

Original Research Article

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## Year around Flowering Strategy for *Jasminum sambac* L.

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### ABSTRACT

#### Keywords

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The present research work entitled ‘Year around flowering strategy for *Jasminum sambac* L’ was carried out at Floriculture Research Farm, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari during 2017-18. It was conducted using various treatments including foliar application of stimulants like FeSO<sub>4</sub> (0.5 %), ZnSO<sub>4</sub> (0.5 %) and *Panchgavya* (1%) along with the tip pruning in the month of June. Among the vegetative parameters (*viz.*, plant height and leaf area) there was no significant difference was observed among various treatments. Whereas, in case of the flower quality (*viz.*, flower bud diameter, flower size fully open, flower bud size and weight of 100 flower buds) and yield parameters were significantly influenced by treatment T<sub>7</sub> – FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after pruning + tip pruning in June + FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after tip pruning.

### Introduction

Jasmine is a genus of shrubs and vines in the olive family oleaceae. It contains around 200 species native to tropical and warm regions of Eurasia, Australia and Oceania. Jasmines are widely cultivated for the characteristic fragrance of their flowers. Major species of jasmine are *Jasminum auriculatum* – Mullai, *Jasminum grandiflorum* - Jathimalli (or) Pitchi (or) Spanish jasmine, *Jasminum sambac* - Gundumalli / Malligai / Arabian

jasmine/Tuscan jasmine, *Jasminum pubescens* – Kakada. *Jasminum sambac*, commonly called Arabian jasmine, is probably native to India or Southeast Asia where it is a broad leaf evergreen shrub. *Jasminum sambac* produces good yield during the months starting from March to August. The remaining months are considered as off season. Hence, it is important to produce flowers year around to meet out the market demand of flowers. Pruning in jasmine helps to encourage growth of new healthy shoots which bears more

flowers than old branch. It also helps to maintain its shape and form. Flowering management in jasmine using pruning with application of stimulants is a practice that enables the scheduling of production for periods when the flower value is higher. The practice of tip pruning in productive branches prevents continuous vegetative growth and higher rate of flowering in axillary buds. Due to tip pruning there is reduction in the auxin content of the apices. It momentarily alters the direction of translocation of assimilates, allocating more assimilates towards stimulating the floral emission of the axillary buds of the branches in the flowering conditions and thus the fixation of inflorescence (Oliveira *et al.*, 2016). By introducing the various stimulants and pruning technique, it may be possible to induce round the year flowering and trying to fetch the better price in market.

## Materials and Methods

The present investigation 'Year around flowering strategy for *Jasminum sambac* L' was carried out at Floriculture Research Farm, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari during 2017-18. The experiment was laid out in Randomized Blocked Design with three replication and ten treatments *viz.* T<sub>1</sub> - Control, T<sub>2</sub> - FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after pruning, T<sub>3</sub> - *Panchgavya* (1%) twice after pruning, T<sub>4</sub> - Tip pruning in June, T<sub>5</sub> - FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after pruning + tip pruning in June, T<sub>6</sub> - *Panchgavya* 1 % twice after pruning + tip pruning in June, T<sub>7</sub> - FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after pruning + tip pruning in June + FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after tip pruning, T<sub>8</sub> - *Panchgavya* 1% twice after pruning + tip pruning in June + *Panchgavya* 1% twice after tip pruning, T<sub>9</sub> - FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after pruning + FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%)

twice after tip pruning, T<sub>10</sub> - *Panchgavya* 1% twice after pruning + *Panchgavya* 1% twice after tip pruning. The gross plot size of the experiment 4.8 x 4.8 m and net plot size was 2.4 x 2.4 m. The spacing was 1.2 x 1.2 m. Three four year old plants of *Jasminum sambac* L. were selected for experiment. Pruning was done at 50 cm height from the ground level in December, 2017 to get uniform height.

The preparation of solution was done as per the said concentration. First spray was done 7 days after pruning and then 2<sup>nd</sup> spray was done after 25 days of first spray with the help of knapsack sprayer. Whereas, the tip pruning was done in the first week of June and the third spray was done immediately after tip pruning in June and fourth spray was done after 25 days of third spray. Fresh stimulants solution was prepared at time of each spray and used immediately. Control plants were sprayed with water. All four plants were tagged for recording the observations and average value for each net plot was computed and recorded.

## Results and Discussion

### Vegetative parameters

Effect of different growth stimulants and tip pruning had non significant effect on vegetative growth parameters in jasmine as discussed below. The data showed that effect of various growth stimulants and tip pruning was found non significant regarding plant height and leaf area in jasmine.

### Flowering and Yield parameters

The application of various stimulants and tip pruning had significant effect on flower quality parameters in jasmine from the month of February to December. It is evident from the data that during February, June, July, September and November month, weight of

100 flower buds significantly influenced due to different treatments of stimulants and tip pruning while, in rest of the months it showed non significant effect. Plants treated with T<sub>7</sub> [FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after pruning + tip pruning in June + FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after tip pruning] gained maximum weight of 100 flower bud (33.94 g) in June month.

Plants treated with T<sub>7</sub> [FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after pruning + tip pruning in June + FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after tip pruning] gained maximum flower bud length consistently from Jan to May month. Moreover, flower bud diameter was found consistently higher in the plants treated treatment with T<sub>7</sub> [FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after pruning + tip pruning in June + FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after tip pruning] in the months of January to May. The increment in flower size might be due to the accelerated mobility of photosynthetic from the source to sink due to the readily available from the *panchgavya* which contains beneficial microorganisms, growth hormones and vital nutrients for plant

growth and quality flower.

The same treatment also resulted significant increase in length of flower bud (17.80 mm, 17.41 mm, 15.98 mm, 15.28 mm, 16.87 mm, 13.38 mm and 15.98 mm) as well as flower bud diameter (7.07 mm, 6.92 mm, 8.25 mm, 8.43 mm, 7.66 mm, 7.16 mm and 7.63 mm) during June to December months of experimentation. The proliferation in flowering attributes might be due to the beneficial role of zinc and iron. In plants, Zn is vital for growth, tolerance to stress and chlorophyll synthesis (Kawachi *et al.*, 2009; Lee *et al.*, 2010). It also plays an important role in a wide range of processes, such as growth hormone production and internodes elongation. Iron is a co factor for a large number of enzymes that catalyze several biochemical processes within the plant (Brittenham, 1994; Marschner, 1995). It plays a vital role in the chlorophyll formation, thylakoid synthesis, chloroplast development and functions in the respiratory enzymes. Moreover, iron serves in the transportation of energy in the plant (Miller *et al.*, 1995).

**Table.1** Effect of different stimulants and tip pruning on plant height (cm) in *Jasminum sambac* L.

Treatments	Plant height (cm)
T <sub>1</sub>	174.83
T <sub>2</sub>	177.58
T <sub>3</sub>	176.33
T <sub>4</sub>	174.91
T <sub>5</sub>	176.25
T <sub>6</sub>	177.75
T <sub>7</sub>	176.50
T <sub>8</sub>	179.75
T <sub>9</sub>	176.33
T <sub>10</sub>	177.42
S. Em.±	1.63
C. D. at 5 %	NS
C. V. %	1.60

**Table.2** Effect of different stimulants and tip pruning on leaf area (cm<sup>2</sup>) in *Jasminum sambac* L.

Treatment	Leaf Area (cm <sup>2</sup> ) (Monthwise)											
	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
T <sub>1</sub>	21.81	20.50	20.78	23.70	26.03	21.60	21.34	22.38	23.31	24.44	25.59	26.62
T <sub>2</sub>	22.33	23.92	21.62	25.67	26.31	22.95	22.64	23.12	24.28	24.68	26.73	27.77
T <sub>3</sub>	22.65	24.02	21.68	26.42	26.66	22.96	22.92	24.12	24.30	24.80	27.70	28.48
T <sub>4</sub>	22.10	22.91	21.15	24.95	26.21	22.21	22.43	23.10	23.86	24.61	26.26	27.14
T <sub>5</sub>	22.94	24.26	21.70	26.79	26.77	23.58	23.51	24.92	24.54	24.86	28.06	28.82
T <sub>6</sub>	23.51	24.28	22.04	27.06	26.78	24.47	23.73	24.95	24.60	25.00	28.06	29.52
T <sub>7</sub>	25.04	28.08	23.24	30.47	29.60	28.87	27.31	26.70	25.69	28.07	30.99	32.09
T <sub>8</sub>	24.49	25.67	23.13	27.87	28.53	25.60	26.91	26.55	24.94	25.40	29.64	30.93
T <sub>9</sub>	23.90	24.33	22.18	27.06	27.56	24.74	23.81	24.98	24.74	25.20	28.07	29.75
T <sub>10</sub>	23.97	25.39	23.08	27.39	27.89	25.51	24.52	25.55	24.77	25.39	29.01	26.62
S.Em.±	1.21	0.23	1.46	1.25	1.42	1.80	1.89	1.12	1.39	1.65	1.11	1.18
C.D. @ 5 %	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
C.V. %	8.99	1.42	10.23	8.10	9.01	12.88	13.69	7.87	9.84	11.33	6.88	6.98

**Table.3** Effect of different stimulants and tip pruning on 100 flower buds wt. (g) in *Jasminum sambac* L.

Treatment	100 flower buds wt. (g) (Monthwise)											
	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Feb
T <sub>1</sub>	21.59	26.71	27.31	28.13	26.51	22.56	26.62	27.63	28.33	25.77	25.79	21.59
T <sub>2</sub>	22.69	27.61	29.20	29.40	30.94	27.69	27.77	28.82	29.09	29.66	28.00	22.69
T <sub>3</sub>	22.75	28.2	30.93	30.97	31.41	28.59	28.48	29.66	30.20	30.40	28.08	22.75
T <sub>4</sub>	21.72	27.48	27.72	29.16	28.60	25.72	27.14	28.32	28.48	26.96	26.98	21.72
T <sub>5</sub>	23.75	28.33	31.02	30.99	31.64	28.83	28.82	30.53	30.29	30.63	28.77	23.75
T <sub>6</sub>	23.88	28.54	31.31	31.87	32.31	29.81	29.52	30.92	30.58	31.67	29.32	23.88
T <sub>7</sub>	25.07	29.85	32.35	33.78	33.94	30.79	32.09	33.18	31.62	33.80	30.89	25.07
T <sub>8</sub>	24.29	29.66	32.21	32.99	33.59	30.56	30.93	32.15	31.48	32.51	30.01	24.29
T <sub>9</sub>	23.92	28.68	31.77	32.01	32.92	29.93	29.75	31.81	30.98	31.84	29.55	23.92
T <sub>10</sub>	24.29	28.82	32.01	32.07	33.56	30.00	30.69	32.14	31.04	32.15	29.69	24.29
S.Em.±	1	1.43	1.31	1.25	1.14	1.45	1.18	0.73	1.19	1.66	1.52	1
C.D. @ 5 %	2.97	4.26	3.88	3.70	3.38	4.29	3.49	2.18	NS	4.62	4.52	2.97
C.V. %	7.39	8.75	7.40	6.93	6.25	8.80	6.98	4.17	6.83	8.82	9.18	7.39

**Table.4** Effect of different stimulants and tip pruning on Flower bud diameter (mm) in *Jasminum sambac* L.

Treatment	Flower bud diameter (mm) (Monthwise)											
	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
T <sub>1</sub>	5.01	5.33	5.47	5.32	4.81	4.62	5.86	5.88	4.61	4.80	5.25	5.01
T <sub>2</sub>	5.88	5.79	7.14	6.13	5.24	5.14	7.21	7.10	5.81	6.39	6.59	5.88
T <sub>3</sub>	5.90	5.82	7.38	6.43	5.26	5.30	7.28	7.36	5.97	6.40	6.66	5.90
T <sub>4</sub>	5.78	5.73	5.75	5.49	5.05	4.85	5.95	5.92	5.39	5.59	5.33	5.78
T <sub>5</sub>	6.08	5.86	7.39	6.82	5.37	5.40	7.48	7.64	6.04	6.48	6.86	6.08
T <sub>6</sub>	6.09	5.93	7.62	6.85	6.12	5.67	7.57	7.69	6.24	6.64	6.95	6.09
T <sub>7</sub>	7.84	7.36	8.76	8.00	7.07	6.92	8.25	8.43	7.66	7.16	7.63	7.84
T <sub>8</sub>	6.53	6.22	8.29	7.23	6.18	6.11	8.20	8.40	6.63	7.11	7.59	6.53
T <sub>9</sub>	6.11	6.01	7.66	6.89	6.12	5.76	7.67	7.86	6.44	6.78	7.06	6.11
T <sub>10</sub>	6.51	6.03	7.75	7.02	6.16	5.80	7.70	8.09	6.51	7.04	7.09	6.51
S.Em.±	0.40	0.24	0.32	0.41	0.31	0.23	0.25	0.18	0.32	0.28	0.25	0.40
C.D. @ 5 %	1.19	0.72	0.96	1.21	0.93	0.67	0.75	0.54	0.94	0.84	0.75	1.19
C.V. %	11.26	6.94	7.64	10.67	9.42	7.05	5.95	4.23	8.99	7.62	6.50	11.26

**Table.5** Effect of different stimulants and tip pruning on Flower Bud length (mm) in *Jasminum sambac* L.

Treatment	Flower Bud length (mm) (Monthwise)											
	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
T <sub>1</sub>	10.75	10.72	13.34	13.36	12.91	12.69	10.55	10.71	12.51	9.74	11.09	10.75
T <sub>2</sub>	12.83	11.67	14.21	15.21	15.53	14.32	12.57	12.18	14.12	11.92	13.71	12.83
T <sub>3</sub>	12.97	11.84	14.61	15.21	15.73	14.63	12.70	12.30	14.36	12.05	13.91	12.97
T <sub>4</sub>	11.86	11.36	14.08	14.97	15.19	14.30	12.47	10.94	14.11	11.80	13.37	11.86
T <sub>5</sub>	13.03	11.88	14.86	16.21	15.87	14.64	12.85	12.36	14.46	12.75	14.05	13.03
T <sub>6</sub>	13.05	11.93	15.03	16.36	15.92	14.84	13.11	12.58	15.36	12.79	14.11	13.05
T <sub>7</sub>	16.99	16.33	17.60	17.91	17.80	17.41	15.98	15.28	16.87	13.38	15.98	16.99
T <sub>8</sub>	13.54	12.11	16.11	16.53	16.64	15.48	13.40	14.07	16.72	13.25	14.82	13.54
T <sub>9</sub>	13.32	11.94	15.31	16.51	16.02	14.92	13.18	12.74	15.82	12.81	14.20	13.32
T <sub>10</sub>	13.53	11.95	15.81	16.52	16.63	15.20	13.26	13.09	16.07	13.12	14.81	13.53
S.Em.±	0.98	0.63	0.65	0.61	0.54	0.55	0.83	0.56	0.57	0.51	0.54	0.98
C.D. @ 5 %	2.91	1.87	1.92	0.80	1.62	1.63	2.46	1.67	1.69	1.51	1.62	2.91
C.V. %	12.89	8.96	7.41	6.61	5.96	6.40	11.01	7.73	6.56	7.13	6.73	12.89

**Table.6** Effect of different stimulants and tip pruning on size of fully open flower (cm) in *Jasminum sambac* L.

Treatment	Flower Size (mm) (Monthwise)											
	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
T <sub>1</sub>	1.80	1.91	2.02	2.00	1.96	2.08	2.17	2.10	2.06	1.62	1.80	1.80
T <sub>2</sub>	2.23	2.12	2.31	2.26	2.35	2.29	2.63	2.46	2.29	2.22	2.23	2.23
T <sub>3</sub>	2.23	2.27	2.37	2.36	2.40	2.38	2.70	2.49	2.35	2.26	2.23	2.23
T <sub>4</sub>	2.20	2.07	2.02	2.04	2.25	2.15	2.36	2.43	2.25	2.06	2.20	2.20
T <sub>5</sub>	2.24	2.35	2.39	2.44	2.40	2.41	2.70	2.56	2.39	2.31	2.24	2.24
T <sub>6</sub>	2.28	2.44	2.44	2.51	2.40	2.46	2.75	2.57	2.41	2.31	2.28	2.28
T <sub>7</sub>	2.65	2.97	2.90	2.75	2.74	2.60	3.06	2.78	2.87	2.59	2.65	2.65
T <sub>8</sub>	2.63	2.71	2.73	2.59	2.56	2.60	2.93	2.66	2.59	2.38	2.63	2.63
T <sub>9</sub>	2.46	2.56	2.44	2.53	2.45	2.46	2.83	2.61	2.41	2.33	2.46	2.46
T <sub>10</sub>	2.50	2.65	2.46	2.57	2.53	2.58	2.86	2.62	2.44	2.34	2.50	2.50
S.Em.±	0.14	0.13	0.14	0.09	0.12	0.11	0.16	0.10	0.13	0.14	0.14	0.14
C.D. @ 5 %	0.41	0.40	0.42	0.27	0.34	0.34	0.47	0.29	0.40	0.43	0.41	0.41
CV %	10.20	9.6	10.25	6.59	8.31	8.23	10.26	10.65	9.67	11.07	10.20	10.20

**Table.7** Effect of different stimulants and tip pruning on Flower yield (g) in *Jasminum sambac* L.

Treatment	Flower yield (g) (Monthwise)											
	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
T <sub>1</sub>	10.75	576.10	1312.30	1055.80	688.17	230.73	83.80	43.60	36.27	12.29	3.50	10.75
T <sub>2</sub>	23.16	775.80	1548.03	921.83	307.47	254.97	76.63	55.50	39.80	20.13	10.73	23.16
T <sub>3</sub>	26.64	787.50	1543.10	1094.90	254.73	281.27	78.50	72.73	49.47	31.37	16.10	26.64
T <sub>4</sub>	18.53	666.60	1402.37	1067.40	97.00	119.00	304.27	243.77	105.90	40.70	23.27	18.53
T <sub>5</sub>	23.05	776.10	1568.47	903.67	101.83	174.00	329.83	246.20	202.23	69.93	28.17	23.05
T <sub>6</sub>	27.66	781.03	1554.82	906.15	99.83	185.87	341.10	269.67	219.37	76.00	32.17	27.66
T <sub>7</sub>	25.66	808.83	1604.03	930.83	138.70	355.47	439.90	290.00	204.23	88.47	42.53	25.66
T <sub>8</sub>	28.64	792.90	1524.80	921.53	114.93	334.73	409.33	271.23	180.43	70.43	34.60	28.64
T <sub>9</sub>	25.37	788.20	1579.23	907.37	641.30	247.73	168.87	89.10	69.83	55.63	18.33	25.37
T <sub>10</sub>	28.54	794.37	1544.37	900.23	673.53	288.03	192.27	98.97	74.40	58.30	19.67	28.54
S.Em.±	0.97	40.94	57.24	58.97	42.69	21.53	17.26	12.54	6.27	3.69	1.55	0.97
C.D. @ 5 %	2.89	121.64	170.08	175.22	126.83	63.96	51.29	37.25	18.64	10.96	4.60	2.89
CV %	7.08	9.40	6.53	10.63	23.72	15.08	12.33	12.92	9.19	12.22	11.71	7.08

**Table.8** Effect of different stimulants and tip pruning on Flower yield (kg/ha) in *Jasminum sambac* L.

Trt.	Flower yield (kg/ha) (Monthwise)										
	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
T <sub>1</sub>	18.67	1000.2	2278.48	1833.13	1194.8	400.61	145.49	75.7	62.96	21.34	6.076
T <sub>2</sub>	40.21	1346.9	2687.77	1860.97	533.83	442.68	133.05	96.361	69.10	34.95	18.63
T <sub>3</sub>	46.25	1367.2	2679.20	1901.02	442.28	488.34	136.29	126.28	85.88	54.46	27.95
T <sub>4</sub>	32.16	1157.3	2434.85	1853.27	168.41	206.61	528.28	423.23	183.86	70.66	40.39
T <sub>5</sub>	40.02	1347.5	2723.25	1545.84	176.80	302.10	572.67	427.46	351.12	121.4	48.90
T <sub>6</sub>	48.02	1356.0	2699.55	1573.30	173.33	322.71	592.23	468.20	380.87	131.9	55.84
T <sub>7</sub>	44.55	1404.3	2785	1674.03	240.81	617.17	763.77	503.51	354.60	153.6	73.84
T <sub>8</sub>	49.72	1376.6	2647.43	1600.01	199.55	581.18	710.70	470.92	313.27	122.2	60.07
T <sub>9</sub>	44.04	1368.5	2741.94	1505.96	1113.4	430.12	293.19	154.69	121.24	96.59	31.83
T <sub>10</sub>	49.55	1379.2	2681.40	1476.21	1169.4	500.09	333.82	171.83	129.17	101.2	34.14
S.Em. ±	0.17	71.1	99.4	112.7	74.1	37.4	30	21.8	10.89	6.40	2.69
CD at 5 %	5	211.2	295.3	334.9	220.2	111	89.1	64.7	32.35	19.03	7.99
CV %	7.06	9.39	6.53	11.60	23.71	15.08	12.33	12.91	9.19	12.21	11.71

**Table.9** Effect of different stimulants and tip pruning on plant height (cm) in *Jasminum sambac* L.

Treatments	Plant height at the end (cm)
T1	174.83
T2	177.58
T3	176.33
T4	174.92
T5	176.25
T6	177.75
T7	176.50
T8	179.75
T9	176.33
T10	177.42
S.Em.±	1.63
CD @ 5 %	NS
CV %	1.6

**Table.10** Effect of stimulants and tip pruning on economics of *Jasminum sambac* L.

Treatments	Yield(kg/ha)	Gross income (Rs./ha)	Gross expenditure (Rs./ha)	Net income (Rs./ha)	BCR
T <sub>1</sub>	6547.486	523798.8	148419	375379.8	2.53
T <sub>2</sub>	7455.407	596432.5	161219	435213.5	2.70
T <sub>3</sub>	7164.449	573155.9	151235	421920.9	2.79
T <sub>4</sub>	6898.165	551853.2	151919	399934.1	2.63
T <sub>5</sub>	7771.412	621712.9	164719	456993.9	2.77
T <sub>6</sub>	7629.951	610396.1	164719	455661.0	2.94
T <sub>7</sub>	8394.712	671577	175519	496058.0	2.83
T <sub>8</sub>	8144.038	651936.8	155551	496385.8	3.19
T <sub>9</sub>	8060.434	644834.7	172019	472815.7	2.75
T <sub>10</sub>	7809.42	624753.6	152051	472702.5	3.11

**Plate.1** General view of the Experiment





**Plate.2** Pruning at 50 cm height, application of stimulants in and tip pruning at 10 cm jasmine



Plate.3

T<sub>7</sub>- 0.5 % FeSO<sub>4</sub> + 0.5 % ZnSO<sub>4</sub>



T<sub>1</sub>- Control



T<sub>7</sub>- 0.5 % FeSO<sub>4</sub> + 0.5 % ZnSO<sub>4</sub>



T<sub>1</sub>- Control



In the months of Jan, Feb, March, April and May largest fully open flower (2.65 cm, 2.97 cm, 2.90 cm, 2.75cm and 2.74 cm) was observed in treatment T<sub>7</sub> [FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after pruning + tip

pruning in June + FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after tip pruning]], respectively.

The result is in close conformity with the finding of Sendhilnathan *et al.*, (2017) in

jasmine. Increase in flower size also might be due to the beneficial role of zinc and iron in enhancing the translocation of carbohydrates, minerals, water and amino acid from the site of synthesis to the storage tissue especially on flowers which increase the size of flowers.

These results are in agreement with the earlier findings of Bhoomi *et al.*, (2018) in jasmine, Karuppaiah (2014) and Neha *et al.*, (2016) in chrysanthemum. During June to December months significantly largest fully open flower (2.51cm, 2.74 cm, 2.60 cm, 3.06 cm, 2.78 cm, 2.87 cm, 2.59 cm and 2.65 cm, respectively) was obtained from the plants treated with treatment T<sub>7</sub> [FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after pruning + tip pruning in June + FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after tip pruning].

It is clear from the data that significantly maximum flower bud yield per plot (1604.03 g and 930.8g) was obtained from the plants treated with treatment T<sub>7</sub> [FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after pruning] during the month of March and April respectively.

Plants treated with treatment T<sub>7</sub> [FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after pruning + tip pruning in June + FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after tip pruning] recorded significantly maximum weight of 100 flower buds (33.94 g, 30.79 g, 33.18 g and 33.80 g) in the months of June, July, September and November, respectively. While It might be due to application of zinc and iron not only relieved the chlorosis and produced healthy green plants but also increased the synthesis of chlorophyll, growth promoting substances and mobility of minerals, water, photosynthates and amino acids from the source to sink might have increased flower production and ultimately flower yield. In May month, non significant result was found due to various treatments of stimulants.

During June month, significantly highest flower bud yield per plot (646.94 g) was achieved from plants without any stimulant and pruning treatment (T<sub>1</sub> – Control). This might be due to the unpruned plants. In the months of July, August and September, significant increase in flower bud yield per plot (355.46 g, 413.23 g and 256.67 g, respectively) was noted in plants treated with treatment T<sub>7</sub> [FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after pruning + tip pruning in June + FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after tip pruning]. The increase in yield may be due to the micronutrients as iron (Fe) and zinc (Zn) are the trace elements that play essential role in plant growth and increasing crop yields. Zinc favours the storage of more carbohydrates through photosynthesis and iron involves in synthesis of plant hormones and also plays an important role in chlorophyll synthesis, photosynthesis and respiration. This may be the attributing factor for the positive effectiveness of optimum dose of zinc and iron on reducing juvenile phase of the plant. Similar results are also obtained by Bhoomi *et al.*, (2018). Furthermore, the positive response to tip pruning might be due to an optimum balance between the vegetative and reproductive growth of plant. Lightly pruned plants can efficiently supply auxin which has resulted in higher yield in Guava (Prasanna *et al.*, 2018). During October and November, significantly maximum flower bud yield per plot (219.37 g and 76.00 g) was resulted from plants treated with treatment T<sub>5</sub> [FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after pruning + tip pruning in June]. Whereas, plants treated with treatment T<sub>7</sub> [FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after pruning + tip pruning in June + FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after tip pruning] produced highest bud yield per plot (35.86 g) in December. This enhancement in yield might be due to micronutrients as iron (Fe) and zinc (Zn) are the trace elements that play essential role in plant growth and increasing crop yields.

Moreover, they improve plant nutrition and increase soil productivity (Marschner, 1995). It is also resulted by Davenport (2006) that the pruning of the tips of branches stimulates the cycles of branching of lateral shoots and removes structures that inhibit reproductive budding originating from the previous productive cycle.

Application of FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after pruning + tip pruning in June + FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after tip pruning (T<sub>7</sub>) to jasmine produced significantly maximum total flower bud yield (4.83 kg per plot and 8.39 t per ha).

### Economics

Different investigated stimulants treatment combinations studied in the present investigation were observed to influence profoundly net income and benefit: cost ratio. Maximum benefit: cost ratio (3.19) was obtained from treatment T<sub>8</sub> (*Panchgavya* 1% twice after pruning + tip pruning in June + *Panchgavya* 1% twice after tip pruning).

Based on the findings of present investigation, it can be concluded that foliar application of FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after pruning (1<sup>st</sup> spray at 7<sup>th</sup> day after pruning and 2<sup>nd</sup> spray at 25<sup>th</sup> day after pruning + tip pruning in June + FeSO<sub>4</sub> (0.5%) + ZnSO<sub>4</sub> (0.5%) twice after tip pruning (1<sup>st</sup> spray immediately after tip pruning and 2<sup>nd</sup> spray at 25<sup>th</sup> day after tip pruning) found beneficial to induce year round production of marketable flower buds.

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