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RESEARCH PAPER

Improvement in post harvest attributes of nerium (*Nerium oleander* L. cv. Red)

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SUMMARY :

Oleander (*Nerium oleander* L. Apocynaceae) is a Mediterranean evergreen shrub widely grown as an ornamental for its abundant and long-lasting flowering as well as its moderate hardiness. Widely used for ornamental purposes in India, nerium flowers have a very limited life after they have been cut off from the mother plant, as survival on their own reserves is generally low due to the special morphological and physiological characteristics of their tissues. In this present study, the evaluated using different chemicals treatments *viz*., boric acid, citric acid, GA_3 and sucrose to study the longevity of the flower *viz*., flower blooming, freshness, colour fading, physiological loss weight and shelf life. This experiment revealed significant influence, when flowers were treated with GA_3-200 ppm polybag packed in (T_{10}) and when treated with sucrose solution 2% and polybag packed in (T_2), on the flowering characters of nerium.

KEY WORDS : Nerium, Post harvest, Attributes

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Floriculture has emerged as a viable diversification option in the agri-business. It is a rapidly expanding dynamic industry recording a growth rate of more than 15 per cent per annum in the last two decades. Rapid urbanization, increased income levels and changes in social values resulted in increase of domestic market both for modern (cut flowers) as well as traditional (loose flowers) flowers significantly. Improvement in the general level of well being in the country and increased affluence particularly among the middle class is also another reason for increase in the volume of local flower market. The floriculture industry in India is characterized by growing traditional flowers (loose flowers) and cut flowers under open field conditions and protected environment conditions respectively. India also has a strong dry flower industry, which contributes a major share to the overall trade. Other segments like fillers, potted plants, seeds and planting material, turf grass industry and value added products also contribute a share in the overall growth of the floriculture sector. At present, the area under flower crops in India is 167000 ha with a production of 9.87 lakh MT of loose flowers and 4798 million numbers of cut flowers (NHB Indian Horticulture Database 2009-10).

Oleander (*Nerium oleander* L.) is a Mediterranean evergreen shrub characteristic of watercourses, gravely places, and damp slopes. It is widely grown as an ornamental in warm temperate and subtropical regions, due to its abundant and long-lasting flowering and moderate hardiness (Kingsbury, 1964; Hardin and Arena, 1974). It is used for screens, hedging along highways, planting along beaches and in urban areas as, by removing suckers and leaving just a few stems, it can also be formed into very attractive small trees. Oleander has flexible branches with green, smooth bark eventually turning to dark grey. The leaves are 5 to 20 cm long, narrow, acuminated, or acute in the apex, shortly petiolate, with a

coriaceus dark-green blade. Some cultivars have white or yellow variegated leaves. Flowers are produced in terminal heads and their colours vary from deep to pale pink, lilac, carmine, purple, salmon, apricot, copper, orange, yellow and white (Huxley, 1992). Oleander can be propagated by seed (Pagen, 1988) but, being allogamous and highly heterozygous, it shows great variability in seedling populations. Growers generally use cuttings. Packaging ensures garden fresh of flowers to the consumers. Lower rate of transpiration, respiration and cell division during transportation, are essential for long storage life and keeping quality. Before packing, flowers should be dried. They should be treated with systemic insecticides and miticides packing must ensure protection of flowers against physical damage, water loss and external conditions detrimental to transported flowers. Boxes made of corrugated fibre boards are good. Flowers sensitive to geotropic bending must be transported in an upright position. The flowers should be transported at an optimal low temperature. The relative humidity of the air during precooling and shipment of cut flowers should be maintained at the level of 95-98%. Lack of light during prolonged transportation particularly at high temperature causes yellowing of leaves in many flowers. Shipment of flowers is usually done by truck, air and sea. For short distance and time period shorter than 20 hr, cut flowers may be transported in insulated trucks without refrigeration after precooling and proper packing.

EXPERIMENTAL METHODS

The study was conducted at Horticultural College and Research Institute Periyakulam, which is situated between $10^{0}1$ North latitude and $81^{0}1$ East latitude and at an altitude of 246 MSL. The experiment was laid out in CRD with three replications. The nerium flowers were harvested at early morning at 6.30 am. The stage of harvest was bud mature opened condition. Immediately after harvest the flowers were treated with the pulsing solutions and kept without packing and compared to treated flowers polybag for studying the longevity of the flowers. Different concentrations of pulsing solutions *viz.*, T_1- Ambient condition without treatment and packing T_2- Packing in polybag without treatment T_3- Treating with 2% sucrose solution without packing, T_4- Treating with 2% sucrose solution packing in polybag condition, T_5- Treating with 2% boric acid solution and without packing, T_6- Treating with 2% boric acid solution and packing with polybag condition, T_7- Treating with 2% citric acid solution and without packing, T_8- Treating with 2% citric acid solution and packing with polybag condition, T_9-Treating with GA_3 200ppm and without packing, T_{10}- Treating with GA_3 200ppm and packing with polybag condition, T_{11}- Treating with boric acid 2% + sucrose solution 2% and without packing and T_{12}- Treating with boric acid 2% + sucrose solution 2% and packing with polybag condition. After pulsing, the assigned samples of flower were immediately transferred into two different storage conditions.

EXPERIMENTAL FINDINGS AND ANALYSIS

Statistical analysis showed that the treatments responded positively for the enhancement of vase life. Among the treatments, the earliest flower opening (Table 1) was registered in T_{10} (100% in the 3rd day). It was followed by T_{11} (98% at 3rd day). These results are in agreement with the flower opening in cut roses where experiments have shown to be dependant of carbohydrate level in the petals. In case of cut flowers, preservatives containing sucrose+ GA_3 help to maintain the respiration rate and extend the flowers post

Table 1 : Effect of chemicals and packing on flower blooming (%) of nerium

Treatments	Day 1	Day 2	Day 3	Day 4	Day 5	Mean
T_1	20	25	30	40	50	33
T_2	35	45	53	60	62	51
T_3	50	60	75	85	90	72
T_4	70	75	80	90	100	83
T_5	50	65	75	80	95	73
T_6	65	70	80	90	100	81
T_7	48	55	68	75	90	67.2
T_8	60	65	70	85	95	75
T_9	55	60	75	80	90	72
T_{10}	80	90	100	100	100	94
T_{11}	45	50	98	80	93	73.2
T_{12}	60	70	87	90	97	80.8
S.E.±	0.90	1.01	1.24	1.32	1.46	
C.D. (P=0.05)	1.86	2.10	2.57	2.73	3.02	

Table 2 : Effect of chemicals and packing on freshness (%) of nerium

Treatments	Day 1	Day 2	Day 3	Day 4	Day 5	Mean
T_1	100	65	53	39	33	58
T_2	100	70	58	45	40	62.6
T_3	100	85	70	62	59	75.2
T_4	100	98	96	90	86	94
T_5	100	80	68	60	55	72.6
T_6	100	94	84	78	74	86
T_7	100	76	65	48	50	67.8
T_8	100	92	80	73	69	82.8
T_9	100	87	73	63	61	76.8
T_{10}	100	100	100	100	100	100
T_{11}	100	73	61	49.66	48	66.33
T_{12}	100	90	78	71	64	80.6
S.E.±	1.63	1.38	0.23	2.94	1.02	
C.D. (P=0.05)	3.37	2.86	0.49	6.10	2.12	

Table 3 : Effect of chemicals and packing on colour fading (%) of nerium

Treatments	Day 1	Day 2	Day 3	Day 4	Day 5	Mean
T_1	100	50	28	24	19	44.2
T_2	100	53	31	32	20	47.2
T_3	100	68	50	50	28	59.2
T_4	100	95	90	80	75	88
T_5	100	65	45	42	24	55.2
T_6	100	86	83	75	62	81.2
T_7	100	67	40	40	20	53.4
T_8	100	80	75	72	50	75.4
T_9	100	72	55	54	39	64
T_{10}	100	100	100	85	75	92
T_{11}	100	60	33	38	20	50.2
T_{12}	100	76	60	58	48	68.4
S.E.±	1.63	1.21	1.01	0.93	0.73	
C.D. (P=0.05)	3.37	2.50	2.09	1.93	1.51	

Table 4 : Effect of chemicals and packing on physiological loss in weight (%) of nerium

Treatments	Day 1	Day 2	Day 3	Day 4	Day 5	Mean
T_1	8.37	15.28	39.12	54.38	78.60	39.15
T_2	6.2	13.92	39.00	54.11	75.31	37.70
T_3	3.95	9.77	33.40	51.97	70.30	33.87
T_4	2.85	8.53	31.00	50.98	66.53	31.97
T_5	4.00	10.23	35.22	52.00	71.28	34.54
T_6	3.03	8.74	31.43	51.31	66.98	32.29
T_7	5.54	10.83	35.42	52.34	73.00	35.42
T_8	3.13	8.97	31.73	51.50	67.00	32.46
T_9	3.68	9.24	32.31	51.81	68.12	33.03
T_{10}	2.60	8.45	30.90	50.89	65.52	31.67
T_{11}	5.83	11.31	37.31	53.85	73.20	36.30
T_{12}	3.31	9.01	31.83	51.67	68.10	32.78
S.E. ±	0.07	0.17	0.55	0.85	1.15	
C.D. (P=0.05)	0.15	0.35	1.15	1.76	2.37	

production longevity(Iwaya- Inine and Takata, 2001). The flower freshness was highest in T_{10} (100% at all the days) and it was followed by T_4 (Table 2). This may be attributed to the fact that sucrose is a form of sugars, the main source of supply of carbohydrate for the flowers that maintains the pool of dry matter and respirable substrates in flower petals. Exogenous sucrose replaces the depleted endogenous carbohydrates utilized during the post-harvest life of flowers. The optimal concentration varies with the treated flower. In cut flowers, sucrose improves water balance and maintains the turgidity of petals. Sucrose inhibits the activity of membrane bound ethylene forming enzymes which delay the loss of membrane permeability (Adam *et al*., 1983). The highest colour fading was registered in T_{10} (100% at 1 to 3rd storage) and it was followed by T_4 (100% at 1st day, 95% for 2nd day and 90% for 3rd day) (Table 3). The lowest physiological loss in weight was recorded in T_{10} (2.60% at 1st day and 8.45% for 2nd day) and it was followed by T_4 (3.95% at 1st day and 9.97% for 2nd day). The highest shelf life (Table 4) was registered in T_{10}, T_7 and T_4 (up to 5 days) and it was followed by T_6 and T_{11} in (4 days). These results are in agreement with the finding of Emongor (2002) who reported the positive effect of gibberellic acid on the post harvest quality and vase life of gerbera cut flowers. Gerbera cut flowers held in GA_3 at 2.5, 5, and 7mg/l, significantly delayed flower senescence by increasing the number of disc florets, delayed petal fading and abscission, and increased flower quality after 14 days. (Bhattacharjee, 2002) reported that the boron facilitates the translocation of sugars and it acts mainly together with sugar by directing the translocation of sugar to the corolla and away from the ovary. Boron delayed the senescence of isolated petals of lilac.The most important way to effects of ethylene on horticultural products, especially cut flowers, is to use of chemical materials for blocking activity or synthesis of ethylene.Vaselife has always been one of the important parameters to assess the quality of a cut flower and loose flower. With increasing demand in different parts of the country, there is a need to transport the flowers to long distances in an attractive condition which requires good transportation facilities and the use of suitable packing materials and preservative chemicals. This is indispensable to regulate the prolonged supply of flowers.

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