Received: 22 Aug 2019 | Revised: 17 Mar 2020 | Accepted: 20 Mar 2020

Electronic Journal of Plant Breeding

Research Article

New multipetalous variety G. Ad.2 in *Adenium obesum*

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Abstract
Research was conducted on *Adenium obesum*, a popular flowering pot plant with the basic objective for genetic improvement at Advance Technology Centre of soilless system, Department of Floriculture and Landscape Architecture, NAU, Navsari. Initially, hybridization was done involving 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*., MSDSH1 (Mung Siam x Double Sweet Heart) showed novel morphological character for colour and flower form having attractive purplish coloured ten petals. Further evaluation was carried out for stability and other flowering characters along with its parents *viz*., Mung Siam and Double Sweet Heart (DSH) and the local germplasm, Local Pink for two years 2016-17 and 2017-18. The MSDSH1 was significantly superior in terms of the number of flowers per cluster (10.23) and flower longevity on plant (11.91 days) as compared to parent and Local Pink as inferred from the pooled data of two years. Flower diameter was significantly superior in DSH at par with MSDSH1 (7.06 cm) while that of Mung Siam was minimum (5.89 cm), although the diameter of corolla was maximum (1.62 cm) in Local Pink while the length of corolla tube (4.01 cm) was maximum in Double Sweet Heart. Further, the maximum flower weight was observed in Double Sweet Heart (1.72 g) which was at par with MSDSH1 (1.61 g). Number of petals was ten in MSDSH1 and Double Sweet Heart as compared to Mung Siam and Local Pink with five petals. Since the genotype MSDSH1 was novel in flower colour with reddish purple shade and morphology with ten multipetalous flower form, besides being superior for the other flowering parameters, especially the number of flowers per cluster and flower longevity on plant, it was renamed as G. Ad.2 and released in SVRC, Gujarat.

KeyWords
Adenium, G. Ad.2, pot plant, germplasm, hybridization, soilless

INTRODUCTION

Adenium obesum (Forssk.Roem.& Schult), belonging to the family Apocynaceae, is native to Africa, south of the Sahara from Senegal to Sudan and Kenya, and through Saudi Arabia, Oman, and Yemen (Plaizier, 1980, Dimmitt and Hanson,1991). It is gaining a high popularity as pot plant (Paul *et al.,* 2015, Chavan *et al*., 2016), although until recently it was being considered as relatively new flowering plant in the ornamental plant industry (McBride *et al*., 2014, Singh *et al*., 2018). It is now widely cultivated as an ornamental plant in many humid, tropical countries including India, Philippines and Thailand with great relevance in the ornamental market (Wannakrairoj, 2008, Versiani *et al.,* 2014).

Adenium is a desirable pot plant owing to its compact growth habit, thick trunk like structure with showy caudex, good branching and flowering for display in balconies and verandas, besides being an excellent plant for xeriscaping and roof top gardens (Chavan *et al*., 2016, Colombo *et al*., 2016 and Colombo *et al*., 2018).

Research in Adenium towards selecting or breeding superior horticultural forms has been meager (Chavan *et al*., 2018, Singh *et al*., 2017, Singh *et al*., 2019). Adeniums are cross pollinated plants and are highly heterozygous in nature. Breeding through hybridization in adenium for creation of newer genotypes has been in progress at the Department of Floriculture and Landscape Architecture, NAU, Navsari with the basic objective to introduce novel flower colour, high *in situ* flower longevity and multipetalous forms. Among the different crosses studied, a germplasm collection MSDSH1 (Mung Siam x Double Sweet Heart) showed novel morphological character for flower colour and flower form with attractive bright reddish purple coloured ten petals in each flower which was further multiplied by grafting and evaluated for its stability and other flowering parameters along with Mung Siam, Double Sweet Heart and commonly grown local germplasm collection *viz*., Local Pink as check.

MATERIALS AND METHODS

The present investigation 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) during year 2016-18. Four different germplasm *viz*., G_1-MSDSH1 (Mung Siam x DSH), G_2-Mung Siam , G_3-Double Sweet Heart, G_4-Local Pink as check were evaluated under completely randomized design system with four repetitions. The plants were planted in pot size 13 cm height x 15 cm width and were placed at a spacing of 30 cm x 30 cm on stands in the greenhouse.The recommended package of practices (Singh *et al.* 2018) was followed for raising the crop. Five plants from each germplasm were selected randomly and were tagged for recording the observations on flowering parameters namely, the number of flowers per cluster, flower weight, flower longevity, flower diameter and corolla diameter and corolla length during the two years of research. Consumer preference was also estimated as display quality based on 5 point visual score for flower colour form and overall appeal. The data of two years were pooled and analysed statistically as per the statistical software for CRD design and the results were used to evaluate the performance of the different germplasm collections for various flowering parameters.

RESULTS AND DISCUSSION

Flower parameters Number of flowers per clusters and *in situ* flower longevity ultimately decide the ornamental pot plant value in adenium, which in turn influences the consumer's preference. Besides, variation in the number of flowers per clump or cluster is an important yield contributing trait in flower crops (Sankari *et al*., 2016). MSDSH1 recorded significantly maximum flowers per cluster (10.28, 10.20 and 10.23 respectively) followed by Double Sweet Heart in both the years *i.e.* 2016-17 and 2017-18 and pooled data, Table 1. *In situ* flower longevity was observed maximum in MSDSH1 (11.48, 12.35 and 11.91 days) followed by Double Sweet Heart (11.38, 11.25 and 11.31 days) during both the years and pooled data. Further, maximum flower weight was observed in Double Sweet Heart (1.53, 1.70 and 1.72 g) that was at par with MSDSH1 as shown in the two years and pooled data respectively (Table 1). Genetic makeup of the germplasm along with the management factors and environmental conditions govern the overall plant growth. It is the genetic factor that expresses morphological differences when different germplasm collections are grown under identical conditions under same management practices. Thus, variation among different germplasm can be attributed to differences in genetic makeup. These results are in agreement with the earlier observations of Dimmitt (1998) and Varella *et al*. (2015) and Singh *et al*. (2017) in Adenium.

Two years data

Table 1. Variation in number of flowers per cluster, flower weight and flower longevity in germplasm collections of Adenium

Germplasm		No. of flowers/ cluster			Flower weight (g)			Flower longevity (days)		
		2016-17	2017-18	Pooled	2016-17	2017-18	Pooled	2016-17	2017-18	Pooled
G_1–$MSDSH_1$(G.Ad.-2)		10.28	10.20	10.23	1.53	1.70	1.61	11.48	12.35	11.91
G_2-Mung Siam		4.23	4.25	4.23	0.65	0.72	0.68	8.43	8.63	8.52
G_3-DSH		8.50	8.53	8.51	1.75	1.70	1.72	11.38	11.25	11.31
G_4-Local Pink (check)		4.05	4.15	4.10	0.93	0.88ww	0.90	6.50	6.50	6.50
T	S.Em ±	0.248	0.235	0.186	0.064	0.059	0.129	0.227	0.302	0.180
	C.D. 0.05	0.76	0.72	0.573	0.20	0.18	0.397	0.70	0.93	0.554
Y	S.Em ±	-	-	0.108	-	-	0.031	-	-	0.139
	C.D. 0.05	--	-	0.332	-	-	0.095	-	-	0.428
T x Y	S.Em ±	-	-	0.216	-	-	0.063	-	-	0.278
	C.D. 0.05	-	-	0.665	-	-	0.194	-	-	0.856
CV%		7.33	6.93	6.40 7.78	10.51	9.51	10.36 9.61	4.82	6.23	5.82 5.34

Table 2. Variation in flower diameter, corolla length and corolla diameter of GAd.-2, parents and local Pink check in Adeniumw

Germplasm		Flower diameter (cm)			Corolla diameter (cm)			Corolla length (cm)		
		2016-17	2017-18	Pooled	2016-17	2017-18	Pooled	2016-17	2017-18	Pooled
G_1–$MSDSH_1$(G.Ad.-2)		7.10	7.03	7.06	1.48	1.45	1.46	3.45	3.23	3.33
G_2-Mung Siam		5.71	6.08	5.89	1.65	1.60	1.62	3.28	3.25	3.26
G_3-DSH		7.28	7.13	7.20	1.45	1.48	1.46	4.03	4.00	4.01
G_4-Local Pink (check)		5.85	6.03	5.93	1.38	1.48	1.42	2.95	2.88	2.91
T	S.Em ±	0.163	0.162	0.124	0.067	0.068	0.053	0.095	0.090	0.070
	C.D. 0.05	0.52	0.51	0.382	NS	NS	0.163	0.29	0.28	0.215
Y	S.Em ±	-	-	0.074	-	-	0.029	-	-	0.042
	C.D. 0.05	-	-	0.228	-	-	0.089	-	-	0.129
T x Y	S.Em ±	-	-	0.148	-	-	0.058	-	-	0.084
	C.D. 0.05	-	-	0.456	-	-	0.178	-	-	0.258
CV%		5.03	4.96	4.55 5.39	9.00	9.13	7.79 10.15	5.56	5.37	5.01 5.91

Flower size and flower morphology in terms of the number of petals per flowers and flower colour are the important parameters for ornamental pot plants. Traditionally, genetic diversity studies based on differences in morphological characters and qualitative traits has been used as a powerful tool in the classification of cultivars and also to study taxonomic status (Lalitha Kameswari *et al.* 2014). In the present study, flower diameter and length of the corolla tube are significantly differed in different germplasm (**Table 2**). Flower diameter was significantly superior in DSH (7.28, 7.13, 7.20 cm) and at par with MSDSH1 while that of Mung Siam was minimum (5.71, 6.08, 5.89 cm) as seen during the two years as well as in the pooled data respectively. Further, the corolla diameter was non significant during the two years although corolla length (4.03, 4.0,4.01 cm) was maximum in Double Sweet Heart and followed by MSDSH1. Number of petals were ten in MSDSH1 and Double Sweet Heart as compared to Mung Siam and Local Pink having five petals only (**Table 3, Fig. 1and 3**). Consumer preference for MSDSH1 was also found to be the highest with maximum score for flower colour (5), flower form (4.65) and overall appeal (4.7) **(Fig2**). Variation in different floral characters might be owing to the divergence in these germplasm as opined by earlier workers (Singh *et al*., 2017, Chavan *et al.,* 2017, Chavan *et al*., 2018, Singh *et al*., 2019). Variation in flower size and the number of flowers per plant in different varieties have been earlier reported in various ornamental pot plants like chrysanthemum (Mohapatra *et al*., 2000), rose (Shahrin *et al.,* 2015) and Orchids (Sugapriya *et al.,* 2012).

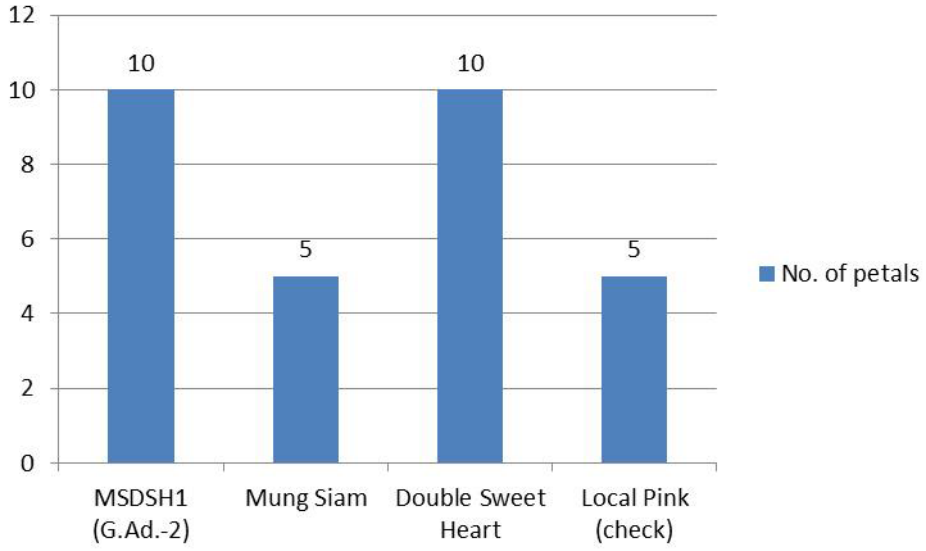

Fig.1.Number of petals per flower in different germplasm in Adenium

Table 3. Morphological characters of different germplasm in adenium

Sr.No.	Characteristics	MSDSH G. Ad.-2m	Mung Siam	DSH	Local Pink
1	Leaf colour	Green	Green	Green	Green
2	Flower colour	Reddish Purple	Purple	Pink	Pink
3	Petal margin colour	Strong Purple	Strong Purple	Dark pink shade	Slightly wavy
4	Petal tip	Broadly pointed petal tip	Pointed	Obtuse	Slightly Pointed
5	Flower form	Double type	Single whorl	Double type	Single whorl
6	No. of petals	10	5	10	5
7	Corolla colour	White	Light yellow	Light Yellow	White
8	Petal margin character	Wavy	Wavy	Wavy	Slightly Wavy

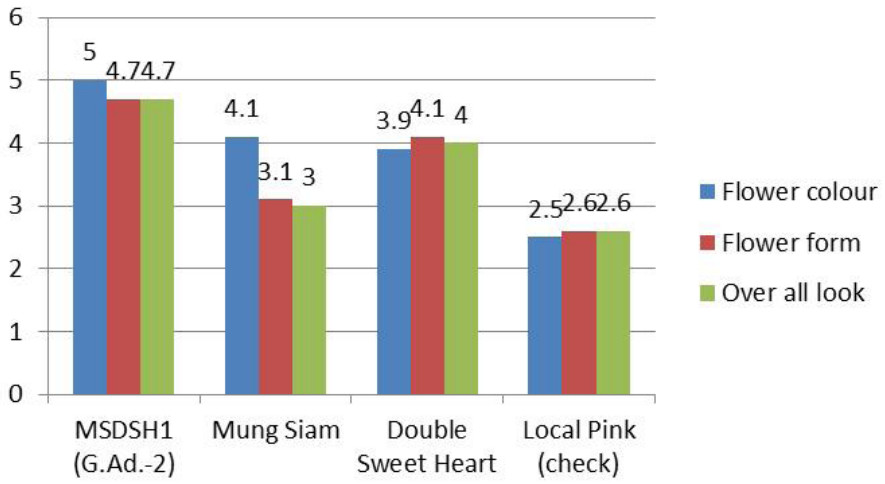

Fig. 2. Scoring for consumer preference on visual basis (5 point scale) fordifferent germplasm for Adenium

(A)Multipetal flower type

B) Compact growth habit

Fig. 3.Gujarat Adenium 2

Adenium genotype MSDSH1 assumes significance owing to its superiority and novelty in respect of flower colour and flower morphology with reddish purple shaded ten petals in each flower as well its superior performance with respect to the number of flowers per cluster, flower size and *in situ* flower longevity. Hence, the germplasm collection MSDSH1 has been renamed as Gujarat Adenium2 (G. Ad.2) and further released as a variety in the SVRC, Gujarat. The variety G. Ad.-2 is recommended to nursery men as well as landscape designers for growing as pot culture as well as for landscaping and roof top gardening.

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