

Effect of Pruning and Paclobutrazol Application on Off Season Production of Jasmine (*Jasminum sambac* L.)

Kumaresan M.*¹, M. Rajaselvam² and K. Nadhiya Devi³

¹ Department of Horticulture, Vels Institute of Science, Technology and Advanced Studies, Pallavaram, Chennai - 600 117, Tamil Nadu, India

²⁻³ Department of Horticulture, Adhiparasakthi Horticultural College, G. B. Nagar, Kalavai Ranipet - 632 506, Tamil Nadu, India

Abstract

An experiment for confirming effect of pruning and paclobutrazol application on *Jasminum sambac* was performed under off season condition during the month of September to February at Department of Floriculture and Landscaping, Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore. The experiment was laid out in Randomized Block design with three replications. Pruning along with application of paclobutrazol at 100, 200 and 300 ppm were applied as soil drenching, 25, 50 and 75 ppm were applied as foliar spraying and 25 + 10, 50 + 15, 75 + 20 ppm were applied as soil drenching + foliar spraying and control (pruning + without paclobutrazol application). The experiment revealed that pruning and paclobutrazol as soil drenching was effective plant growth retardant by reducing plant height (82.77 cm), plant spread (E-W 95.66 cm, N-S 84.64 cm), intermodal length (3.78 cm) and leaf area (18.87 cm²) and increases the flowering characters viz., number of cymes plant⁻¹ (124.44), number of flower buds plant⁻¹ (706.6) and estimated yield acre⁻¹ (380.95 kg). At higher concentration of paclobutrazol by soil drench method, the vegetative growth was plummeting and as a consequence increased yield was obtained. Thus, paclobutrazol has a strong tendency to increase flower buds production by altering the above mentioned parameters significantly.

Key words: *Jasminum sambac* L., Off season, Pruning, Paclobutrazol, Growth, Flowering

Jasmine (*Jasminum sambac* L.) belongs to the family “Oleaceae”, which is one of the oldest fragrant flowers cultivated by humans and known to be the native of subtropical climate and taken to other parts of the globe and it contains around 200 species [1]. Among the huge number of species existing, only three species (*J. sambac*, *J. grandiflorum* and *J. auriculatum*) have attained importance in commercial cultivation [2-3]. India is considered as one of the centers of origin for jasmine. A critical analysis of these species has revealed that, number of true species to be only 89, of which 40 inhabited the Indian sub-continent [4].

In jasmine the peak flower production period is limited to March to September (i.e., 8-9 months) in a year. There is no continuous and uniform supply of flowers to the market because of the peculiar flowering habit. This confine availability of flowers leads to maximum price of Rs. 700 - 1400 kg⁻¹ during off season (Nov., Dec., Jan. and Feb.) whereas it is around Rs. 40-120 kg⁻¹ during the peak production season. Apart from the low production, the quality of flowers will also be poor during off season. This result in scarcity during the lean months and glut during the peak season creating a wide fluctuation in price, demand and supply. Regulation of flowering in jasmine immense practical value. The time of peak flowering dose not

generally coincide with the time of greatest demand therefore any method of modifying the flowering sequence to avoid peak production in particular month and promotion of a more or less continuous and uninterrupted flower production throughout the year would confer great advantage to both growers and consumers. The possibility of altering the time of pruning and application of paclobutrazol may enhance the flower production during the off season.

Pruning is an important cultural operation being followed in jasmine. Pruning refers to the removal of certain portion of a plant parts. It is important for maintenance of floriferousness and flower quality along with vigour of the plant. It is a very important and necessary step for improved growth and also to get profuse and larger blooms with inspiring colour and quality of the flowers [2-3]. It is a useful technique since antique times for restarting growth and stimulating flowering of plants [5]. As a result of pruning, number of branches get increased which resulted in more number of flower buds with increase flower yield. Hence pruning was attended in jasmine to induce flowering during the off-season and thereby increase the profitability of the farmers.

In the recent years, a number of plant growth retardants have been used in the field of farming for inducing more

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Correspondence to: Kumaresan M, Department of Horticulture, Vels Institute of Science, Technology and Advanced Studies, Pallavaram, Chennai - 600 117, Tamil Nadu, India, Tel: +91 9677650324; E-mail: kummutnau@gmail.com

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acceptable plant characteristics like compact growth, dwarfness and increased number of healthy branches, which are the desired traits in the modern floriculture industry. It's also used to regulate shoot growth, stem elongation, to induce secondary branches, early flowering, to increase the number of flowers, reductions of leaf expansion, and to get thicker leaves with darker green color. It's also increased the tolerance of plants to temperature and drought stress, thereby improving shelf life and extending the flower storability. The aim of the present work is to study the effect of pruning and paclobutrazol on off season production of *Jasminum sambac* L.

MATERIALS AND METHODS

The study was conducted at Department of Floriculture and Landscaping, Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore during the year 2015-2016. The experiment was laid out in randomized block design with three replications. Irrigation was withheld for 2-3 days before pruning. Pruning was done to a height of 45 cm above the ground level. The plants were pruned in a month of last week of September. After pruning, fertilizers were applied at the rate of 2.5kg farmyard manure (FYM) and 60:120:120g NPK plant⁻¹ in 2 splits (1/2 N + full PK at pruning and remaining 1/2 N was applied after first flush of flowering). The plants were irrigated adequately afterwards. Pruning along with paclobutrazol (100, 200 and 300 ppm) were applied as soil drenching, (25, 50 and 75 ppm) where applied as foliar spraying and (25 + 10, 50 +15, 75+20 ppm) were applied as soil drenching + foliar spraying and control (pruning + without

paclobutrazol). Drenching and spraying were done in 20th day after pruning, when the plant attain sufficient good number of fresh leaves and the freshly prepared paclobutrazol were drenched at 10 cm from the surrounding areas at different concentration and for spraying plants were sprayed using a hand sprayer on upper and lower surface to run-off with as per the treatments. Spraying was carried out in the morning hours. The paclobutrazol were applied once at the study. The treated plants were observed for growth and flowering. Plant height, plant spread (E-w and N-S), Internodal length and single leaf area were taken monthly intervals. Plant height (cm) was measured from the soil surface to the highest shoot tip. A portable Leaf Area Meter (CI-202, USA) was used to measure the leaf area (cm²). For flowering response, observations on number of flower buds plant⁻¹ were taken in daily basis. The Data were subjected to analysis of variance (ANOVA), and the mean values were compared using Duncan's multiple range test at P=0.05 level.

RESULTS AND DISCUSSION

Effect of pruning and paclobutrazol on vegetative characters

The results obtained from the present investigation on vegetative characters are presented in table 1 revealed that, among all the treatments, (T₃) Pruning + paclobutrazol at 300 ppm soil drenching recorded the maximum reduction in plant height (82.77 cm), plant spread in terms of both E-W (95.66 cm) and N-S (84.64 cm), internodal length (3.78 cm) and single leaf area (18.87 cm²).

Table 1 Effect of pruning and paclobutrazol on vegetative characters of *Jasminum sambac* L during off season

Treatments	Vegetative characters				
	Plant height (cm)	Plant spread E-W (cm)	Plant spread N-S (cm)	Internodal length (cm)	Leaf area (cm ²)
T ₁ Pruning + Paclobutrazol @ 100 ppm soil drenching	92.11	90.55	81.22	4.19	20.54
T ₂ Pruning + Paclobutrazol @ 200 ppm soil drenching	89.99	91.66	81.82	4.07	19.91
T ₃ Pruning + Paclobutrazol @ 300 ppm soil drenching	82.77	95.66	84.64	3.78	18.87
T ₄ Pruning + Paclobutrazol @ 25 ppm foliar spraying	98.91	101.51	102.65	5.44	39.87
T ₅ Pruning + Paclobutrazol @ 50 ppm foliar spraying	97.11	94.55	96.62	5.41	38.71
T ₆ Pruning + Paclobutrazol @ 75 ppm foliar spraying	94.33	82.16	88.37	5.52	37.71
T ₇ Pruning + Paclobutrazol @ 25 + 10 ppm (soil drenching + foliar spraying)	93.33	89.83	94.89	4.94	30.62
T ₈ Pruning + Paclobutrazol @ 50 + 15 ppm (soil drenching + foliar spraying)	91.44	83.66	96.22	4.77	30.56
T ₉ Pruning + Paclobutrazol @ 75 + 20ppm (soil drenching + foliar spraying)	90.44	80.33	94.65	4.53	28.29
T ₁₀ Control (pruning + without paclobutrazol)	107.14	112.32	114.55	7.11	40.08
Mean	93.75	92.22	93.56	4.97	30.51
SEd	3.83	3.76	3.83	0.20	1.29
CD @ 0.05%	8.22	8.07	8.21	0.43	2.78

The reduction in plant height may be due to the fact of paclobutrazol its delay cell division and elongation of plant aerial parts by restricting gibberellin biosynthesis, thereby resulting in reduced internodal length and vegetative growth. The application of paclobutrazol blocks the gibberellin biosynthesis pathway by inhibiting cytochrome P-450, which mediates oxidative demethylation reactions including those which are necessary for the synthesis of ergosterol and the conversion of kaurene to kaurenate in the gibberellin biosynthesis pathway [6]. When gibberellin biosynthesis is blocked, cell division continues but the new cells do not elongate resulting in shoots with same or more number of leaves

but with compressed internodes [7]. Reduced leaf area might be due to the application of paclobutrazol causing an inverse effect on the GA biosynthesis which in turn might have led to reduction in the length of cell types and cell number, consequently causing reduction in the leaf area. This is in accordance with the findings reported in *Hibiscus rosa-sinensis* [8].

Effect of pruning and paclobutrazol on flowering parameters

The data from the (Table 2) shows that the significantly maximum number of cymes plant⁻¹ (124.44), number of flower buds plant⁻¹ (706.6) and estimated yield acre⁻¹ (380.95 kg) was

recorded with the pruning and application of paclobutrazol at 300 ppm as soil drenching [9]. The increase in number of cymes plant⁻¹, number of flower buds plant⁻¹ and estimated yield acre⁻¹ might be attributed to the development of more number of auxiliary shoots and more number of branches which ultimately produced more number of cymes. It has also been reported that paclobutrazol application independently can increase the number of buds due to amount of cytokinin formed and allocation of photosynthates utilization. The transport of cytokinin stimulates the growth of axillary buds [10].

CONCLUSION

The study on the effect of pruning and paclobutrazol application on off season production indicated that pruning and application of paclobutrazol at 300 ppm as soil drenching recorded enhanced respective growth and flower yield of *Jasminum sambac* during the off season (November, December and January) and this treatment, followed by pruning + paclobutrazol @ 200 ppm as soil drenching.

Table 2 Effect of pruning and paclobutrazol on flowering parameters of *Jasminum sambac* L. during off season

Treatments	Flowering parameters		
	No. of cymes plant ⁻¹	No. of flower buds plant ⁻¹	Estimated yield acre ⁻¹
T ₁ Pruning + Paclobutrazol @ 100 ppm soil drenching	116.74	629.3	255.28
T ₂ Pruning + Paclobutrazol @ 200 ppm soil drenching	118.11	635.8	348.87
T ₃ Pruning + Paclobutrazol @ 300 ppm soil drenching	124.44	706.6	380.95
T ₄ Pruning + Paclobutrazol @ 25 ppm foliar spraying	101.88	597.3	295.16
T ₅ Pruning + Paclobutrazol @ 50 ppm foliar spraying	107.55	606.6	306.94
T ₆ Pruning + Paclobutrazol @ 75 ppm foliar spraying	113.55	609.5	312.06
T ₇ Pruning + Paclobutrazol @ 25 + 10 ppm (soil drenching + foliar spraying)	103.66	611.9	281.93
T ₈ Pruning + Paclobutrazol @ 50 + 15 ppm (soil drenching + foliar spraying)	105.33	617.9	294.96
T ₉ Pruning + Paclobutrazol @ 75 + 20ppm (soil drenching + foliar spraying)	107.88	622.2	305.15
T ₁₀ Control (pruning + without paclobutrazol)	84.55	521.5	205.38
Mean	108.36	615.86	298.66
SEd	5.80	32.81	16.20
CD @ 0.05%	12.44	70.39	34.76

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