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Udaya TV
Ph.D. Scholar, Department of Floriculture and Landscape Architecture, COH, UHS, Bagalkot, Karnataka, India

Pavan Kumar P
Assistant Professor, Department of Floriculture and Landscape Architecture, COH, Bengaluru, UHS, Bagalkot, Karnataka, India

Balaji S Kulkarni
Dean and Professor, Department of Floriculture and Landscape Architecture, COH, UHS, Bagalkot, Karnataka, India

Bapuraygouda Patil
Assistant Professor, Department of Seed Technology, Seed Unit, UHS, Bagalkot, Karnataka, India

Itigi Prabhakar
Assistant Professor, Department of Social and Allied Sciences, College of Horticulture, UHS Campus, GKVK Post, Bengaluru Karnataka, India

Mohammed Abdul Waseem
Assistant Professor, Department of Horticulture Entomology, Directorate of Extension, UHS, Bagalkot, Karnataka, India

Corresponding Author:
Udaya TV
Ph.D. Scholar, Department of Floriculture and Landscape Architecture, COH, UHS, Bagalkot, Karnataka, India

Morpho-physiological assessment and yield performance of Nerium (*Nerium oleander* L.) hybrids for ornamental improvement

Udaya TV, Pavan Kumar P, Balaji S Kulkarni, Bapuraygouda Patil, Itigi Prabhakar and Mohammed Abdul Waseem

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Abstract
The present investigation was carried out to evaluate the performance of *Nerium oleander* L. F_1 hybrids for growth, flowering, and yield traits. The study was conducted at the Department of Floriculture and Landscape Architecture, College of Horticulture, Bagalkot, University of Horticultural Sciences, Bagalkot during 2020-21 and 2021-22. Twenty hybrids derived from the cross combination UHSBN-12 × UHSBN-14 were evaluated for various morpho-physiological and floral attributes using a randomized block design. Significant variation was observed among hybrids for all the traits studied. Hybrid P-19 exhibited superior performance for plant height (243.0 cm), plant spread (E-W: 259.52 cm; N-S: 257.44 cm), number of primary branches (5.38), and hundred bud weight (34.86 g). Hybrid P-4 showed the longest leaf (21.72 cm), longest petiole (1.31 cm), and the highest flower yield (5.80 kg/plant). In contrast, hybrid P-11 recorded the lowest growth and yield performance. Marked differences in floral quality were observed, with hybrid P-1 producing the largest flower diameter (5.35 cm) and bud diameter (7.20 mm), while hybrid P-8 showed the least fresh weight loss (10.16%), indicating superior postharvest retention. The variation among hybrids may be attributed to genetic recombination resulting from diverse parental combinations and heterotic expression in F_1 progenies. These findings highlight the potential of specific hybrids such as P-4, P-19, and P-3 for use in future breeding and commercial ornamental cultivation programs in Nerium oleander.

Keywords: Nerium oleander, hybrid evaluation, flowering, yield, heterosis

1. Introduction
Nerium (*Nerium oleander* L.), an evergreen ornamental shrub, is highly valued for its wide adaptability, prolonged flowering duration, and resistance to biotic and abiotic stresses. Hybridization in nerium is an effective breeding strategy to combine desirable traits such as flower color, size, fragrance, and plant vigor. Despite its ornamental importance, limited systematic research has been carried out on hybrid evaluation in nerium. This study aims to assess the growth, flowering, and yield performance of nerium hybrids under field conditions, to identify superior genotypes for future breeding and commercialization.

2. Materials and Methods
The experiment was conducted during 2020-21 and 2021-22 at the Department of Floriculture and Landscape Architecture, College of Horticulture, Bagalkot, University of Horticultural Sciences, Bagalkot. Hybrid seeds obtained from controlled crosses among selected parental lines were raised and transplanted under uniform cultural conditions. Observations were recorded on growth, flower quality, and yield parameters using five randomly selected plants per hybrid. The data were subjected to statistical analysis as per standard procedures.

3. Results and Discussion
3.1 Growth Parameters
3.1.1 Plant Height (cm)
Significant variation in plant height was observed among the twenty Nerium oleander hybrids (UHSBN-12 × UHSBN-14) over the two-year study period (2020-21 and 2021-22).

In 2020-21, plant height increased from 42.1 cm in September to 101.0 cm in June (IG = 72.2 cm), with the tallest hybrids being P5 (136.0 cm), P8 (130.0 cm), and P19 (122.0 cm), and the shortest P14 (62.0 cm) and P18 (73.0 cm). In 2021-22, heights were markedly higher, rising from 113.0 cm in September to 184.0 cm in June (IG = 146.0 cm), with P19 (243.0 cm), P15 (213.0 cm), P16 (210.0 cm), and P5 (210.0 cm) attaining maximum growth, while P14 (112.0 cm) and P18 (155.0 cm) remained the shortest.

The observed variation reflects the strong genetic influence on stem elongation and overall vigor. Taller hybrids such as P19 and P5 likely possess additive genes promoting internodal elongation and enhanced apical growth (Mulas *et al*., 2016) [8]. Year-to-year increase indicates cumulative vegetative development and adaptation to environmental conditions. Such genotypes are preferable for landscape planting and as sources for increased floral production due to better canopy development (Srilatha *et al*., 2015) [11].

3.1.2 Plant Spread (East-West) (cm)

The East-West canopy spread also exhibited significant differences among hybrids. In 2020-21, mean spread increased from 45.6 cm in September to 86.4 cm in June (IG = 64.6 cm), with the widest spread in P19 (104.04 cm), P10 (100.51 cm), and P5 (102.00 cm), and narrowest in P11 (60.37 cm) and P12 (68.02 cm). During 2021-22, spread rose substantially from 109.0 cm in September to 210.0 cm in June (IG = 159.0 cm), with maximum values in P19 (259.52 cm), P5 (254.12 cm), and P10 (253.85 cm), and minimum in P11 (152.47 cm) and P12 (171.80 cm).

Variation in lateral spread can be attributed to genetic differences in branch initiation and elongation, as well as apical dominance and cytokinin-mediated lateral growth (Kunjamma *et al*., 2022) [6]. Hybrids with wider spreads provide more sites for floral bud formation and efficient light interception, enhancing flower yield and aesthetic value (Sharma *et al*., 2017) [10].

3.1.3 Plant Spread (North-South) (cm)

Significant variation in North-South spread was recorded, with 2020-21 values ranging from 35.1 cm in September to 75.0 cm in June (IG = 51.0 cm), and 2021-22 values increasing from 92.7 cm in September to 196.0 cm in June (IG = 142.0 cm). Hybrids P19 (101.93 cm; 257.44 cm), P10 (93.24 cm; 253.22 cm), and P3 (92.29 cm; 233.10 cm) consistently exhibited the widest canopy, whereas P11 (51.25 cm; 129.46 cm), P16 (56.31 cm; 152.92 cm), and P14 (59.26 cm; 149.67 cm) were most compact.

The spread is influenced by internodal length, number of branches, and hormonal control of lateral growth. Wider canopy hybrids offer more sites for flower development and greater photosynthetic efficiency, contributing to higher floral yield (Srilatha *et al*., 2015; Kumari *et al*., 2024) [11, 5]. Year-to-year differences reflect cumulative growth and plant vigour improvement.

3.1.4 Number of Primary and Secondary Branches

The number of primary branches varied from 2.58 (P3) to 5.38 (P19), with an average of 4.30, while secondary branches ranged from 3.61 (P2) to 16.44 (P9), averaging 10.5 (Table 15). Hybrids with higher branching (e.g., P19 and P9) formed denser canopies, providing more floral sites. Differences in branching pattern are linked to genetic regulation of apical dominance and hormonal balance, particularly cytokinins that promote lateral bud outgrowth (Srilatha *et al*., 2015) [11]. Enhanced branching contributes to aesthetic value and increased flower yield.

3.1.5 Internodal Length (cm)

Internodal length varied from 2.22 cm (P14) to 4.04 cm (P1), with a mean of 3.11 cm. Shorter internodes resulted in compact plant architecture (e.g., P14), desirable for pot culture and ornamental use. Variation in internodal length is influenced by gibberellin activity; reduced gibberellin synthesis leads to shorter internodes and bushier plants (Kunjamma *et al*., 2022) [6]. Compact hybrids are suitable for landscaping and container production.

3.1.6 Leaf Length, Leaf Width, and Petiole Length

Leaf length ranged from 11.42 cm (P9) to 21.72 cm (P4), and leaf width from 0.92 cm (P9) to 2.04 cm (P8). Petiole length varied from 0.41 cm (P9) to 1.31 cm (P4). Hybrids with larger leaves (P4, P5) have higher photosynthetic efficiency, contributing to greater carbohydrate accumulation and vigor. Variation in petiole length influences leaf orientation, affecting light capture and aesthetic appeal (Sharma *et al*., 2017) [10].

3.2 Flower Quality Parameters

3.2.1 Flower Diameter (cm)

Significant differences were observed in flower diameter among the hybrids. The values ranged from 3.53 cm (P12) to 5.35 cm (P1), with a mean of 4.39 cm. Hybrids P1 (5.35 cm), P4 (5.25 cm), and P15 (4.53 cm) exhibited the largest flowers, while P12 had the smallest.

Larger flower diameter is often associated with an increased number of petals and enhanced floral whorls, reflecting the genetic potential for floral organ development. Such hybrids are desirable for loose flower markets, garland preparation, and essential oil extraction. Similar observations have been reported in Nerium and jasmine by Rajiv *et al*. (2018) [9] and Kumar *et al.* (2021) [4].

3.2.2 Corolla Tube Length (cm)

The corolla tube length varied significantly among hybrids, ranging from 0.61 cm (P6, P7, P9) to 1.08 cm (P17), with a mean of 0.84 cm. Longer corolla tubes, as in P17, are preferred for certain market uses, while shorter tubes may ease handling during harvesting and string preparation. Variation in corolla tube length is governed by floral organ development genes and hormonal regulation (Halevy, 1987) [2].

3.2.3 Pedicel Length (cm)

Pedicel length ranged from 0.31 cm (P9) to 0.81 cm (P10), with an average of 0.50 cm. longer pedicels improve flower display and facilitate handling during harvesting, while shorter pedicels may be preferred for compact inflorescences. Genetic factors, along with auxin-mediated elongation, likely contribute to this variation.

3.2.4 Bud Length (cm)

Significant variation was recorded in bud length, ranging from 2.68 cm (P10) to 3.98 cm (P3), with a mean of 3.40 cm. longer buds, as in P3, indicate potential for larger fully-opened flowers. Bud length is influenced by assimilate partitioning and gibberellin activity, which promote cell elongation during early floral development.

3.2.5 Bud Diameter (mm): Bud diameter varied from 4.52 mm (P11) to 7.20 mm (P1), with an average of 5.59 mm. Hybrids with larger buds, such as P1, P3, and P4, are more attractive for commercial floriculture. Variation in bud size is genetically controlled and correlates with flower diameter and whorl formation (Lakshmi & Ganga, 2017) [7].

3.2.6 Fresh Weight Loss within 24 hours (%)
Fresh weight loss showed a wide range from 10.16% (P8) to 64.38% (P10), with a mean of 35.8%. Hybrids P3 (13.91%), P4 (16.42%), and P6 (16.39%) retained freshness longer, indicating better postharvest performance. Fresh weight retention is influenced by carbohydrate reserves, membrane integrity, and ethylene sensitivity (Khongwir *et al*., 2019) [3].

3.3 Flowering and Yield Parameters
3.3.1 Number of Inflorescences per Plant
Significant differences were observed, with the number of inflorescences per plant ranging from 4.12 (P11) to 31.62 (P3), and a mean of 14. Hybrids P3, P6, and P8 produced the highest number of inflorescences. High inflorescence number is associated with enhanced branching, vegetative vigor, and effective assimilate partitioning, leading to improved flower production (Halevy, 1987) [2].

3.3.2 Number of Flowers per Inflorescence
The number of flowers per inflorescence varied from 6.18 (P11) to 22.22 (P4), with an average of 14. P4, P18, and P15 exhibited the maximum flowers per inflorescence. This trait depends on floral meristem activity, hormonal regulation, and assimilate availability, which directly affect flower density and marketable yield (Das *et al*., 2022) [1].

3.3.3 Hundred Bud Weight (g)
Hundred bud weight ranged from 22.05 g (P9) to 34.86 g (P19), with a mean of 27.00 g. higher bud weight reflects larger floral whorls and better genetic potential for flower size. Hybrids with heavier buds, such as P19, are preferred for both commercial cutting and decorative uses.

3.3.4 Flower Yield per Plant (kg)
Flower yield per plant showed significant variation, ranging from 0.27 kg (P11) to 5.80 kg (P4), with an average of 2.37 kg. Hybrids P4, P3, and P18 produced the highest yields, attributed to greater vegetative vigor, larger leaf area, enhanced branching, and efficient assimilate translocation to floral structures. The observed variability indicates opportunities for selecting high-yielding genotypes for commercial propagation (Rajiv *et al*., 2018) [9].

Table 1: Plant height during 2020-21 and 2021-22 in nerium hybrids of UHSBN-12 X UHSBN-14

Hybrid line	Plant height (cm)										
	2020-21					2021-22					
	SEP	DEC	MAR	JUN	IG	SEP	DEC	MAR	JUN	SEP	IG
P_1	12.00	62.00	85.00	98.00	71.50	110.00	125.00	148.50	165.50	182.00	146.20
P_2	45.00	79.00	94.00	107.00	81.25	120.00	144.00	155.50	167.00	180.00	153.30
P_3	39.00	67.00	85.00	102.00	73.25	125.00	146.00	162.00	178.00	186.00	159.40
P_4	38.00	65.00	82.00	98.00	70.75	115.00	122.00	143.00	164.00	191.00	147.00
P_5	44.00	72.00	95.00	136.00	86.75	146.00	156.00	176.00	196.00	210.00	176.80
P_6	40.50	61.00	77.00	92.00	67.63	105.00	119.00	131.50	136.00	160.00	130.30
P_7	37.00	55.00	63.00	79.00	58.50	96.00	108.00	122.00	137.00	145.00	121.60
P_8	46.00	77.00	102.00	130.00	88.75	147.00	163.00	176.00	186.00	201.00	174.60
P_9	42.30	58.00	70.00	93.00	65.83	107.00	125.00	141.00	169.00	190.00	146.40
P_{10}	45.50	75.00	109.00	115.00	86.13	127.50	140.00	153.00	166.00	193.00	155.90
P_{11}	47.50	79.00	105.00	120.00	87.88	99.00	111.00	126.00	140.00	154.00	126.00
P_{12}	38.50	53.00	70.00	80.00	60.38	97.00	110.00	138.00	165.00	180.00	138.00
P_{13}	43.20	61.00	94.00	116.00	78.55	106.00	124.00	142.00	160.00	193.00	145.00
P_{14}	34.20	47.00	55.00	62.00	49.55	70.00	81.00	88.50	96.00	112.00	89.50
P_{15}	44.50	62.00	76.00	102.00	71.13	124.00	146.00	166.00	186.00	213.00	167.00
P_{16}	42.50	65.00	89.00	102.00	74.63	120.00	143.00	158.00	181.00	210.00	162.40
P_{17}	45.00	58.00	67.00	89.00	64.75	102.00	116.00	129.50	141.00	173.00	132.30
P_{18}	39.50	52.00	60.00	73.00	56.13	88.00	105.00	116.00	132.00	155.00	119.20
P_{19}	41.00	65.00	84.00	122.00	78.00	140.00	160.00	173.00	186.00	243.00	180.40
P_{20}	47.50	64.00	81.00	98.00	72.63	118.00	138.00	150.00	162.00	200.00	153.60
Mean	42.10	63.90	82.20	101.00	72.20	113.00	129.00	145.00	161.00	184.00	146.00
S.Em.±	0.82	2.02	3.38	4.25	2.46	4.31	4.71	4.93	5.40	6.42	4.99
C.D at 5%	3.64	9.03	15.10	19.00	11.00	19.30	21.10	22.10	24.10	28.70	22.30

Table 2: Plant spread in the East –West direction during 2020-21 and 2021-22 in nerium hybrids of UHSBN-12 X UHSBN-14

Hybrid line	Plant spread East –West (cm)										
	2020-21					2021-22					
	SEP	DEC	MAR	JUN	IG	SEP	DEC	MAR	JUN	SEP	IG
P_1	42.00	51.00	64.00	72.00	57.25	96.00	118.00	130.00	149.00	195.77	137.75
P_2	48.00	62.00	75.00	92.00	69.25	108.00	126.00	155.00	171.00	210.18	154.04
P_3	52.00	65.00	88.00	106.00	77.75	129.00	154.00	178.00	202.00	239.79	180.56
P_4	49.00	64.00	91.00	105.00	77.25	125.00	149.00	172.00	198.00	228.87	174.57
P_5	46.50	60.20	79.00	102.00	71.93	136.00	163.50	189.50	221.00	254.12	192.82
P_6	41.20	59.00	70.00	88.00	64.55	111.00	140.00	157.00	174.00	196.90	155.78
P_7	44.50	61.50	74.00	102.00	70.50	115.00	128.00	152.00	176.00	205.11	155.22
P_8	38.50	53.50	61.00	79.00	58.00	94.00	112.00	135.00	168.00	190.42	139.88
P_9	48.64	60.79	68.31	87.57	66.33	112.28	143.94	169.34	192.44	221.19	167.84
P_{10}	55.82	69.77	78.39	100.51	76.12	128.85	165.20	194.35	220.85	253.85	192.62

P_{11}	33.53	41.91	47.09	60.37	45.72	77.39	99.22	116.73	132.65	152.47	115.69
P_{12}	37.77	47.22	53.05	68.02	51.52	87.20	111.80	131.53	149.46	171.80	130.36
P_{13}	41.52	51.90	58.32	74.77	56.63	95.86	122.89	144.58	164.30	188.85	143.30
P_{14}	41.70	52.13	58.57	75.09	56.87	96.27	123.42	145.20	165.00	189.66	143.91
P_{15}	38.81	48.51	54.50	69.87	52.92	89.58	114.85	135.12	153.54	176.48	133.91
P_{16}	43.92	54.91	61.69	79.09	59.90	101.40	130.00	157.52	179.00	207.19	155.02
P_{17}	45.86	57.32	64.40	82.57	62.54	105.86	135.71	159.66	181.44	208.55	158.24
P_{18}	53.00	62.76	70.51	90.40	69.17	115.90	148.59	174.81	198.65	228.33	173.25
P_{19}	57.78	72.22	81.15	104.04	78.80	133.38	171.00	198.69	225.79	259.52	197.68
P_{20}	51.00	62.58	70.32	90.15	68.51	115.58	148.18	174.32	198.10	227.70	172.77
Mean	45.60	57.90	68.40	86.40	64.60	109.00	135.00	159.00	181.00	210.00	159.00
S.Em.±	1.43	1.72	2.60	3.11	2.13	3.69	4.45	5.10	5.77	6.46	5.03
C.D at 5%	6.39	7.70	11.60	13.90	9.54	16.50	19.90	22.80	25.80	28.90	22.50

Table 3: Plant spread in the North-South direction during 2020-21 and 2021-22 in nerium hybrids of UHSBN-12 X UHSBN-14

Hybrid line	Plant spread North-South (cm)										
	2020-21					2021-22					
	SEP	DEC	MAR	JUN	IG	SEP	DEC	MAR	JUN	SEP	IG
P_1	47.89	59.87	67.27	86.24	65.32	110.56	141.75	166.76	189.50	217.82	165.28
P_2	42.12	52.65	59.15	75.84	57.44	97.23	124.65	146.65	166.64	191.54	145.34
P_3	37.62	48.23	61.83	92.29	59.99	118.32	151.69	172.38	198.13	233.10	174.72
P_4	35.94	42.28	48.04	71.70	49.49	84.36	108.15	135.19	151.90	194.74	134.87
P_5	31.73	40.67	52.15	77.83	50.59	99.78	127.93	145.37	167.09	196.58	147.35
P_6	37.77	44.43	50.49	75.36	52.01	88.65	113.66	142.07	159.63	204.66	141.73
P_7	30.17	38.67	49.58	74.00	48.11	94.88	121.64	138.22	158.88	186.91	140.11
P_8	33.70	43.20	55.39	82.67	53.74	105.99	135.88	154.41	177.48	208.80	156.51
P_9	40.14	47.22	53.66	80.08	55.27	94.22	120.79	150.99	169.65	217.50	150.63
P_{10}	46.73	54.97	62.47	93.24	64.35	109.69	140.63	175.78	197.51	253.22	175.37
P_{11}	20.89	26.79	34.34	51.25	33.32	65.71	84.25	95.73	110.04	129.46	97.04
P_{12}	31.42	36.96	42.00	62.69	43.27	73.75	94.55	118.19	132.80	170.25	117.91
P_{13}	32.23	37.92	43.09	64.31	44.39	75.66	97.00	121.25	136.23	174.66	120.96
P_{14}	29.00	34.00	39.70	59.26	40.49	75.97	97.40	110.68	127.22	149.67	112.19
P_{15}	29.61	37.96	48.66	72.63	47.21	93.12	119.38	135.66	155.93	183.45	137.51
P_{16}	28.22	33.20	37.72	56.31	38.86	66.24	84.92	106.16	119.28	152.92	105.90
P_{17}	29.68	38.05	48.78	72.81	47.33	93.34	119.67	135.99	156.31	183.89	137.84
P_{18}	38.86	45.72	51.96	77.55	53.52	91.23	116.96	146.21	164.28	210.61	145.86
P_{19}	41.55	53.27	68.29	101.93	66.26	130.67	167.53	190.38	218.82	257.44	192.97
P_{20}	36.24	42.64	48.45	72.32	49.91	85.08	109.08	136.35	153.20	196.41	136.02
Mean	35.10	42.90	51.20	75.00	51.00	92.70	119.00	141.00	161.00	196.00	142.00
S.Em.±	1.50	1.82	2.09	2.83	1.98	3.79	4.86	5.35	6.15	7.21	5.39
C.D at 5%	6.69	8.14	9.35	12.60	8.84	17.00	21.70	23.90	27.50	32.30	24.10

Table 4: Mean performance of the hybrids for growth, flowering and yield parameters

Traits	Number of 1^0 branches	Number of 2^0 branches	Internodal Length (cm)	Leaf length (cm)	Leaf width (cm)	Petiole length (cm)	Flower diameter (cm)	Pedicel length (cm)	Corolla tube length (cm)	Bud diameter (mm)	Bud length (cm)	FWL (%)	No. of inflorescences/ plant	No. of flowers/inflorescences	Hundred bud weight (g)	Yield/plant (kg)
UHSBN-12	5.85	16.40	4.11	18.50	2.00	0.78	4.55	0.52	0.90	6.20	3.80	28.20	27.92	68.15	27.46	3.92
UHSBN-14	3.50	12.38	4.86	13.12	1.60	0.47	5.32	0.38	0.70	4.88	2.80	34.84	19.71	47.21	24.32	2.77
P_1	3.09	4.66	4.04	18.18	1.52	0.91	5.35	0.51	1.01	7.20	3.84	37.18	10.10	11.11	32.76	1.61
P_2	3.45	3.61	3.64	17.68	1.56	0.94	4.78	0.62	0.94	6.02	3.74	44.44	14.56	18.72	28.35	3.19
P_3	2.58	8.59	2.55	16.32	1.53	1.02	4.49	0.41	0.92	7.04	3.98	13.91	31.62	16.32	24.15	5.35
P_4	3.83	10.68	3.54	21.72	2.02	1.31	5.25	0.51	0.91	6.45	3.74	16.42	21.21	22.22	28.14	5.80
P_5	4.21	8.08	2.88	19.26	1.96	1.13	3.91	0.41	0.93	5.23	2.88	45.31	12.36	14.42	26.88	2.02
P_6	4.79	12.19	2.53	12.52	1.92	0.61	3.64	0.40	0.71	6.32	3.64	16.39	25.25	13.13	25.62	3.72
P_7	5.17	13.59	2.65	15.81	1.53	1.22	4.18	0.61	0.71	5.60	3.26	25.81	9.18	11.22	26.04	1.15
P_8	4.83	11.84	2.63	14.64	1.41	0.71	4.44	0.50	0.81	4.82	3.53	10.16	22.22	13.13	26.88	3.43
P_9	5.00	16.44	3.47	11.42	0.92	0.41	4.08	0.31	0.61	5.13	3.06	19.05	19.38	17.34	22.05	3.18
P_{10}	4.58	11.00	3.23	13.64	1.41	0.61	4.85	0.81	0.91	5.10	3.74	64.38	13.13	8.08	30.66	1.42
P_{11}	3.54	10.30	3.91	11.54	1.34	0.62	3.71	0.62	0.72	4.52	2.68	33.33	4.12	6.18	25.20	0.27
P_{12}	4.00	12.32	3.63	13.72	1.01	0.91	3.53	0.40	0.91	5.20	3.83	31.82	12.11	9.08	27.72	1.34
P_{13}	4.67	10.30	2.55	14.79	1.63	0.82	4.39	0.71	1.02	5.07	3.26	53.33	9.18	7.14	31.50	0.89
P_{14}	4.50	10.84	2.22	15.66	1.62	0.81	5.15	0.40	0.71	6.30	3.54	37.93	11.11	12.12	24.36	1.44
P_{15}	4.58	9.69	2.99	18.54	1.96	0.93	4.53	0.41	0.82	5.07	3.09	47.62	10.30	21.63	26.46	2.48
P_{16}	3.92	8.40	2.55	17.54	2.04	1.02	4.39	0.41	0.82	5.30	3.47	39.47	9.18	14.28	23.94	1.35
P_{17}	4.17	11.14	3.46	15.12	1.51	0.97	4.54	0.43	1.08	5.52	3.35	33.76	5.40	14.04	24.57	0.71
P_{18}	4.60	11.41	3.61	12.88	1.55	0.72	4.33	0.41	0.72	5.52	3.19	40.00	18.54	21.63	25.20	4.25
P_{19}	5.38	12.80	2.53	12.63	1.41	0.61	4.04	0.51	0.71	5.02	3.03	54.82	12.12	13.13	34.86	2.43
P_{20}	5.20	12.19	3.61	15.45	1.24	0.93	4.22	0.62	0.82	5.30	3.19	50.00	9.27	14.42	25.20	1.42
Mean	4.30	10.50	3.11	15.50	1.55	0.86	4.39	0.50	0.84	5.59	3.40	35.80	14.00	14.00	27.00	2.37
S.Em.±	0.17	0.646	0.13	0.61	0.07	0.05	0.11	0.03	0.03	0.16	0.08	3.37	1.55	1.04	0.73	0.34
C.D at 5%	0.74	2.89	0.56	2.75	0.31	0.23	0.51	0.13	0.13	0.73	0.36	15.10	6.95	4.66	3.24	1.54

4. Conclusion

The present study on Nerium oleander hybrids revealed significant genetic variability for growth, flowering, and yield traits, demonstrating substantial potential for improvement through hybridization and selection. The cross combination UHSBN-12 × UHSBN-14 exhibited marked heterosis and stability across years, confirming its adaptability under varied environmental conditions. Among the twenty hybrids assessed, P10, P19, and P3 consistently performed better in terms of plant height, canopy spread, and number of primary branches, contributing to higher flower yield per plant. These hybrids also excelled in key floral traits such as larger flower diameter, longer bud length, and higher hundred bud weight, indicating superior ornamental quality. Based on their overall performance, P10 and P19 are recommended for commercial exploitation due to their vigorous growth and high flower yield, while P3 is considered ideal for ornamental landscaping because of its compact growth and attractive floral features. Hence, these hybrids hold strong promise for the dual purpose of commercial production and ornamental utilization, offering valuable genetic material for the development of novel, high-yielding, and aesthetically appealing cultivars of *Nerium oleander*.

References

1. Das R, Munikrishnappa PM, Seetharamu GK, Rajesh AM, Kumar P. Evaluation of crossandra (*Crossandra undulaefolia* Salisb.) genotypes under Eastern dry zone of Karnataka. Pharma Innov. 2022;11(4):1950-4.
2. Halevy AH. Assimilate allocation and flower development. In: Atherton JG, editor. Manipulation of flowering. London: Butterworths; 1987. p. 363-78.
3. Khongwir NKL, Singh MC, Singh KP, Arora A. Influence of different polyethylene packaging on shelf life of tuberose (*Polianthes tuberosa* Linn.) loose flowers. Acta Sci Agric. 2019;3(1):146-52.
4. Kumar KK, Ganga M, Rajamani K, Geethanjali S, Elaiyabharathi T. Evaluation of *Jasminum sambac* accessions for flower bud yield and floral quality to identify a promising genotype for loose flower cultivation. Pharma Innov. 2021;10(10):1642-5.
5. Kumari P, Singh D. Variability, heritability and genetic advance in gladiolus (*Gladiolus grandiflora* L.). Ann Agric Sci. 2024;44(4):507-9.
6. Kunjamma KBK, Shirol AM, Kumar PP, Athani SI, Mulla SWR. Studies on the performance of Barleria (*Barleria cristata* L.) genotypes for growth and yield parameters under north Karnataka conditions. Pharma Innov. 2022;11(2):673-7.
7. Lakshmi J, Ganga M. Floral biology studies in commercial species of Jasmine (*Jasminum* spp.). Int J Agric Sci. 2017;7(3):443-6.
8. Mulas M, Barbara P, Francesconi DAH. Evaluation of spontaneous oleander (*Nerium oleander* L.) as a medicinal plant. J Herbs Spices Med Plants. 2016;81:33-6.
9. Rajiv G, Jawaharlal M, Subramanian S, Sudhakar D, Uma D. Studies on morphological characteristics and categorization of nerium accessions based on utility. Electron J Plant Breed. 2018;9(3):1100-6.
10. Sharma S, Singh DV, Kumar R. Genetic variability, heritability and genetic advance in tuberose (*Polianthes tuberosa* L.). J Plant Dev Sci. 2017;9(3):391-4.
11. Srilatha V, Kumar KS, Deepthi YK. Evaluation of chrysanthemum (*Dendranthema grandiflora* Tzvelev) varieties in southern zone of Andhra Pradesh. Agric Sci Dig. 2015;35(2):155-7.