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EFFECT OF DIFFERENT LEVELS OF PRUNING ALONG WITH NPK ON GROWTH AND YIELD OF NERIUM (*NERIUM OLEANDER L.*)

Vijai ananth. A and S.Rameshkumar

Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalai Nagar (Tamilnadu), India

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ABSTRACT

Field investigation was carried out at the floriculture complex in the Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalai Nagar, Tamil Nadu during the year 2010-2011 to study the effect of different levels of pruning along with NPK on growth and flowering of *Nerium oleander*. The experiment was laid out in Factorial Randomized Block Design with two factors, twelve treatments replicated thrice. The experiment was conducted by using three levels of pruning height viz., P₁-60, P₂-90 and P₃-120cm along with three different levels of inorganic fertilizer viz., NPK @ 90:160:160g/plant, 120:240:240g/plant, 150:300:300g/plant and without inorganic fertilizer. Three year old plants of *Nerium* cv. 'Pink Double' already existing in the field planted at a spacing of 1m × 1m was used for the present study. The healthy plants were pruned at a height of 60, 90 and 120 cm and the fertilizers were applied as per treatments. The observations on growth parameters viz., Plant height, number of branches, number of leaves, internodal length, fresh weight and dry weight and yield parameters viz., Days to first flowering, number of flowers, flower diameter, single flower weight, and flower yield were recorded. The study revealed that pruning at 90cm and NPK @ 120:240:240 g/plant increased the number of leaves, number of branches fresh weight dry weight and yield attributing characters.

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INTRODUCTION

Nerium is an evergreen shrub species belongs to Apocynaceae family native to Northern Africa and the Mediterranean region, widely planted as an ornamental in warm temperature and Sub tropical region as a result of its abundant and long lasting flowering habit and its heat, salinity and drought tolerance. *Nerium* flowers are commonly used for worship in home and temples. Several varieties have become very popular as cultivated shrubs because of their fragrant showy blooms and in spite of the poisonous quality of the sap. The flowers are available throughout the year, but are at their best during rains. Pink single, pink double, deep rose, white single and deep rosy red flowers are common in both their single and double forms (Ponni, 2004). The active principle of the leaves is a cardio tonic substance named oleandrin. It has anti-inflammatory and stimulant properties. The root, bark and seeds contain cardio-active glycosides, formerly designated as neriodorin, neriodorein and karabin, which are anti-inflammatory and stimulant and are used for pain relief. Oleanders can be grown in several different forms

including rounded shrubs and small trees. Pruning occurs most often to maintain these growth habits. Pruning in *Nerium* is considered as an essential operation since the flowers are bloom in current season growth. Oleanders can withstand severe pruning and many mature, established plants have been "rehabilitated" through the use of careful pruning. Pruning is necessary to ease the harvesting flowers and other inter-cultural practices. Very low level pruning could not fulfil its requirement for growth and optimum production. Pruning is an operation based on scientific principles to improve the overall performance of plants as reported by Nantakumar and Balakrishnan (1998). Growth of *nerium* plants after pruning is decided by the nutrient availability. The critical stage at which the plant requires the major nutrient to develop its frame work is immediately after pruning. It has been established that the nutrient requirement by many of the flowering crops are not consistent. Hence, the nutrient supply should be adjusted to the specific requirements of plants during the various stages of growth to attain maximum levels of yield (Mengel, 1969). Therefore the present study was carried

*Corresponding author: +91

Email: ayanshola2005@yahoo.com, fowoltfaith@hotmail.com

out to study the Effect of different levels of pruning along with NPK on growth and yield of Nerium.

MATERIALS AND METHODS

The investigation was carried out at the Floriculture Research Complex in the Department of Horticulture, Faculty of Agriculture, Annamalai University. The experiment was laid out in FRBD. Two factors viz., Pruning height at three levels (60cm, 90cm and 120cm) and NPK at four levels viz., 90:160:160 g/plant, 120:240:240 g/plant, 150:300:300 g/plant and untreated control were adopted in 12 possible combinations. Two year old bushes of uniform size and vigour were selected for the Experiment. The plants were originally propagated from stem cuttings and planted at 1mX1m spacing. The plants were pruned in first week of May month by cutting back the shoots at various levels viz., 60cm, 90cm and 120cm height from the ground level. The required quantity of organic manure in the form of FYM @ 10kg plant⁻¹ was incorporated as basal application immediately after pruned. The inorganic fertilizers P and K treatments were applied as basal and N in two split doses. After 30 days the NPK were applied as per the treatment schedule. Observations were recorded on various growth, flowering and yield parameters. The data were analysed using the analysis of variance to draw the standard error and the critical difference was worked out at 0.5% probability as suggested by Panse and Sukhatme (1978).

RESULTS AND DISCUSSION

The growth parameters of Nerium oleander were significantly influenced by both different levels of inorganic fertilizer application in *per se* and in combination (Table 1). Plant height was the highest in the combination of P₃NPK₃ (Pruning at 120cm and NPK @ 150:300:300 g/plant). However, the highest growth parameters viz., Number of leaves /plant (1269.33), Number of branches/plant (41.66), Internodal length (9.63cm), Fresh weight (2743.85 g) and Dry weight (570.23 g) were recorded in P₂NPK₂ (Pruning at 90 cm NPK @ 120:240:240 g/plant). This was closely followed by the combination of P₂NPK₃. The maximum plant height observed in pruning level of 120 cm could be due to the higher initial height. However, the increase in fresh and dry weight of shoots at P₂NPK₂ could be attributed by production of more Number of branches and Number of leaves due to increased light intensity, aeration caused by pruning and uptake of NPK augmented by optimum dose of inorganic fertilizer application. These results go in agreement with the findings of the Jayaprakash and Sulladmath (1978) who has reported that availability of excess nitrogen in the soil increased number of stems due to nitrogen application in rose. Pruning is known to influence the growth and yield parameters of flower crops (Paul *et al.*, 1995).

Table 1 Effect of Pruning and Inorganic Fertilizer on Growth Parameters of *Nerium oleander*

Treatments	Plant Height (cm)		No of Leaves/Plant		No of Branches/Plant		Internodal Length (cm)	Fresh Weight (g)	Dry Weight (g)
	120	180	120	180	120	180			
	Days	Days	Days	Days	Days	Days			
P ₁	121.54	157.14	1226.33	1234.25	37.07	41.08	5.75	1788.92	355.66
P ₂	130.36	161.78	1235.25	1258.41	38.08	42.08	8.00	2307.20	488.29
P ₃	152.65	189.02	1122.54	1152.41	37.94	41.91	6.89	2014.73	412.22
SED	0.67	0.66	37.38	35.58	0.20	0.20	0.06	4.72	9.38
CD	1.36	1.36	77.75	74.01	0.41	0.41	0.13	9.79	19.45
NPK ₁	131.82	161.84	1193.50	1217.55	38.35	42.33	6.71	2000.07	430.04
NPK ₂	143.28	174.04	1223.67	1245.77	37.34	41.33	8.31	2393.11	485.32
NPK ₃	153.55	186.03	1235.33	1256.00	38.12	43.11	7.54	2194.65	441.61
NPK ₀	119.92	155.35	1119.65	1140.77	36.02	40.00	4.97	1559.97	317.93
SED	0.75	0.76	39.61	37.25	0.23	0.23	0.07	5.45	10.83
CD	1.58	1.58	82.38	77.48	0.47	0.47	0.16	11.31	22.46
P ₁ NPK ₁	120.82	155.27	1220.52	1230.33	37.10	41.00	5.50	1762.03	353.60
P ₁ NPK ₂	122.68	158.88	1212.65	1241.66	36.32	40.33	6.73	2066.55	419.11
P ₁ NPK ₃	131.06	161.29	1228.56	1254.00	39.33	43.33	6.06	1852.20	351.51
P ₁ NPK ₀	118.26	153.12	1196.56	1211.00	35.65	39.66	4.73	1474.91	298.44
P ₂ NPK ₁	130.92	161.54	1238.54	1262.66	39.10	43.00	8.03	2264.46	532.21
P ₂ NPK ₂	132.98	164.62	1248.52	1269.33	37.62	41.66	9.63	2743.85	570.23
P ₂ NPK ₃	137.66	165.55	1249.25	1280.00	38.63	43.66	9.23	2564.13	524.38
P ₂ NPK ₀	124.92	155.44	1198.32	1221.66	35.10	40.00	5.13	1656.39	326.36
P ₃ NPK ₁	138.69	168.71	1124.54	1244.33	37.12	43.00	6.60	1973.73	404.33
P ₃ NPK ₂	167.91	198.62	1231.82	1257.00	38.08	42.00	8.56	2368.92	466.63
P ₃ NPK ₃	200.51	231.26	1261.29	1288.33	39.29	42.33	7.33	2167.63	448.93
P ₃ NPK ₀	128.49	157.50	1201.58	1220.00	35.29	40.33	5.06	1548.62	328.99
SED	1.32	1.32	80.12	76.20	0.41	0.41	0.13	9.44	18.76
CD	2.73	2.73	166.64	158.49	0.85	0.85	0.27	19.59	38.91

Pruning Levels (Height from ground level): P₁ - 60cm

P₂ - 90cm

P₃ - 120cm

Inorganic Fertilizers: NPK₁-NPK @ 90:160:160 g/plant, NPK₂-NPK @ 120:240:240 g/plant, NPK₃-NPK @ 150:300:300 g/plant, NPK₀- Without fertilizer

Table 2 Effect of Pruning and Inorganic Fertilizer on Yield Parameters of *Nerium oleander*

Treatments	Days to First flowering (Days)	Number of Flowers/Plant	Flower Diameter (cm)	Single Flower Weight (g)	Flower Yield (kg)
P ₁	181.25	1002.91	4.25	7.90	7.93
P ₂	161.41	1149.82	4.96	9.60	11.22
P ₃	170.00	1042.00	4.65	8.39	8.79
SED	1.40	7.39	0.03	0.07	0.03
CD	2.90	15.32	0.06	0.14	0.08
NPK ₁	170.23	1040.66	4.55	8.39	8.73
NPK ₂	172.88	1149.21	5.12	9.62	11.18
NPK ₃	172.55	1126.00	4.85	9.24	10.48
NPK ₀	188.33	943.77	3.96	7.27	6.88
SED	1.21	8.5	0.03	0.08	0.04
CD	2.42	17.69	0.07	0.17	0.09
P ₁ NPK ₁	180.66	1016.66	4.10	8.06	8.18
P ₁ NPK ₂	183.66	1051.66	4.66	8.28	8.70
P ₁ NPK ₃	182.32	1028.66	4.33	8.15	8.37
P ₁ NPK ₀	188.66	914.66	3.93	7.10	6.48
P ₂ NPK ₁	155.01	1067.66	5.03	8.82	9.41
P ₂ NPK ₂	156.33	1297.33	5.46	11.41	14.79
P ₂ NPK ₃	155.14	1246.66	5.36	10.63	13.24
P ₂ NPK ₀	187.66	987.66	4.00	7.54	7.44
P ₃ NPK ₁	175.61	1037.66	4.53	8.30	8.6
P ₃ NPK ₂	178.66	1098.66	5.23	9.18	10.07
P ₃ NPK ₃	177.23	1102.66	4.86	8.93	9.84
P ₃ NPK ₀	188.66	929.00	3.96	7.18	6.86
SED	1.80	14.78	0.06	0.14	0.07
CD	3.81	30.65	0.12	0.29	0.16

Pruning Levels (Height from ground level): P₁ -60cmP₂ - 90cmP₃ - 120cmInorganic Fertilizers: NPK₁-NPK@ 90:160:160 g/plant, NPK₂-NPK@ 120:240:240 g/plant, NPK₃-NPK @ 150:300:300 g/plantNPK₀- Without fertilizer

Among the various treatments the intermodal length registered the highest in P₂NPK₂ (9.63 cm) and the minimum intermodal length was registered in P₁NPK₀ (4.73 cm). The increased level of nitrogen would have consistently increased the intermodal length. This result was in concomitant to the findings of Young *et al.*, (1973) who observed an increase in intermodal length of rose due to nitrogen application.

The individual effect of different levels of pruning and inorganic fertilizer dosage significantly influenced the flowering and yield parameters of nerium (Table 2). This influence was reflected in interaction also. Days to first flowering in the present study revealed that the early flowering was occurred in P₂NPK₁ (155.01 days) which was significantly on par with P₂NPK₂ (156.33 days) and P₂NPK₃ (155.14 days). Whereas delayed flowering was observed in the treatment combination of P₃NPK₀ (188.66 days). Pruning at the height of 90cm was evinced to be the optimum level of pruning to induce early flowering. It could be due to the fact that pruning helps to broaden the C/N ratio, thus stimulating flowering as in the case of bougainvilleas in which flowering takes place soon after pruning, with the application of proper fertilizers and watering as reported by Chomchalow (2004).

The optimum pruning level of P₂-pruning at 90cm and NPK₂ @ 120:240:240 g/plant exhibited the highest number of flowers/plant, flower diameter, single flower weight and flower yield when compared to other levels of these factors. Interaction treatment of P₂ and NPK₂ exhibited the highest number of flowers/plant (1297.33), flower diameter (5.46cm), single flower weight (11.41g) and flower yield (14.79 kg/plant) followed by the interaction treatment of P₂ NPK₃ which recorded the single flower weight of 10.63g

and flower yield of 13.24 kg/plant. The earliness in flowering increased the yield of flowers per hectare. This might be probably being due to the suppression of apical dominance which resulted in increased number of flowers per plant and ultimately increased the flower yield per hectare. Further the increase in the number of shoots, leaves complimented by the optimum level of pruning and optimum dose of NPK @ 120:240:240 g/plant would have maintained the wider C: N ratio which is essential for early flowering. Nijjar and Rehalia (1997) observed increase in flower weight due to high levels of nitrogen in rose. Similar observations of increased flower yield and quality were observed by Vidhyasankar and Bhattacharjee (2000) in *Jasminum auriculatum* due to increased nitrogen levels and by Nofal and Marwan (1982) in *Jasminum grandiflorum* L. From the above results and facts it is concluded that pruning at 90cm from ground level and application of NPK @ 120:240:240 g /plant can be adopted to obtain maximum flower yield.

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