DOI : 10.58993/ijh/2025.82.2.14

Indian J. Hortic. 82(2), June 2025: 217-222

Effects of pruning and growth regulators on off-season flower induction in 'Udupi Jasmine'

Shreedevi Badiger[1], Nataraj S.K.[2], Satish K.M.[3], Chaitanya, H.S.[4], Srinivasa, V.[5] and Harish, B.M.[6*]

[1]Department of Floriculture and Landscaping Architecture, College of Horticulture, Mudigere 577132, Karnataka, India

ABSTRACT

'Udupi Jasmine' (*Jasminum sambac* var. *aeyaneanum*) is an important flower crop of coastal Karnataka possessing a geographical indication tag, having peak season during March-April and an off-season for blooming commencing during November-February. Present study was conducted to induce off-season flowering through growth regulators and pruning in 'Udupi Jasmine' by treating with different growth regulators and pruning intervals and elucidate the interaction between both on plant growth and flowering traits of the crop. The effect of pruning in October recorded the highest plant height (109.08cm), number of primary shoots (24.11) number of secondary shoots (111.58), number of flowers per shoot (108.71), individual flower weight (0.07g) and flowers weight per plant (111.85g) and the plant growth regulator GA_3 @ 150ppm recorded the highest plant height (119.02cm), number of primary shoots (33.28) and number of secondary shoots (130.75), number of flowers per shoot (118.00) and flowers weight per plant (132.22g) and CCC at 1200ppm shown to increase flower weight (0.09g). Interaction between October pruning and growth regulator GA3 @ 150 ppm reported the highest plant height (124.44 cm), number of primary shoots (33.80), number of secondary shoots (134.97), number of flowers per shoot (122.87) and flowers weight per plant (135.78g). Whereas, the maximum individual flower weight (0.10g) was recorded in plant pruned during November with CCC foliar spray at 1200ppm.

Key words: Udupi jasmine, off-season, pruning, growth regulator, growth retardant.

INTRODUCTION

Jasmines are precious traditional flowering plants widely grown in Southern and Eastern parts of India. Jasmine is a fragrant shrub or vine in the *Oleaceae* family that belongs to the *Jasminum* genus and is known as the queen of the night because of its hallucinating fragrant perfume released in the night hours. The word jasmine is derived from the Arabic word "*Yasmin*," which means fragrance (Singh, 12), and jasmine is in the same subgroup as olive, lilac and forsythia plants. The genus *Jasminum* comprises 500 species (Bailey, 2).

'Udupi Jasmine' (*Jasminum sambac* var. *aeyaneanum*) is an important flower crop of coastal Karnataka peak flowering season in March-April and an off-season from November to February. During this off-season, flowering is sparse or no flowering in coastal Karnataka, this curtailing the adaptation of this crop by formers as major source of income. Hence, it is of utmost urgent to find an effective and immediate strategy to increase the flowering in the off-season. Though there are appreciable number of alternative technologies that exists for the flowering period modification *viz*., modification in the planting time (Keerthishankar *et al.,* 6) altered irrigation supply (Chandraju *et al*., 3), selection of variety (Anoopdas and Fatmi, 1), alteration growing condition, varying the nutrient sources, pruning and plant growth regulators (PGR) etc. Though genetic improvement of the genotypes to yield superior offseason bloom is the highly potent and assured alternative among all the mentioned (Win *et al*., 14). It seeks the dedication towards the work in terms of selection of suitable parents and breeding tools, further this genetic improvement also bares the uncertainty in the outputs. Hence the facing towards the agronomical practices for getting offseason bloom in the jasmine crop would be felt more time saving and convenient. Among the agronomical practices the pruning and growth regulators are found to be effective. In recent years, growth regulators are considered efficient in floriculture for manipulating the growth and flowering and apart from growth regulation by the plant growth regulators, pruning of the plants also found to be more efficient in altering the flowering or bearing behavior of the plants. Since,

*Corresponding author email: harshareddy886153@gmail.com

[2]Department of Floriculture and Landscaping Architecture, College of Horticulture, Mudigere-577132, Karnataka, India.

[3]Department of Biotechnology, KSNUAHS, Shivamogga-577201, Karnataka, India. Krishi Vidnyana Kendra, Bramhavar, Udupi-576101, Karnataka, India.

[4]Department of Vegetable Science, College of Horticulture, Mudigere-577132, Karnataka, India.

[5]Department of Vegetable Science and Floriculture, Choudhary Sarwan Kumar Himachal Pradesh Krishi Vishvavidhyalaya, Palampur-176062, Himachal Pradesh, India.

jasmine being the crop that bears the flowers on new season growth. Although, these components *viz*., pruning and growth regulators are found efficient in achieving results in interest, their specificity towards the crop or in certain genotypes under the control, time of application, intensities or doses, and interaction between these components when used together are worth considering to arrive at desired yield of the crop. Though many literature available regarding these considerations and their action on the jasmine crop, there is an insignificant work done regarding the locally grown and internationally noticed jasmine cultivar 'Udupi jasmine' and hence the present study is proposed to standardize the time of pruning and dose of plant growth regulators for induction off-season flowering and planned to evaluate the interaction between these two potential components *viz*., pruning and growth regulators for off-season flower induction trough some significant modification in growth parameters of 'Udupi Jasmine'.

MATERIALS AND METHODS

To elucidate the effect of growth regulators and pruning on offseason flowering of jasmine cultivar 'Udupi jasmine' a field experiment was conducted in the farmers' field at Mandarthi village, Brahamavara, from 2019 to 2021. The experiment was laid out in 'Factorial Randomized Complete Block Design' (RCBD) with ten treatment combinations and three replications. Treatments included two factors *viz*., (P_1) month of pruning with two levels *viz*., October and November pruning and (P_2) growth regulators with five levels *viz*., GA_3 at 125 ppm, GA_3 at 150 ppm, CCC at 1000 ppm, CCC at 1200 ppm and water spray. Two-year-old plants were pruned during the fourth night of October and November. After pruning, when the new shoots appeared with the required number of leaves, the freshly prepared solutions were sprayed on five plants in each replication at 15 days after pruning in October and November. The data on vegetative *viz*., plant height (cm), number of primary shoots, number of secondary shoots, number of leaves per plant and flowering parameters *viz*., number of days taken for first bud bearing, number of flowers per shoot and flower weight per plant (g) were recorded at 90 days after pruning. The statistical analysis of the data was done by adopting the standard procedure given by Panse and Sukhatme (9) with the use of Indostat® statistical analysis software.

RESULTS AND DISCUSSION

The results depicted in Table 1 revealed the effect of pruning and growth regulators on vegetative and flowering traits *viz*., plant height, number of primary shoots, number of secondary shoots during the off-season (December to February), number of flowers per shoot, individual flower weight and flower weight per plant that were significantly visible on 90 days after pruning. The effect of October pruning (P_1) was recorded highest on plant height (110.62 cm), number of primary shoots (23.60) and number of secondary shoots (111.53), number of flowers per shoot (6.59)

Table 1. Effect of pruning and growth regulators on vegetative and flowering parameters of 'Udupi jasmine'.

Treatment	Plant height (cm)	Number of primary branches	Number of secondary branches	Number of flower/ shoot (90 DAP)	Individual flower weight (g) (90 DAP)	Flower weight per plant (g) (90 DAP)
			Pruning			
(P_1) October pruning	110.62	23.60	111.53	6.59	0.08	434.27
(P_2) November pruning	104.38	23.00	104.13	6.44	0.08	389.17
S.Em±	1.27	0.19	0.36	0.04	0.00	10.24
CD@ 5%	3.79	0.58	1.07	0.12	0.00	30.43
			Plant growth regulators			
(G_1) GA_3 125 ppm	113.05	24.17	119.67	7.90	0.08	618.88
(G_2) GA3 150 ppm	117.05	31.50	131.67	9.05	0.09	780.23
(G_3) CCC 1000 ppm	105.08	22.83	103.17	4.23	0.08	431.91
(G_4) CCC @ 1200 ppm	106.93	20.83	94.50	3.78	0.08	151.69
(G_5) Water spray	95.38	17.17	90.17	7.60	0.07	75.89
S.Em±	2.02	0.31	0.57	0.06	0.00	16.19
CD @ 5%	6.03	0.92	1.69	0.18	0.001	48.12

*DAP: Days after pruning; ppm: parts per million

and flower weight per plant (434.27g) as inferred by Pawar *et al*. (10); Palanikumar and Ra meesh (8); Keerthishankar *et al*. (6); Suganya *et al.* (13) in *Jasminum sambac* this might be due to the fact that the October month pruning being supported by optimum growth temperature with longer photoperiod hours found to be enhancing the growth parameters. Whereas, there was no difference found for the individual flower weight in between the two pruning levels due to the sufficient stimulus due to pruning that is given to the dormant buds irrespective of the time of pruning as reported by Dhansekaran (4) and Naik *et al*. (7).

In continuation the effect of growth regulators treated had significant effect of growth on Udupi Jasmine in terms of its vegetative and flowering behavior. The plant treated with GA_3 at 150 ppm (G_2) was recorded the maximum plant height (117.05 cm), number of primary shoots (31.50), number of secondary shoots (131.67), number of flowers per shoot (9.05), individual flower weight (0.09 g) and flower weight per plant (780.23 g) as compared to the control i.e., water spray (G_5) since, GA_3 @ 150 ppm found optimum and not deviating the yield by elongation of the internodes on the other hand as a foliar spray, it is systematically translocated to activate the dormant buds to result in higher yield (Dhansekaran, 4; Sekhar *et al*., 11; Harkulkar *et al*., 5).

The polled data for the effect of pruning and plant growth regulators for the years 2021 and 2022 were analyzed and the outcome have been depicted in the Table 2, that highlighted the significant influence on the plant traits of 'Udupi Jasmine' throughout the years. October pruning (P_1) sustained its dominance over other level for subsequent years in producing maximum plant height (109.08 cm), number of primary branches (24.11), number of secondary branches (111.58), number of flowers per shoot (108.71) and flower weight per plant (111.85 g) whereas, nothing different that the results obtained for single year the outcome of the individual flower weight doesn't found to be different for the different level of pruning for the pooled set of data.

The effect of growth regulators on jasmine plants in two years 2021 and 2022 are pooled and the results shown that the GA_3 @ 150 ppm shown to be having its significant effect on the increment of plant height (119.02 cm), number of primary branches (33.28), number of secondary branches (130.75), number of flowers per shoot (118.00) and flower weight per plant (132.22 g). Although the growth retardant CCC at 1000 ppm shown its dominance with highest individual flower weight (0.09 g) among all the treatment for the pooled data set, since the CCC being the growth retardant and effective in diverting the stored carbohydrate reserve towards the bearing buds thereby resulting in the increased individual flower weight (Suganya *et al.,* 13). Among the growth regulators and their effect on Udupi Jasmine the lower values for all the observed traits were noticed across the years for the treatment G_5 i.e., water spray.

The output of the Table 3 gives the effect of interaction between the different levels of pruning with

Table 2. Effect of pruning and growth regulators on vegetative and flowering parameters of 'Udupi jasmine'.

Treatment	Plant height (cm)	Number of primary branches	Number of secondary branches	Number of flowers/ shoot (90 DAP)	Individual flower weight (g) (90 DAP)	Flower weight per plant (g) (90 DAP)
			Pruning			
(P_1) October pruning	109.08	24.11	111.58	108.71	0.07	111.85
(P_2) November pruning	104.00	23.72	103.29	104.44	0.07	104.02
S.Em±	0.27	0.14	0.36	0.43	0.004	0.45
CD@ 5%	0.80	0.41	1.06	1.26	0.01	1.30
			Plant growth regulators			
(G_1) GA_3 125 ppm	111.58	24.72	120.08	114.62	0.07	119.36
(G_2) GA3 150 ppm	119.02	33.28	130.75	118.00	0.07	132.22
(G_3) CCC 1000 ppm	99.74	23.42	101.32	99.97	0.09	103.20
(G_4) CCC 1200 ppm	106.89	21.80	95.78	105.97	0.07	95.07
(G_5) Water spray	95.49	16.37	89.25	94.32	0.06	89.83
S.Em±	0.31	0.16	0.42	0.50	0.00	0.51
CD @ 5%	0.92	0.47	1.23	1.46	0.01	1.50

*DAP: Days after pruning; ppm: parts per million

Table 3. Effect of interaction of pruning and growth regulators on vegetative and flowering parameters of 'Udupi jasmine'.

Treatment	Plant height (cm)	Number of primary branches	Number of secondary branches	Number of flowers/ shoot (90 DAP)	Individual flower weight (g) (90 DAP)	Flower weight per plant (g) (90 DAP)
P_1G_1	114.27	25.00	123.67	7.90	0.08	725.71
P_1G_2	122.10	33.33	135.33	9.13	0.10	810.56
P_1G_3	104.93	23.00	109.67	4.33	0.08	412.47
P_1G_4	108.43	20.33	95.33	3.83	0.08	154.84
P_1G_5	93.37	16.33	93.67	7.73	0.07	67.77
P_2G_1	111.83	23.33	115.67	7.90	0.08	512.05
P_2G_2	112.00	29.67	128.00	8.97	0.09	749.89
P_2G_3	95.23	22.67	96.67	4.13	0.08	451.35
P_2G_4	105.43	21.33	94.87	3.73	0.08	148.53
P_2G_5	97.40	18.00	93.97	7.47	0.07	84.00
S.Em±	2.85	0.44	0.73	0.09	0.00	22.90
CD @ 5%	8.47	0.81	2.12	0.26	0.001	68.05

*DAP: Days after pruning

all the level of growth regulators on the vegetative parameters and in improving the flowering traits during off-season of Udupi Jasmine. The interaction between the treatments P_1G_2 (October pruning and GA_3 @150 ppm) resulted in the comparative increment over all the treatment interaction for each vegetative and flower traits recorded this results were in line with the sole application of GA_3 @ 150 ppm without interaction with the pruning thereby pronouncing the dominating effect of GA_3 irrespective of pruning time (Dhansekaran, 4) as this treatment was followed by the treatment combination of P_2G_2 (November pruning and GA_3 @150 ppm). This might be due to the pruning in October enhanced plant height, the number of leaves and higher number of primary shoots and the growth regulators sprayed had synergistic effect in activating the dormant bud and activate leaves to synthesize higher photosynthates. (Keerthishankar *et al*., 6). The lowest values were recorded for the P_1G_5 (October pruning with water spray) for all the traits under study except individual flower weight (g) for which two treatment interactions P_1G_5 and P_2G_5 found to had the weaker effect.

The pooled interaction effect of the pruning with growth regulators across two years given in the Table 4 indicated the persistence of the treatment P_1G_2 in resulting the highest value for all the traits observed except for individual flower weight (g) for which the treatment interaction P_2G_4 recorded the highest value. Since, as it is noticed earlier the effect of CCC @ 1000 ppm found to be concentrating the reserve material in the duds to increase the individual flower weight (Suganya *et al.,* 13) this effect persisted for the increased concentration of 1200 ppm to interact with the November pruning of plants.

Deviating from the un-pooled analysis results the next best interaction for the traits like plant height (cm), number of primary branches, number of secondary branches and flower weight per plant (g) were found to be recorded for P_2G_3 whereas, for the number of flowers per shoot and individual flower weight the interactions P_1G_1 and P_1G_3 respectively were found the next best. Contrasting to the earlier outcomes the comparative minimum increment over all the interactions across the years (2021 and 2022) for plant height (cm) was recorded for P_2G_4 as the CCC @ 1200 ppm being a growth retardant, while for the number of primary branches P_1G_2 found to had the meager effect. Two treatment interaction *viz*., P_1G_5 and P_2G_1 were found to be affecting minimum for the number of secondary branches, number of flowers per shoot, individual flower weight (g) and flower weight per plant (g). Along with these two interactions the treatment P_2G_5 found to be having the meager effect on individual flower weight (g) of Udupi Jasmine over the years (2021 and 2022).

The results obtained from the study it is seen that the off-season flower induction in Udupi Jasmine can be achieved by practicing October Pruning with foliar application of GA_3 at 150 ppm, which induced the maximum plant height, number of primary shoots, number of secondary shoots, leaf length, leaf width, number of flowers per shoots, flower diameters, flower yield per plant and minimum days to first bud initiation compared to November Pruning. In November, the pruning time coincides with the winter season,

Table 4. Effect of interaction between pruning and growth regulators on vegetative and flowering parameters of 'Udupi jasmine'.

Treatment	Plant height (cm)	Number of primary branches	Number of secondary branches	Number of flowers/ shoot (90 DAP)	Individual flower weight (g) (90 DAP)	Flower weight per plant (g) (90 DAP)
P_1G_1	112.68	24.87	124.30	115.50	0.07	123.50
P_1G_2	124.46	33.80	134.97	122.87	0.07	135.78
P_1G_3	104.91	23.80	107.77	105.33	0.09	110.53
P_1G_4	108.02	21.43	97.60	106.67	0.08	95.81
P_1G_5	95.35	16.67	93.27	93.17	0.06	93.63
P_2G_1	95.35	16.67	93.27	93.17	0.06	93.63
P_2G_2	110.49	24.57	115.87	113.73	0.07	115.22
P_2G_3	113.58	32.77	126.53	113.13	0.07	128.65
P_2G_4	94.57	23.03	94.87	94.60	0.10	95.88
P_2G_5	105.76	22.17	93.97	105.27	0.06	94.33
S.Em±	0.55	0.28	0.73	0.86	0.01	0.89
CD @ 5%	1.59	0.81	2.12	2.52	0.02	2.60

*DAP: Days after pruning

minimum temperature, and sunshine, reducing plant growth and flowering. The future course of work may be thought of by looking at the study's salient findings. The other months of pruning in jasmine ecotypes may be attempted to seek the response of off-season flower induction coupled with varied dosed of various growth regulator formulations.

AUTHORS' CONTRIBUTION

Conceptualization of research (SB & NSK); Designing of the experiments (NSK & SKM); Contribution of experimental materials (SKM & SV); Execution of field/lab experiments and data collection (SB); Analysis of data and interpretation (SB & CHS); Preparation of the manuscript (SB & HBM).

DECLARATION

The authors declare that they do not have any conflict of interest.

REFERENCES

1. Anoopdas, S.G. and Fatmi, U., 2022. performance of different varieties of jasmine (*Jasminum sambac*) under prayagraj agro-climatic conditions. *Int. J. Plant Soil Sci.* **34**: 965-69. https://doi.org/10.9734/ijpss/2022/v34i242724
2. Bailey, L.H. 1958. Manual of cultivated plants. Macmillan and Co, New York.
3. Chandraju, S., Thejovathi, C. and Kumar, C.C., 2013. Impact of distillery spentwash irrigation on the yield of Jasmine (Oleaceae) flowering plant. *Curr. Bot.* **3**.
4. Dhansekaran, D. 2018. Influence of growth regulating chemicals on growth and flowering in Jasmine (*Jasminum sambac.*Ait.) *J. Hort. Sci.* **13**:221-26. https://doi.org/10.24154/jhs.v13i2.524
5. Harkulkar, B.P., Dalvi, N.V., Salvi, B.R., Pawar, C.D. and Deshpande, R.S. 2022. Effects of pruning levels and growth regulators on Jasmine (*Jasminum sambac* L.) under Konkan condition. *J. Eco-friendly Agric.* **17**: 22-4. https://dpo.org/10.5958/2582-2683.2022.00005.3
6. Keerthishankar, K., Yathindra, H.A., Seetharamu, G.K., Mohan Kumar, S. and Kulkani, B.S., 2022. Yield and economic analysis of off-season flower induction in GI tagged Mysuru Jasmine *(Jasminum sambac*) as influenced by pruning month, growth regulators and regular application of fertilizers. *J. Pharm. Innov.* **11**: 1602-08.
7. Naik, B.P., Bhatt, S.T., Dipal, B., Patel, G.D., Gaikwad, S.S. and Dipika, G. 2019. Effect of different stimulants on off season flowering in *Jasminum sambac* L. *Int. J. Chem. Stud.* **7**: 2022-26.
8. Palanikumar and Rameesh. 2021. Induction of off-season flowers in jasmine (*Jasminum sambac* AIT) cv. Gundumalli. *Int. J. Curr. Res.* **13**: 19972-19978.

9. Panse, V.G. and Sukhatme, P.V. 1967. Statistical methods of agricultural workers. I.C.A.R Publication, New Delhi, India.

10. Pawar, R., Bhatt, S.T. and Bhatt, D. 2019. Influence of time and level of pruning on flowering yield in *Jasminum sambac* var. Baramasi under South Gujarat condition. *J. Pharmacogn. Phytochem*. **8**: 1975-77.

11. Sekhar, C.T., Saravanan, S.S. and Sreethu, S. 2020. Effect of plant growth regulators on growth and flower yield of jasmine (*Jasminum nitidum*) c.v CO-1 (Star Jasmine). *Int. J. Curr. Microbiol. Appl. Sci.* **9**: 3587-92. https://dpo.org/10.20546/ijcmas.2020.929.443

12. Singh, A. K. 2006. Flower Crops. New India publishing Agency, Pitam Pura, New Delhi, India.

13. Suganya, S., Rajamani, K., Ganga, M., Jeyakumar, P., Latha, M.R. and Padmapriya, S. 2023. Response of growth and flowering characters of *jasminum sambac* (L.) to modified planting system and pruning schedule. *Res. J. Agric., Ani. Vet. Sci.* 1-6. https://dpo.org/10.18805/ag.D-5716

14. Win, K.M., Korinsak, S., Jantaboon, J., Siangliw, M., Lanceras-Siangliw, J., Sirithunya, P., Vanavichit, A., Pantuwan, G., Jongdee, B., Sidhiwong, N. and Toojinda, T., 2012. Breeding the Thai jasmine rice variety KDML105 for non-age-related broad-spectrum resistance to bacterial blight disease based on combined marker-assisted and phenotypic selection. *Field Crops Res.* **137**: 186-94. https://doi.org/10.1016/j.fcr.2012.09.007

(Received : May, 2024; Revised : June, 2025; Accepted : June, 2025)