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Influence of pruning time and pruning height on growth and flowering of Winter Jasmine (*Jasminum multiflorum* [Burm. f.] Andr.)

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Abstract

An investigation was carried out during 2019-2020 at the Department of Floriculture and Landscape Architecture, Tamil Nadu Agricultural University, Coimbatore to study the effect of pruning time and pruning height on growth and flowering of *Jasminum multiflorum*. Pruning back of three year old plants was done to a height of 45 cm or 60 cm from the ground level at monthly intervals from August to March. The study led to the inference that pruning to 60 cm height during the last week of September resulted in the maximum plant height (148.80 cm) at flowering (90 DAP), pruning during last week of February resulted in the maximum number of primary branches (25.34) and pruning during the last week of November resulted in the maximum number of secondary branches (176.27). The peak flower yield (350.28 g/plant/month) was recorded during December and this is the characteristic feature of *J. multiflorum* due to which it is rightly called as the 'Winter jasmine'. The total flower yield during winter (Nov–Feb) was highest (350.28 g/plant) in the plants pruned to 60 cm height during the last week of September.

This study led to the inference that the ideal pruning season is September and the ideal pruning height is 60 cm from ground level for *J. multiflorum* to obtain high flower bud yield during winter (Nov–Feb). This will enable availability of flowers of *J. multiflorum* during the off-season of the three commercially cultivated jasmine species namely, *J. sambac*, *J. grandiflorum* and *J. auriculatum*.

Keywords: *Jasminum multiflorum*, pruning, growth, flowering

1. Introduction

Jasmine is one of the important flowers grown from very ancient period in India. It is popular for its attractiveness, colour and fragrance and holds a place of pride and passion in the heart of every Indian woman. India exports fresh jasmine flowers to the neighboring countries including Sri Lanka, Singapore, Malaysia and the Gulf countries and in recent times even to the United States. Jasmine flower crop is grown on commercial scale throughout India, but extensively in Tamil Nadu which is the leading producer of jasmine in the country with an annual production of 1,36,901 tonnes from an area of 13,246 ha with a productivity of 11.21 t/ha (Hort Tech, 2018) [3].

Among the *Jasminum* species, only three major cultivated species namely, *Jasminum sambac*, *J. grandiflorum* and *J. auriculatum* have attained commercial importance (Green and Miller, 2009). However, the lack of flowering during the cooler months which coincide with October-February is the major drawback in these commercial species (Krishnamoorthy, 2014) [5]. The peak flowering period for these species is restricted to March till September, i.e. 7 to 8 months in a year. Hence, there is no continuous and uniform supply of flowers of the above three jasmine species to the market, especially during the winter months Nov - Feb. However, there is a constant demand for fresh jasmine flowers all-round the year.

J. multiflorum is native to South Asia and is commonly known as Indian jasmine, Winter jasmine and Downy jasmine. It has year-round flowering habit and profusely flowers during the winter months (Raman *et al.*, 1969 and Ganga *et al.*, 2015). The present study was undertaken to assess the influence of pruning time and pruning height on the growth and flowering of *J. multiflorum*.

2. Materials and methods

A field experiment was conducted at the Department of Floriculture and Landscape Architecture, Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu during the year 2019-2020.

The experiment was laid out in Factorial Randomized Block Design (FRBD) with varying pruning height and pruning time in three year old plants of an improved culture of *J. multiflorum* (Acc.Jm-1), which is presently under Adaptive Research Trial (ART) and Multi-location Trial (MLT). The study involved two levels (height) of pruning namely 45 cm and 60 cm from the ground level at monthly intervals from August to March.

The pruned plants were observed for vegetative growth parameters namely, plant height, number of primary and secondary branches, flower yield and flower quality parameters viz., length of flower bud, length of corolla tube and weight of hundred flower bud weight. Five randomly selected plants were tagged per replication in each treatment and observations were recorded. Statistical analysis was done following the method of Panse and Sukhatme (1978) [11].

3. Results and Discussion

3.1 Influence of pruning on plant vegetative growth characters of *J. multiflorum*

The data (Table 1) revealed that the effect of month of pruning and pruning height on the growth parameters viz., plant height at flowering, number of primary branches and number of secondary branches was significant. The plants

pruned to 60 cm height from the ground level in the month of September recorded the maximum plant height (148.80cm) and number of primary branches (25.34) during the month of last week of February and more number of secondary branches per plant (176.27) was observed in 45cm of pruning height during the month of last week of November. This may be due to fact that the maximum temperature during September month is 30.4 °C and day length is about 11.5 hours and this might have favoured the growth and flowering. According to Leonhardt and Teves (2002), Rai (1984) and Pal and Krishnamurthi (1967), jasmine needs maximum temperature of 30 °C, long days and cumulative heat for favourable growth and flower induction.

Stunted growth was observed in the plants pruned during October and this might be due to the shorter day lengths and drastic reduction in the mean temperatures during the season, which is in agreement with the findings of Kalaimani (2017) [6], Sujatha *et al.* (2009) [13] and Jennoah (2012) [4] in *J. sambac*. Pruning during last week of November resulted in the minimum plant height at flowering (48.9 cm). This might be due to the effect of weather conditions with low heat units leading to low photosynthesis and restricted cell enlargement. This finding is in consonance with the observation of Kumaresan (2016) [7] and Chaitanya (2013) [2] in *J. sambac*.

Table 1: Effect of pruning time and pruning height on plant height (cm) of *J. multiflorum* (Winter Jasmine)

Factors	Plant height (cm)											
	30 th DAP*				60 th DAP				90 th DAP (Commencement of Harvest)			
Pruning height\Pruning time	PH ₁ (45cm)	PH ₂ (60cm)	Control	Mean	PH ₁ (45cm)	PH ₂ (60cm)	Control	Mean	PH ₁ (45cm)	PH ₂ (60cm)	Control	Mean
PT ₁ - Last week of Aug	56.05	72.50	89.60	72.72	71.00	88.65	94.70	84.78	90.85	97.65	102.50	97.00
PT ₂ - Last week of Sep	78.65	98.05	92.50	89.73	112.85	124.1	109.40	115.47	137.6	148.80	129.60	138.68
PT ₃ - Last week of Oct	75.15	96.00	88.60	86.58	104.15	119.2	102.50	108.63	130.2	139.80	128.90	132.98
PT ₄ - Last week of Nov	67.05	92.15	90.80	83.33	96.25	112.1	109.20	105.87	121.1	129.65	121.50	124.10
PT ₅ - Last week of Dec	60.80	77.65	82.70	73.72	77.20	93.85	98.60	89.88	97.35	110.00	112.70	106.68
PT ₆ - Last week of Jan	64.15	86.10	97.50	82.58	85.15	102.5	108.50	98.72	105.1	124.65	129.50	119.77
PT ₇ - Last week of Feb	54.15	91.00	87.50	77.55	94.65	118.2	102.60	105.15	134.5	119.70	130.70	128.30
PT ₈ - Last week of Mar	59.00	72.95	74.80	68.92	72.15	88.90	90.50	83.85	92.10	101.05	103.40	98.85
Mean	64.38	85.80	88.00	79.39	89.18	105.9	102.00	99.04	113.6	121.41	119.85	118.30
	PT	PH	PTxPH		PT	PH	PTxPH		PT	PH	PTxPH	
SEd	0.2463	0.1508	0.4267		0.2205	0.1350	0.3819		0.2071	0.1268	0.3587	
Cd P(0.05)	0.5097	0.3121	0.8828		0.4561	0.2793	0.7901		0.4284	0.2623	0.7420	

*DAP - Days after Pruning

*PT - Pruning Time

*PH - Pruning Height

Table 2: Effect of pruning time and pruning height on number of primary branches of *J. multiflorum* (Winter Jasmine)

Factors	Number of primary branches/plant											
	30 th DAP				60 th DAP				90 th DAP (Commencement of Harvest)			
Pruning height\Pruning time	PH ₁ (45cm)	PH ₂ (60cm)	Control	Mean	PH ₁ (45cm)	PH ₂ (60cm)	Control	Mean	PH ₁ (45cm)	PH ₂ (60cm)	Control	Mean
PT ₁ - Last week of Aug	10.43	12.23	9.54	10.45	12.53	13.85	12.01	12.12	14.77	15.31	14.25	14.26
PT ₂ - Last week of Sep	12.67	13.65	11.78	15.65	13.87	14.65	12.25	19.85	14.73	16.82	14.65	23.25
PT ₃ - Last week of Oct	13.56	12.65	11.82	16.78	16.91	15.84	14.05	19.66	20.32	19.28	17.31	22.12
PT ₄ - Last week of Nov	6.58	10.87	8.42	14.35	7.63	11.63	9.56	17.45	11.11	15.64	13.88	20.89
PT ₅ - Last week of Dec	14.35	16.98	16.34	12.38	19.35	19.22	20.88	13.35	24.87	24.46	20.98	15.87
PT ₆ - Last week of Jan	13.57	17.32	17.95	12.17	16.97	22.01	19.75	15.94	21.38	25.07	21.25	19.65
PT ₇ - Last week of Feb	11.9	18.32	14.75	8.18	14.55	22.32	15.87	9.35	18.39	25.34	17.65	13.79
PT ₈ - Last week of Mar	11.8	14.98	17.38	14.95	13.85	16.54	20.45	16.41	17.31	20.58	21.32	19.32
Mean	11.78	14.87	13.54	13.51	14.33	17.73	15.84	15.31	17.58	20.21	17.87	18.19
	PT	PH	PTxPH		PT	PH	PTxPH		PT	PH	PTxPH	
SEd	0.3977	0.2435	0.6889		0.9624	0.5893	1.6670		0.517	0.3169	0.89635	
Cd P(0.05)	0.8228	0.5038	1.4251		1.9910	1.2192	3.4485		1.070	0.6555	1.8542	

Table 3: Effect of pruning time and pruning height on number of secondary branches of *J. multiflorum* (Winter Jasmine)

Factors	Number of secondary branches/plant											
	30 th DAP				60 th DAP				90 th DAP (Commencement of Harvest)			
Pruning height\Pruning time	PH ₁ (45cm)	PH ₂ (60cm)	Control	Mean	PH ₁ (45cm)	PH ₂ (60cm)	Control	Mean	PH ₁ (45cm)	PH ₂ (60cm)	Control	Mean
PT ₁ -Last week of Aug	76.23	70.44	82.4	76.75	95.75	85.79	109.35	96.57	119.67	108.89	131.55	119.33
PT ₂ - Last week of Sep	88.98	80.35	97.45	112.23	102.26	106.98	120.34	132.35	145.54	132.45	145.65	155.37
PT ₃ -Last week of Oct	102.46	107.61	97.78	100.56	135.89	139.22	134.98	128.68	154.35	168.12	178.38	155.96
PT ₄ -Last week of Nov	107.35	113.49	102.62	101.32	152.48	134.58	128.24	128.24	176.27	164.13	152.36	152.25
PT ₅ - Last week of Dec	115.75	113.45	109.35	88.64	130.82	134.48	131.68	109.14	146.15	160.37	158.14	141.77
PT ₆ - Last week of Jan	101.39	102.98	98.98	102.46	138.34	127.26	118.57	136.35	164.27	157.33	143.34	167.95
PT ₇ - Last week of Feb	99.46	98.15	105.98	107.49	134.45	121.15	129.49	138.68	157.37	151.27	148.89	164.91
PT ₈ - Last week of Mar	95.31	99.18	101.45	98.19	118.79	131.48	122.16	124.57	149.39	144.72	147.33	147.88
Mean	98.79	98.95	99.32	98.15	126.64	122.67	124.34	124.15	151.57	148.94	150.25	150.23
	PT	PH	PTxPH		PT	PH	PTxPH		PT	PH	PTxPH	
SEd	0.6480	0.39686	1.1224		0.5770	0.3533	0.995		0.5887	0.3605	1.0197	
Cd P(0.05)	1.3406	0.82096	2.3220		1.1938	0.7310	2.0677		1.2179	0.7458	2.1094	

3.2 Influence of pruning on flowering and yield parameters of *J. multiflorum*

The effect of pruning time and pruning height on flower yield per plant was found to be significant and the data are presented in Table 4.

Among the treatments, the highest flower yield (350.28 g/plant) was observed at 60 cm of pruning height during December (when plants pruned in last week of August). In December the plants are exposed to low temperature of 25.4 °C and short days which leads for profuse flowering in *J.*

multiflorum.

Maximum number of branches might have ultimately resulted in increased yield of flower buds. Flower yield is dependent on the number of flowering branches. Production of more amount of foliage in September pruned plants might have resulted in increased photosynthesis and ultimately large reserve food source leading to production of more number of flowers as reported by Kumaresan, (2016) [7], Chaitanya, (2013) [2] Sujatha *et al.* (2009) [13] and Jennoah, (2012) [4] in *Jasminum sambac*.

Table 6: Effect of pruning time and pruning height on flower yield of *J. multiflorum* (Winter Jasmine)

Treatment	Flower yield during winter [Nov-Feb] (g/plant)								Total yield during winter [Nov-Feb] (g/plant)	
	Nov		Dec		Jan		Feb		45cm	60cm
	45cm	60cm	45cm	60cm	45cm	60cm	45cm	60cm		
PT ₁ -Last week of Aug	306.32	312.35	333.87	348.87	313.86	339.62	287.07	312.31	1241.2	1313.1
PT ₂ - Last week of Sep	3.89	5.86	327.78	350.28	245.09	283.3	217.91	241.55	749.67	880.99
PT ₃ -Last week of Oct	1.76	3.57	305.74	339.62	297.65	347.05	267.35	325.61	872.5	1009.8
PT ₄ -Last week of Nov	0.00	0.00	0.00	0.00	6.98	8.76	317.86	339.62	324.84	348.38
Mean	263.17	283.46	259.83	268.82	289.64	256.55	245.84	298.21	797.25	888.06
	PT	PH	PTxPH	PT	PH	PTxPH	PT	PH	PTxPH	
SEd	0.273	0.167	0.472	0.378	0.291	0.421	0.254	0.526	0.262	
CD P(0.05)	0.564	0.345	0.977	0.326	0.461	0.542	0.552	0.598	0.226	

4. Conclusion

The present study led to the inference that the ideal pruning season is September and the ideal pruning height is 60 cm from ground level for *J. multiflorum* to obtain high flower bud yield during winter (Nov–Feb). This will enable availability of flowers of *J. multiflorum* during the off-season of the three commercially cultivated jasmine species namely, *J. sambac*, *J. grandiflorum* and *J. auriculatum*.

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