. In *Jasminum sambac*, Choudhury *et al.* (2019) found similar results.

Bud length

The average flower bud length values for each of the different defoliants used ranged from 1.44 to 1.20. C_3 recorded the longest bud (1.44), which is comparable to C_5's (1.32). During the two months of treatment imposition, M_1 (1.32) had the maximum bud length, which is noticeably longer than M_2 (1.26). Interaction had an impact on the mean values of flower bud length, which ranged from 1.44 to 1.19. While M_2C_4 reported a minimum bud length of 1.19, M_1C_3 recorded a maximum of 1.44.

Pedicel length

The average length of the floral pedicel ranged from 1.36 (C_4) to 1.06(C_4). M_1 (1.24) had the longest pedicel, which is noticeably longer than M_2 (1.13). The range of the interaction's impact on the average flower pedicel length values was 1.42 (M_1C_3) to 1.00 (M_2C_4).

Table 2: Influence of time of pruning, defoliation on days taken for bud diameter, bud length and pedicel length of *Jasminum sambac*.

	Bud diameter			**Flower bud length**			**Flower Pedicel length**		
	M_1	**M_2**	**Mean**	**M_1**	**M_2**	**Mean**	**M_1**	**M_2**	**Mean**
C_1	0.96	0.90	0.93	1.31	1.17	1.24	1.18	1.10	1.14
C_2	0.91	0.83	0.87	1.27	1.21	1.24	1.24	1.09	1.17
C_3	1.05	1.00	1.03	1.44	1.43	1.44	1.42	1.30	1.36
C_4	0.93	0.95	0.94	1.21	1.19	1.20	1.11	1.00	1.06
C_5	0.95	0.90	0.93	1.34	1.30	1.32	1.22	1.18	1.20
Mean	0.96	0.92		1.32	1.26		1.24	1.13	
	M	**C**	**MxC**	**M**	**C**	**MxC**	**M**	**C**	**MxC**
S. Em±	0.01	0.01	0.01	0.02	0.03	0.05	0.02	0.04	0.05
C.D. @ 5%	0.02	0.03	0.04	0.06	0.10	NS	0.07	0.11	NS

Flower weight

Flowers weighed between 24.91 and 21.39 on average. The maximum floral weight of C_3 (24.91) was comparable to that of C_1 (23.05). Among the different defoliants, C_4 had the lowest flower weight (21.39). The maximum weight, observed in M_1 (23.86), was substantially higher than that of M_2 (21.89) during the two months of treatment imposition. Between 25.61 and 20.62, the mean flower weight values varied depending on the interaction. M_1C_5 (24.79), M_1C_3 reported a maximum blossom weight of 25.61. In M_2C_4 (20.62), the minimum flower weight was noted. According to Mundhe *et al.* (2015), who found

comparable results in Jasminum sambac, the higher bloom weight may be due to improved photosynthetic transport from the source to the sink, which is probably fueled by growth hormones released or created as a result of improved plant growth.

Cumulative flower yield

The range of the cumulative flower yield mean values was 1.41 to 1.00. With the greatest yield (1.41), C_3 outperformed all other treatments by a substantial margin. C_4 (1.00) had the lowest yield of any of the defoliants used. The two months of imposing treatments resulted in the highest yield in M_1 (1.21), which is much higher than M_2 (1.17). The cumulative flower yield mean values with the interaction effect ranged from 1.40 (M_1) to 0.99 (M_2). The yield of M_2C_3 (1.42) was the greatest and was comparable to that of M_1C_3 (1.40). M_2C_4 had the lowest yield, with a value of 0.99. Numerous factors, including temperature, soil management techniques, net photosynthesis, and their interconnections, affect a plant's ability to produce flowers. The time and severity of pruning are important factors that affect jasmine flower output. According to the findings of Pawar *et al.* (2019), in *Jasminum sambac*, more photosynthetic output is produced and accumulated, leading to more vigorous plant development and a greater number of productive branches. According to Khanchana *et al.* (2019), in *Jasminum sambac*, the production of more flowers is proportionate to the number of flowering branches, therefore the increasing number of branches eventually led to a higher flower output.

Table 3 : Influence of time of pruning, defoliation on days taken for flower weight and cumulative flower yield of *Jasminum sambac*.

	Flower weight			Cumulative flower yield		
	M_1	**M_2**	**Mean**	**M_1**	**M_2**	**Mean**
C_1	23.19	22.91	23.05	1.31	1.24	1.27
C_2	23.58	21.26	22.42	1.15	1.06	1.10
C_3	25.61	24.21	24.91	1.40	1.42	1.41
C_4	22.16	20.62	21.39	1.01	0.99	1.00
C_5	24.79	20.44	22.62	1.20	1.12	1.16
Mean	23.86	21.89		1.21	1.17	
	M	**C**	**MxC**	**M**	**C**	**MxC**
S. Em±	0.21	0.33	0.47	0.01	0.01	0.02
C.D. @ 5%	0.62	0.98	1.39	0.02	0.04	0.05

Plate 2: Flower yield in different treatments

Conclusion

The present investigation demonstrates that pruning followed by chemical defoliants significantly influenced the flowering behavior of jasmine. Among the treatments, paraquat dichloride at 1000 ppm applied in December proved most effective in promoting early bud initiation and advancing the first harvest, closely followed by KNO_3 at 5%, whereas

NaCl at 1% consistently delayed bud initiation. These findings highlight the importance of precise timing and choice of defoliant in optimizing jasmine productivity. The results are in agreement with earlier reports in *Jasminum sambac* and other fruit crops, reinforcing that synchronized pruning and stress induction can enhance flowering efficiency. Overall, the study provides practical insights for growers aiming to achieve uniform and early flowering, thereby improving yield and marketability of jasmine flowers.

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