

Original Research Article

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New Multipetalous Variety G. Ad.1 of *Adenium obesum*

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ABSTRACT

Investigations aiming at genetic improvement in *Adenium obesum*, a popular flowering pot plant were carried out at Advance Technology Centre of soilless system, department of Floriculture and Landscape Architecture, NAU, Navsari. Hybridization was initiated with ten parents (seven females and three males) in 2014 and their crosses were studied during 2015 to 2016. Among the crosses studied, a germplasm viz., SDSH1 (Sudarshan x Double Sweet Heart) showed novel morphological character for multipetalous form having attractive bright red coloured fifteen petals. This germplasm was further evaluated for stability and other flowering parameters along with its parents viz., Sudarshan and Double Sweet Heart and the local germplasm, Local Pink for two years 2016-17 and 2017-18. The flowers of SDSH1 showed significantly superior flower diameter (7.36 cm) while that of Sudharshan was minimum (5.63 cm) as seen in the pooled data of two years. Diameter of corolla was maximum (1.50 cm) in Local Pink while length of corolla tube (4.08 cm) was maximum in Double Sweet Heart. Further, maximum flower weight (2.75 g) was observed in the SDSH1, followed by Double Sweet Heart (1.76, 1.83 and 1.79 g) as per the pooled data. Number of petals was maximum in the SDSH1 which looked showy with triple whorls having fifteen petals, as compared to one parent Double Sweet Heart with ten petals and Sudarsahn and Local Pink with five petals. The germplasm SDSH1 recorded significantly maximum flowers per cluster (8.01) while Local germplasm showed minimum (4.01). In situ flower longevity was observed to be highly significantly maximum in the SDSH1 (20.17 days) followed by Double Sweet Heart (11.00 days). Since, the germplasm SDSH1 was novel in flower morphology having multipetalous flower form in bright red colour and superior in other flowering parameters it was renamed as Gujarat Adenium 1 (G. Ad.1) and released in SVRC, Gujarat.

Keywords

Adenium, G. Ad.1,
Pot plant,
Germplasm,
Hybridization,
Soilless

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Introduction

Adenium obesum(Forssk.) Roem. & Schult, is recently gaining high popularity as pot plant (Paul *et al.*, 2015a), although until recently it was being considered a relatively new flowering plant in the ornamental plant industry (McBride *et al.*, 2014, Colombo *et al.*, 2018). It belongs to the family, Apocynaceae and is native to Africa, South of the Sahara from Senegal to Sudan and Kenya, and through Saudi Arabia, Oman, and Yemen (Plaizier, 1980, Dimmit and Hanson (1991) and is widely cultivated as ornamental plant in many humid, tropical countries such as India, Philippines and Thailand with great relevance in the ornamental market (Wannakrairoj *et al.*, 2008, Versiani *et al.*, 2014).

Compact growth habit, thick trunk like structure with showy caudex, good branching and flowering with high level of divergence for flower colour makes adenium a desirable pot plant to display in balconies, in verandas as well as is excellent plant for xeriscaping and roof top gardens (Dimmitt *et al.*, 2009; Chavan *et al.*, 2016; Chavan *et al.*, 2017; Colombo *et al.*, 2016). Besides, this plant represents one of the richest sources of phytochemicals such as glycosides and posses great potential for pharmaceutical application (Paul *et al.*, 2015).

Adenium shows a great deal of natural variation, however, research towards selecting or breeding superior horticultural forms have been meagre. Adeniums are cross pollinated plants and are highly heterozygous in nature. Breeding through hybridization has been going on in adenium for creation of newer genotypes with the basic objective to develop genotype having novel flower colour, high in situ longevity and multipetalous form at the department of Floriculture and Landscape Architecture, NAU, Navsari. Among different crosses studied, a germplasm SDSH1

(Sudarshan x Double Sweet Heart) showed novel morphological character for multipetalous form having attractive bright red coloured fifteen petals which was further multiplied by grafting and evaluated for its stability and other flowering parameters along with Sudarshan, Double Sweet Heart and commonly grown local germ plasm *viz.*, Local Pink as check.

Materials and Methods

Investigation on adenium hybridization was conducted at Advance Technology Centre of soilless system', department of Floriculture and Landscape Architecture, NAU, Navsari Greenhouse Complex, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari (Gujarat). Initially, hybridization was done in 2014 with seven ten parents (seven as female and three as male) and the crosses were evaluated during 2015-2016. Among different crosses studied, cross SDSH1 having novel multipetalous flower form in bright red colour was selected and multiplied further through grafting. Experiment based on evaluation of SDSH1 along with its parents *viz.*, Sudarshan, Double Sweet Heart and commonly grow local germplasm, Local Pink was conducted during the year 2016-17 and 2017-18. Four different germplasm *viz.*, G₁-SDSH1 (Sudarshan x DSH), G₂- Sudarshan, G₃- Double Sweet Heart (DSH), G₄-Local Pink as check were evaluated under completely randomized design system with four replications. The plants were planted in pot size 13 cm height x 15 cm width at a spacing of 30 cm x 30 cm and placed on stands in the greenhouse. The recommended package of practices was followed for raising the crop. Five plants from each germplasm were selected randomly and were tagged for recording the observations on flowering parameters like flower diameter, corolla diameter, corolla length, flower weight,

flowers per cluster, flower longevity, during the two years. Consumer preference was also estimated as display quality based on 5 point visual score for flower colour form and overall look. The data of two years was subjected to pooled analysis following the statistical NAU software for CRD design and results were used to evaluate the performance of different germplasm for various flowering parameters.

Results and Discussion

Flower size is important parameter to determine ornamental pot plant value. Flower diameter, length of corolla tube and diameter of corolla tube significantly differed in different germplasm (Table 1). The flowers of SDSH1 showed significantly superior flower diameter (7.35, 7.38 and 7.36 cm) while that of Sudharshan was minimum (5.70, 5.58 and 5.63 cm) as seen during the two years and the pooled analysis respectively. Diameter of corolla was maximum (1.50, 1.50 and 1.50 cm) in Local Pink while length of corolla tube (4.10, 4.08 and 4.08) was maximum in Double Sweet Heart during both the years and pooled data. Further, Flower weight and number of petals are also important parameters for flower pot plant. Maximum flower weight (2.70, 2.81 and 2.75 g) was observed in the SDSH1, followed by Double Sweet Heart (1.76, 1.83 and 1.79 g) during both the years and pooled data. As seen in figure 1, number of petals were maximum in the SDSH1 which looked highly showy with triple whorls having fifteen petals, as compared to Double Sweet Heart with ten petals and Sudarshan and Local Pink each with five petals only. Flowers of SDSH1 looked highly attractive in bright red colour as compared to other germplasm (pink shades), table 3 and plate 1.

Number of flowers per clusters and in-situ flower longevity ultimately decide the ornamental pot plant value and influence consumer's preference. SDSH1 recorded

significantly maximum flowers per cluster (7.73, 8.30 and 8.01) followed by Double Sweet Heart in both the years *i.e.* 2016-17 and 2017-18 and pooled data, Table 2. Genetic constituents of the germplasm along with the management factor and environmental conditions govern the overall plant growth.

It is the genetic factor that expresses their morphological differences when different germplasm are grown under identical conditions under same management. These results clearly indicate genetic inheritance and influence of the germplasm with respect to growth parameters.

Thus, variation among different germplasm can be attributed to differences in genetic makeup and its constituents. These kinds of results are in agreement with Dimmitt (1998) and Varella *et al.*, (2015) and Singh *et al.*, (2017) for Adenium.

In situ flower longevity was observed maximum in SDSH1 (20.15, 20.20 and 20.17 days) followed by Double Sweet Heart (11.05, 10.95 and 11.00 days) during both the years and pooled data. Enhanced *insitu* longevity may be ascribed to specific genetic character of the germplasm.

Consumer preference for SDSH1 was also found to be highest with maximum quality score (5) for flower colour, flower form and overall look, figure 2. Variation in different floral characters might be owing to the divergence in these germplasm as suggested in earlier varietal study in adenium (Singh *et al.*, 2017).

Difference in flower size, flower clusters per plant in different varieties have been earlier reported in various ornamental pot plants chrysanthemum (Mohapatra *et al.*, 2000, Madhu Bala 2015), rose (Shahrin *et al.*, 2015) and Orchids (Sugapriya *et al.*, 2012).

Table.1 Variation in flower diameter, corolla length and corolla diameter in different germplasm in Adenium

Germplasm		Flower diameter (cm)			Corolla length (cm)			Corolla diameter (cm)		
		2016-17	2017-18	Pooled	2016-17	2017-18	Pooled	2016-17	2017-18	Pooled
G₁ –SDSH₁ (G.Ad.-1)		7.35	7.38	7.36	3.23	3.25	3.23	1.38	1.43	1.40
G₂-Sudharshan		5.70	5.58	5.63	3.13	3.13	3.12	1.35	1.30	1.32
G₃-DSH		7.13	7.08	7.10	4.10	4.08	4.08	1.50	1.33	1.41
G₄-Local Pink(check)		6.03	6.18	6.10	2.70	2.75	2.72	1.50	1.50	1.50
T	S.Em ±	0.187	0.247	0.157	0.073	0.049	0.033	0.045	0.067	0.043
	C.D. 0.05	0.58	0.76	0.483	0.22	0.15	0.101	0.14	0.21	0.132
Y	S.Em ±	-	-	0.107	-	-	0.037	-	-	0.026
	C.D. 0.05	-	-	0.331	-	-	0.114	-	-	0.080
T x Y	S.Em ±	-	-	0.215	-	-	0.074	-	-	0.052
	C.D. 0.05	-	-	0.662	-	-	0.228	-	-	0.160
CV%		5.72	7.54	6.58	4.43	2.97	4.49	6.30	9.65	7.49
				6.81			2.88			8.69

Table.2 Variation in number of flowers per cluster, flower longevity and flower weight in different germplasm in Adenium

Germplasm		Flower weight (g)			Flowers per cluster			Flower longevity(days)		
		2016-17	2017-18	Pooled	2016-17	2017-18	Pooled	2016-17	2017-18	Pooled
G₁ –SDSH₁ (G.Ad.-1)		2.70	2.81	2.75	7.73	8.30	8.01	20.15	20.20	20.17
G₂-Sudharshan		0.80	0.80	0.80	5.78	5.45	5.61	7.53	7.45	7.48
G₃-DSH		1.76	1.83	1.79	7.60	7.83	7.71	11.05	10.95	11.00
G₄-Local Pink(check)		0.81	0.89	0.84	3.80	4.23	4.01	5.88	6.20	6.03
T	0.061	0.050	0.042	0.296	0.347	0.266	0.296	0.320	0.207	
	0.19	0.16	0.129	0.91	1.07	0.819	0.91	0.99	0.637	
Y	-	-	0.025	-	-	0.128	-	-	0.161	
	-	-	0.077	-	-	0.394	-	-	0.498	
T x Y	-	-	0.051	-	-	0.256	-	-	0.323	
	-	-	0.157	-	-	0.788	-	-	0.996	
CV%		8.04	6.38	6.69	9.50	10.75	8.08	5.32	5.72	5.79
				7.63			11.89			5.24

Table.3 Morphological characters of different germplasm in adenium

Sr. No.	Genotype/character	Petal tip	Petal margin	flower colour	Petal margin colour shade
1	G ₁ –SDSH ₁ (G.Ad.-1)	Sharply Pointed	Very Wavy	Red	Darker red
2	G ₂ -Sudharshan	Sharply Pointed	Wavy	Deep Pink	Light
3	G ₃ -DSH	Obtuse	Wavy	Pink	Dark Pink
4	G ₄ -Local Pink(check)	Slightly Pointed	Slightly wavy	Pink	Dark Pink

Plate.1 Gujarat Adenium 1



Fig.1 Number of petals per flower in different germplasm in Adenium

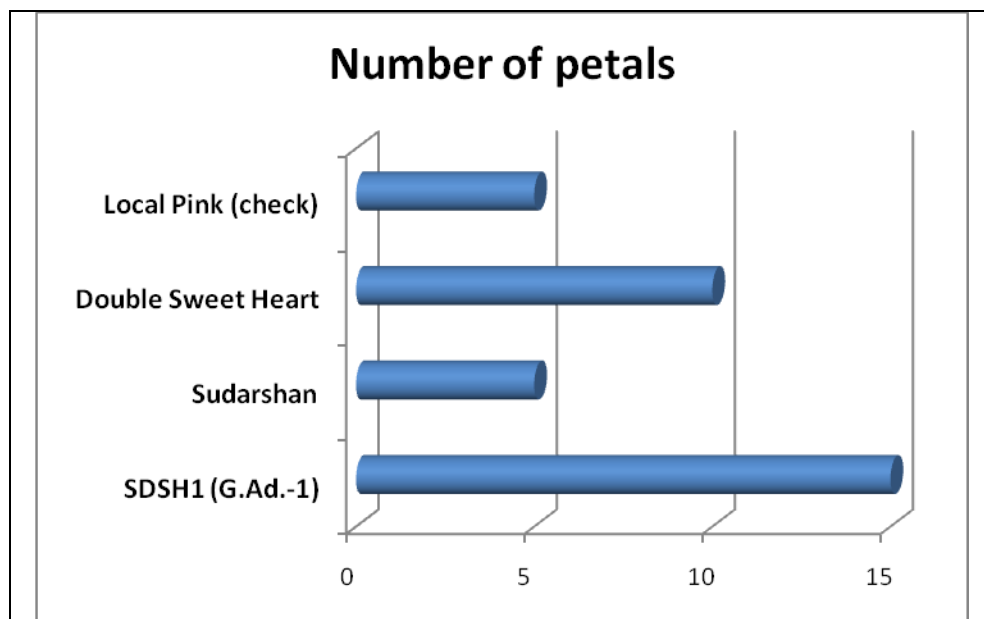
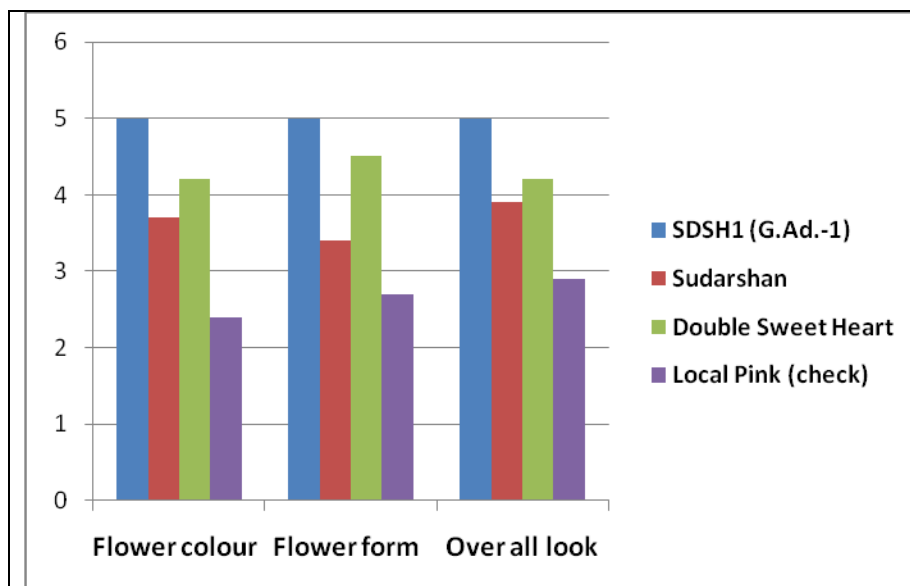


Fig.2 Quality score for consumer preference on visual basis (5 point scale) in different germplasm in Adenium



Adenium germplasm SDSH1 was superior, since it was novel in flower morphology with bright red coloured fifteen petals and performed excellent with respect to the desirable characters like number of flowers per cluster, flower size and *in situ* flower longevity, etc. Hence, the germplasm SDSH1 has been renamed as Gujarat Adenium 1 (G. Ad.1) and further released as a variety in the SVRC, Gujarat. Thus, this variety is recommended for growing as pot culture as well as for landscaping and roof top gardening for nursery men as well as landscape designers.

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