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Influence of Certain Chemicals on Flower Induction Flowering, Quality and Yield in Jasmine (*Jasminum sambac*. L.)

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A B S T R A C T

A field experiment was conducted at Floricultural Research Station, Agricultural Research Institute, Rajendranagar, SKLTSHU, Hyderabad during 2019-2020 to study the influence of certain chemicals on flower induction, flowering, quality and yield in Jasmine (*Jasminum sambac*). The experiment was laid out in Randomized Block Design (RBD) with nine treatments and three replications. Results of the experiment revealed that, the plants treated with 0.5 % Thiourea significantly reduced days taken for flower initiation (27.6 days) and influenced to increase number of cymes per plant (137.6), number of flower buds per cyme (5.0), number of flower buds per plant (688.30), the flower quality parameters like length of flower bud (22.56 mm), length of corolla tube (13.30 mm) and width of flower buds (9.62 mm), were also recorded maximum in 0.5 % thiourea. Weight of 100 flower buds (28.03 g), flower yield per plant (192.90 g), flower yield per month in plot (1.153 kg) and flower yield for three months in plot (2.35 kg) were also found superior in 0.5 % thiourea.

Introduction

Jasmine (*Jasminum sambac* L.) Oleaceae member which is a very important commercial loose flower crop in South India. The white fragrant flowers of jasmine are symbol of purity, eternal love, nobility and also symbolizes the beauty of a girl and are usually offered to God for worshiping. Hence, these are preferably planted in Hindu temple gardens and Moghul garden for their quality of serenity.

Pruning helps in rejuvenation and encouraging growth of new healthy shoots to bear more flowers. Besides pruning exogenous application of chemicals in jasmine will also result in enhancing growth and flowering. However, the selection of suitable chemicals, dosage and time of application certainly manipulate the growth towards profitable yields of flower crops in

general and jasmine in particular during the off season. Besides the natural phytohormones, a group of off season flower inducing chemicals modifies the plant in its growth and developmental behaviour without inducing phytotoxic or malformative effects. It has been reported that the demand for jasmine is increasing due to its unique fragrance but there is a huge demand supply gap of fresh flowers during off season. During the off season the cost of flower increases 10 times than normal season.

The balance of production during lean and peak season should be maintained by different horticultural techniques and one of important practice is application of flower inducing chemicals. Thiourea is a nitrogen and sulphur containing compound and is used for its growth promoting attributes in plant biology under different environmental conditions and it is known to have great roles in oxidative stress tolerance and modification of gene expression, regulation and induction of signaling mechanisms (Ratna Kumar *et al.*, 2016). Thiourea, accumulates carbohydrate in plant body which leads to early flower bud initiation as well as bud opening, later which results in lengthening of flowering span (Sainath, 2009).

Nitrobenzene is a combination of nitrogen and plant growth regulators, extracted from seaweeds that act as plant energizer, flowering stimulant and yield booster (Aziz and Miah, 2009).

Foliar application of nitrobenzene leads to quick absorption and influences the biochemical pathway of the plants to uptake more nutrients from the soil. It also increases nutrient use efficiency thus improves vegetative growth. Further, it also induces profuse flowering and helps in regulation of flowers (Mithila *et al.*, 2012).

Similarly, Humic and fulvic acids are called humin materials widely consist of a part of soil organic matter (65-70%) these organic complexes are found naturally in soil (Mackowiak *et al.*, 2001). These humin materials affect the soil properties and physiological properties of plants due to carboxyl (COOH–) and phenolic (OH–) groups (Schnitzer, 1992) which increase plant growth, early flower induction and yield.

In the view of the above facts, the present investigation has been taken up to study the influence of various chemicals on flowering aspects of jasmine (*Jasminum sambac* L.).

Materials and Methods

The present study was conducted during 2019-2020 at Floricultural Research Station, ARI, Rajendranagar, SKLTSHU, Hyderabad. The experiment was laid out in Randomized Block design with three replications and nine treatments. Pruning was done at a height of 45 cm above the ground level during last week of September the cultivar taken in the study was Gundumalli. After pruning, fertilizers were applied at the rate of 60:120:120g NPK per plant in 2 splits (1/2 N+ full P: K at pruning and remaining 1/2 N was applied after first flush of flowering).

Crop was irrigated depending upon the requirement. The pruning operation was done in seven years old plants manually with pruning shears. Foliar application of Nitrobenzene 200 ppm (T1), Nitrobenzene 300 ppm (T2), Humic acid 0.25% (T3), Humic acid 0.5% (T4), Fulvic acid 0.25% (T5), Fulvic acid 0.5% (T6), Thiourea 0.25% (T7), Thiourea 0.5% (T8), Control Water spray (T9) was done until their leaves were completely wet to the point of run off. Spraying was done in two intervals at 30 and 60 days after pruning.

Observations

The observations were recorded from five plants in each treatment on number of days taken for flower initiation, number of cymes per plant, number of flower buds per cyme, number of flower buds per plant, the flower quality parameters like length of flower bud, length of corolla tube and width of flower buds, weight of 100 flower buds, flower yield per plant, flower yield per month in plot and flower yield for three months in plot. The data was collected monthly wise for all the parameters from January to March.

Results and Discussion

Effect of chemicals on number of days taken for flower initiation

The results indicated in Table 1 shows significant differences in initiation of flowering due to chemical sprays. Foliar application of T8 Thiourea 0.5 % induced significantly early flowering (27.6 days) which was significantly followed by thiourea 0.25 % (29.6 days) whereas, the treatment Control (T9) recorded late initiation of flowering (53.0 days) as compared to all other treatments.

These results might be due to the fact that plants treated with thiourea have built up sufficient food reserves at initial stages due to suppression of apical dominance, increased number of leaves and mobility of photosynthates from source to sink.

This reserve food has been utilized for reproductive purpose with a restriction on vegetative growth which decreases days to flowering (Nandhini *et al.*, 2018) This trend is in concurrence with the findings of Kalicharan, (2012) in Moringa and Jutamanee *et al.*, (2009) in Jasmine.

Effect of chemicals on flower parameters

The data presented in Table 2 indicates significant differences in flowering parameters due to chemical sprays.

Number of flower buds per cyme

In January, maximum mean number of flower buds per cyme (5.0) was observed in T8 Thiourea 0.5 %, whereas minimum mean number of flower buds per cyme (2.6) was recorded in T9 Control. In February, maximum mean number of flower buds per cyme (5.0) was noticed in T8 (thiourea 0.5%), whereas minimum mean number of flower buds per cyme (2.6) was observed in T9 (control). In March, maximum mean number of flower buds per cyme (5.0) was observed in T8 Thiourea 0.5 %, whereas minimum (3.3) was noticed in T9 Control.

Number of cymes per plant

In January, maximum mean number of cymes per plant (65.3) was observed in T8 Thiourea 0.5 %, whereas minimum mean number of cymes per plant of (26.6) was noticed in T5 Fulvic acid 0.25 %. In February, the mean number of cymes per plant increased gradually, recorded maximum (104.0) in T8 Thiourea 0.5 %, whereas minimum mean number of cymes per plant (31.3) was noticed in T9 Control. In March, the mean number of cymes per plant increased gradually, recorded maximum (137.6) was observed in T8 Thiourea 0.5 %, whereas minimum mean number of cymes per plant (55.6) was noticed in T9 Control.

In the present study, there was gradual increase in cymes in every month and thiourea treatment recorded maximum cymes compared to others. Nijar and Rehalia (1977) reported that, the increase in number of cymes per plant is due to fact nitrogen in thiourea

application was responsible for carrying out several metabolic activities influencing vegetative growth and also flower production.

Number of flower buds per plant

In January, maximum mean number of flower buds per plant (326.66) was recorded in T8 Thiourea 0.5 %, whereas, minimum mean number of flower buds per plant of (80.00) was noticed in T5 Fulvic acid 0.25 %. In February, the mean number of buds per plant increased gradually and recorded maximum of (520.00) in T8 Thiourea 0.5 %, whereas minimum mean number of flower buds per plant (83.00) was noticed in T9 Control.

In March, the mean number buds per plant increased gradually, recorded maximum (688.30) in T8 Thiourea 0.5 %, whereas significantly minimum mean number of flower buds per plant (185.00) was registered in T9 Control.

The present results indicate that increase in number of flower buds per cyme and cymes per plant treated with Thiourea resulted in increased flower buds per plant. Kanthaswamy, (2006) reported that, application of thiourea results in increased number of flowers per plant might be due to increased number of branches leading to enhanced flower production.

Effect of chemical sprays on flower quality

It is vivid from the Table 3 that, different chemical sprays influenced flower quality parameters.

Length of flower bud (mm)

In January, maximum mean length of flower bud of (22.36) was recorded in T8 Thiourea 0.5 %, whereas minimum mean length of flower bud (19.90) was noticed in T9 Control. In February, maximum mean length of flower bud of (22.56) was registered in T8 Thiourea 0.5 %, whereas minimum mean length of flower bud (20.06) was recorded in T9 Control. In March, maximum mean length of flower bud was observed with (22.53) in T1 Nitrobenzene 200 ppm, whereas minimum of (20.90) was recorded in T9 Control.

Length of corolla tube (mm)

In January, maximum mean length of corolla tube (13.20) was registered in T8 Thiourea 0.5 %, whereas minimum mean length of corolla tube (10.36) was noticed in T9 Control. In February, maximum mean length of corolla tube (13.00) was observed in T8 Thiourea 0.5 %, whereas minimum mean length of corolla tube (10.43) was recorded in T9 Control. In March, maximum mean length of corolla tube was observed (13.30) in T8 Thiourea 0.5 %, whereas minimum (10.59) was noticed in T9 Control.

Width of flower bud (mm)

In January, maximum mean width of flower bud of (8.76) was observed in T8 Thiourea 0.5 %, whereas minimum mean width of flower bud (7.40) was recorded in T9 Control. During February, maximum mean width of flower bud (8.79) was observed in T8 Thiourea 0.5 %, whereas minimum mean width of flower bud (7.62) was noticed in T9 Control. In March, maximum mean width of flower bud was registered (9.62) in T8 Thiourea 0.5 %, whereas minimum (7.93) was noticed in T9 Control.

Effect of chemical sprays on yield attributes

The results presented in Table 4 shows significant differences due to chemical sprays on yield attributes.

Weight of 100 flower buds (g)

In January, maximum mean weight of 100 flower buds (23.73) was recorded in T8 Thiourea 0.5 %, whereas mean minimum weight of 100 flower buds (19.0) was noticed in T9 Control. In February, maximum mean weight of 100 flower buds (24.12) was observed in T8 Thiourea 0.5 %, whereas minimum mean weight of 100 flower buds (19.23) was obtained in T9 Control. In March, maximum mean weight of 100 flower buds (28.03) was registered in T8 Thiourea 0.5 %, whereas minimum (19.60) was noticed in T9 Control.

Flower yield per plant (g)

In January, maximum mean flower yield per plant (77.56) was recorded in T8 Thiourea 0.5 % significantly, whereas minimum mean flower yield per plant (16.67) was noticed in T9 Control. In February, maximum mean flower yield per plant (120.15) was registered in T8 Thiourea 0.5 %, whereas minimum mean flower yield per plant (15.96) was observed in T9 Control. In March, maximum mean flower yield per plant was documented (192.90) in T8 Thiourea 0.5 %, whereas minimum (35.93) was noticed in T9 Control.

Table.1 Effect of different chemicals on number of days taken for flower initiation in Jasmine (*Jasminum sambac* L.)

Treatments	Days
T1: Nitrobenzene 200 ppm	31.3
T2: Nitrobenzene 300 ppm	29.0
T3: Humic acid 0.25%	35.0
T4: Humic acid 0.5%	37.3
T5: Fulvic acid 0.25%	45.3
T6: Fulvic acid 0.5%	43.0
T7: Thiourea 0.25%	29.6
T8: Thiourea 0.5%	27.6
T9: Control (Water spray)	53.0
SEm+	**0.45**
CD	**1.37**

Table.2 Effect of different chemicals on flowering parameters of jasmine (*Jasminum sambac* L.)

Treatments	Number of flower buds per cyme			Number of cymes per plant			Number of flower buds per plant		
	Jan	Feb	March	Jan	Feb	March	Jan	Feb	March
T1: Nitrobenzene 200 ppm	4.3	4.6	4.6	44.6	62.6	121.6	209.33	217.66	568.06
T2: Nitrobenzene 300 ppm	4.3	4.3	5.0	53.0	86.3	124.6	229.66	374.00	623.33
T3: Humic acid 0.25%	3.3	3.6	3.6	35.3	47.6	83.0	116.00	158.33	303.33
T4: Humic acid 0.5%	3.6	3.6	4.0	53.3	55.0	89.0	194.33	201.00	356.00
T5: Fulvic acid 0.25%	3.0	3.3	3.0	26.6	35.6	72.0	80.00	107.00	218.00
T6: Fulvic acid 0.5%	3.6	3.6	3.6	28.6	39.0	76.0	184.00	142.66	277.60
T7: Thiourea 0.25%	4.3	4.6	5.0	55.0	88.6	131.6	239.00	384.33	658.30
T8: Thiourea 0.5%	5.0	5.0	5.0	65.3	104.0	137.6	326.66	520.00	688.30
T9: Control (Water spray)	2.6	3.0	3.3	33.3	31.3	55.6	87.66	83.00	185.00
SEm+	0.42	0.40	0.23	0.42	0.92	2.09	14.12	17.96	20.79
CD	0.91	0.87	0.70	0.91	2.79	6.33	42.78	54.32	62.87

Table.3 Effect of different chemicals on flower quality attributes in jasmine (*Jasminum sambac* L.)

Treatments	Length of corolla tube (mm)			Length of flower bud(mm)			Width of flower bud (mm)		
	Jan	Feb	March	Jan	Feb	March	Jan	Feb	March
T1: Nitrobenzene 200 ppm	10.60	12.00	12.18	21.16	21.38	22.63	8.27	8.34	9.15
T2: Nitrobenzene 300 ppm	10.70	12.30	12.50	21.36	21.79	22.48	8.39	8.56	9.21
T3: Humic acid 0.25%	11.35	11.36	11.53	21.16	21.31	21.33	7.59	7.90	8.72
T4: Humic acid 0.5%	11.75	11.60	11.69	21.16	21.40	21.80	7.80	8.10	8.89
T5: Fulvic acid 0.25%	10.63	11.23	11.80	20.29	20.30	20.90	7.49	7.79	8.41
T6: Fulvic acid 0.5%	10.75	11.27	11.83	20.49	20.80	21.33	7.60	7.81	8.40
T7: Thiourea 0.25%	13.10	12.63	13.20	22.12	22.22	22.43	8.68	8.79	9.20
T8: Thiourea 0.5%	13.20	13.00	13.30	22.36	22.56	22.53	8.76	8.79	9.62
T9: Control (Water spray)	10.36	10.43	10.59	19.90	20.06	20.90	7.40	7.62	7.93
SEm+	0.08	0.08	0.06	0.05	0.08	0.07	0.05	0.05	0.06
CD	0.26	0.24	0.18	0.15	0.24	0.23	0.15	0.17	0.20

Table.4 Effect of different chemicals on yield parameters in jasmine (*Jasminum sambac* L.)

Treatments	Weight of 100 flower buds (g)			Flower yield per plant (g)			Flower yield per month in plot (kg)			Flower yield for 3 months in plot (kg)
	Jan	Feb	March	Jan	Feb	March	Jan	Feb	March	
T1: Nitrobenzene 200 ppm	20.60	21.83	12.18	43.14	59.38	132.32	0.258	0.356	0.793	1.407
T2: Nitrobenzene 300 ppm	21.26	22.73	12.50	50.82	84.68	148.34	0.305	0.507	0.890	1.168
T3: Humic acid 0.25%	20.04	20.76	11.53	22.78	36.86	62.49	0.136	0.221	0.374	0.787
T4: Humic acid 0.5%	22.83	21.00	11.69	38.90	45.88	78.57	0.233	0.236	0.471	0.940
T5: Fulvic acid 0.25%	19.50	19.55	11.80	14.85	21.10	48.95	0.085	0.126	0.293	0.584
T6: Fulvic acid 0.5%	19.60	19.80	11.83	19.92	29.14	63.47	0.119	0.174	0.381	0.764
T7: Thiourea 0.25%	22.83	23.26	13.20	52.48	89.33	179.01	0.314	0.536	1.870	1.919
T8: Thiourea 0.5%	23.73	24.12	13.30	77.56	120.15	192.90	0.477	0.720	1.153	2.351
T9: Control (Water spray)	19.00	19.23	10.59	16.67	15.96	35.93	0.100	0.095	0.215	0.410
SEm+	0.13	0.28	0.06	9.23	13.51	13.88	0.020	0.028	0.028	0.28
CD	0.48	0.61	0.18	3.05	4.47	4.59	0.062	0.086	0.084	0.62

Flower yield per month in plot (kg)

In January, maximum mean flower yield per month in plot (0.477) was observed in T8 Thiourea 0.5 %, whereas minimum mean flower yield per month in plot (0.100) was noticed in T9 Control. In February, maximum mean flower yield per month in plot (0.720) was observed in T8 Thiourea 0.5 %, whereas minimum mean flower yield per month in plot (0.095) was recorded in T9 Control. In March, maximum mean flower yield per month in plot was registered (1.870) in T7 Thiourea 0.25 %, whereas minimum of (0.215) was noticed in T9 Control.

Flower yield for three months (kg)

The maximum mean flower yield (2.351) was observed in T8 Thiourea 0.5 % significantly, whereas minimum flower yield (0.410) was observed in T9 Control.

In the present study, thiourea foliar application after pruning resulted a positive effect in respect of flower quality and yield attributes. Garg *et al.,* (2005) reported that, the positive effects of thiourea seems to be mediated through enhanced photosynthetic efficiency besides more efficient carbohydrate and nitrogen metabolism. Similar, results were also reported by Nandhini *et al.,* (2018) in Jasmine.

From the above results, it was concluded that, the plants pruned during last week of September and application of Thiourea 0.5% as foliar spray in two intervals *i.e.*, 30 and 60 days after pruning recorded significant results for quality and yield parameters for Jasmine (*Jasminum sambac*) L. cv. Gundumalli during January to March.

References

Aziz, M. A. and Miah, M. A. M. 2009. Effect of "Flora" on the growth and yield of wetland rice. *J. Agric. Rural Dev*., 7: 9-13.

Garg, B., Burmin, U. and Kathju, S. 2005. Physical aspects of drought tolerance in cluster bean and strategies for yield improvement under arid conditions. *J Arid Legumes*. 2: 61-66.

Jutamanee, K., Krisanapook, K. and Phavaphutanon, L. 2009. Effect of chemical substances on inducing bud break and improve flower quality of jasmine (*Jasminum sambac* Ait) in cool season. *Journal of International Society for South East Asian Agricultural Sciences*., 15(1): 184-186.

Kalicharan. 2012. Studies on off - season production in moringa (Moringa oleifera L.) "PKM1". *M. Sc., (Hort.) Thesis*, Tamil Nadu Agricultural University, Coimbatore.

Kanthaswamy. 2006. Studies on phenology and floral biology in *Moringa oleifera*. *Inetrnat. J Agric. Sci*., 2(2): 341-343.

Mackowiak, C., Grossl, P. and Bugbee, B. 2001. Beneficial effects of humic acid on micro nutrient availability to wheat. *Soil Science Society American Journal*., 65: 1744-1750.

Mithila, D., Sajal, R. and Imamul, H. S. M. 2012. Effects of nitrobenzene on growth of tomato plants and accumulation of Arsenic. *Bangladesh. J. of Sci. and Res*., 25: 43-52.

Nandhini, C., Balasubramanian, P., Beaulah, A. and Amutha, R. 2018. Effect of physical and chemical interventions on flowering and quality parameters of jasmine (*Jasminum sambac* Ait.) Cv. Ramanathapuram Gundumalli during off season. *International Journal of Chemical Studies*., 6(4): 1653-1657.

Nijjar, G. and Rehali, A. 1977. Effect of nitrogen, potassium and phosphorus on the growth and flowering of rose cultivar Super Star. *Indian Journal of*

Horticulture.

Ratna kumar, P., Khan M. I. R., Minhas, P. S., Farooq, M.A., Sulthana, R., Per, T. S., Dekote, P. P., Khan, N. A. and Rane, J. 2016. Can plant bio-regulators minimize crop productivity losses caused by drought, heat and salinity stress. An integrated review. *J. Appl. Bot. Food Qual*., 89: 113-125.

Sainath, 2009. Influence of spacing, fertilizer and growth regulators on growth, seed yield and quality in annual chrysanthemum (*Chrysanthemum coronarium* L.). *M. Sc., (Agri.) Thesis*. University of Agricultural Sciences, Dharwad.

Schnitzer, M. 1992. Significance of soil organic matter in soil formation, transport processes in soils and in the formation of soil structure. *Soil Utilization and Soil Fertility*. Humus Budget., 206. 4: 63–81.

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