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Effect of different Media on Seed Germination and Growth of Adenium obesum

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ABSTRACT

Adenium obesum is a succulent plant commonly known as 'Desert Rose' and is an important ornamental pot plant propagated through seed, cuttings and grafting methods. The plant is in massive demand for its striking flower colours and sculptural caudex. The plants propagated through seeds form better and bigger caudex and media plays a very important role in germination of seeds and growth of plants. So, an experiment was conducted for two years (2020-21 and 2021-22) to study the effect of media on seed germination and growth of adenium. Ten media compositions comprising four media *i.e.*, sand, cocopeat, farm yard manure and vermicompost alone as well as mix compositions of these media in different ratio (v/v) were used as substrate in the experiment. The experiment was conducted in CRD design in trays. The results reveal that sowing of seeds of adenium in cocopeat as well as sand resulted in maximum germination percentage (89.29 % and 84.88 %, respectively) whereas germination speed index (5.66) was found maximum in sand. For seedling growth parameters, media composition of cocopeat + vermicompost (1:1 v/v) gave the maximum number of leaves (22.20), caudex diameter (2.32 cm), caudex length (3.13 cm) and tap root length (7.36 cm).

Keywords: Adenium, media composition, germination, caudex

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INTRODUCTION

The 'Desert rose' *Adenium obesum* (Forsk.), 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 but has been introduced and naturalised in different parts of the world (Plaizier, 1980). The species is extensively used in landscaping because of its easy maintenance and tolerance to drought, as well as because of its variations in flower shapes and striking colours ranging from pink, red, white to yellow, as well as sculptural caudex. For many years, they are grown as pot plant and are commonly used for making bonsai. This plant is caudiciform, which means it bears roots or swollen stem that helps to preserve water. It can be propagated through seeds, cuttings and grafting. Though. The commercial propagation of the species practiced mainly through seeds due to the reason that sexually propagated plants have a well-developed caudex and main roots compared to the ones propagated by cuttings. The adenium hybrids are mostly multiplied through grafting in which *A. obesum* is used as rootstock. To ensure the propagation of a species and its subsequent sustainable exploitation, knowledge of its seed germination process as well as the ideal substrates for the germination, establishment and development of seedlings is essential. Suitable growing media is expedient for the production of quality seedlings as this affects the development and functional rooting system. A suitable growing medium provides sufficient anchorage to the plant, serves as a reservoir of nutrients and water, and permits oxygen diffusion to the roots and gaseous exchange between the roots and atmosphere outside the root substrate (Abad *et al.* 2002). Keeping in view, the increase in demand of this plant among landscapers, nurserymen and plant lovers, this study was conducted to find out the best media for seed germination and seedling growth and development of adenium for large scale production.

MATERIALS AND METHODS

The experiment was conducted at the Floriculture Nursery, College of Horticulture, S. D. Agricultural University, Jagudan, Mehsana for two years (2020-21 and 2021-22). In both the years, freshly harvested seeds of adenium have been sown during the month of June in plastic trays of 45 cm x 30 cm size, filled with different media as per treatments. In each treatment forty seeds were sown. The experiment was conducted in a completely randomized design and replicated thrice under shade net condition. Treatment consisted of ten different media as treatments *i.e.*, T_1 Sand, T_2 Cocopeat, T_3 FYM, T_4 Vermicompost, T_5 Sand + Cocopeat, T_6 Sand + FYM, T_7 Sand + Vermicompost, T_8 Cocopeat + FYM, T_9 Cocopeat + Vermicompost, T_{10} FYM + Vermicompost. The germination percentage and germination speed index were calculated using the formula given by Agrawal (1995). Seedling growth parameters like the number of leaves, diameter of caudex,

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Table 1: Effect of different media on germination per cent and germination speed index of adenium seeds

	Germination per cent (%)			Germination speed index		
Treatment	**2020-21**	**2021-22**	**Pooled**	**2020-21**	**2021-22**	**Pooled**
T_1 – Sand	85.00	84.76	84.88	5.44	5.88	5.66
T_2 - Coco peat	90.00	88.57	89.29	3.33	3.79	3.56
T_3 – FYM	35.00	24.76	29.88	0.59	0.62	0.61
T_4 – Vermicompost	80.00	80.95	80.48	3.60	3.82	3.71
T_5 - Sand + Coco peat (1:1 v/v)	83.33	81.90	82.62	4.60	4.70	4.65
T_6 - Sand + FYM (1:1 v/v)	30.00	29.52	29.76	0.90	0.81	0.86
T_7 - Sand +Vermicompost (1:1 v/v)	60.00	67.62	63.81	4.17	4.22	4.19
T_8 - Cocopeat + FYM (1:1 v/v)	45.00	47.62	46.31	2.21	2.14	2.18
T_9- Cocopeat + Vermicompost (1:1 v/v)	80.00	78.10	79.05	4.78	4.64	4.71
T_{10} - FYM + Vermicompost (1:1 v/v)	38.33	44.76	41.55	1.44	1.46	1.45
S. Em±	2.98	2.15	1.84	0.15	0.08	0.09
C.D. at 5%	8.79	6.34	5.25	0.44	0.22	0.24

caudex length and tap root length were recorded 90 days after sowing. Data were statistically analysed in individual year and also pooled over two years.

RESULTS AND DISCUSSION

Effect of different media on germination characters of *A. obesum*

It is evident from the data presented in Table 1 that different media combinations have significantly affected the seed germination percentage and germination speed index. Among different media, seeds sown in coco-peat has resulted in maximum germination per cent *i.e.*, 90.00 %, 88.57 % and 89.29 % for the years 2020-21, 2021-22 and in pooled data, respectively which was found statistically at par with T_1 and T_5 during the year 2020-21 and with T_1 (sand) during the year 2021-22 and in pooled data which conformed with the data presented by Santos *et al.* (2020). It is also apparent from the data presented in Table 1 that the maximum germination speed index was found in the seeds sown in the sand (T_1) for the years 2020-21 (5.44), 2021-22 (5.88) and in pooled data (5.66). Colombo *et al.* (2015) reported a similar finding in adenium. Seeds require water, oxygen and proper temperature for germination as well as water helps in softening the protective seed coat. Oxygen aids in aerobic respiration so that they can produce energy for germination and growth. The embryo gets energy by breaking down its food stores. Cocopeat has good water holding capacity and moisture supply as well as sufficient porosity which permits adequate moisture and gaseous exchange between media and seed which helps better seedling emergence. Similarly, sand has physical characteristics like high porosity, good water drainage and aeration, which are essential requirements for seed germination. The germination performance of desert rose seeds can be attributed to the adaptation and occurrence of species in sites having sandy soils (Santos *et al.*, 2020).

Effect of different media on seedling growth characters of *A. obesum*

Significant effect of different media was recorded on seedling growth characters *viz.* number of leaves, diameter of caudex (cm), caudex length (cm) and tap root length (cm) showed (Table 2). Significantly maximum number of leaves (22.07, 22.33 and 22.20), caudex diameter (2.36 cm, 2.28 cm, and 2.32), caudex length (3.10 cm, 3.16 cm and 3.13 cm) and tap root length (7.24 cm, 7.47 cm and 7.36 cm) were observed in T_9 *i.e.*, cocopeat + vermicompost for the experimental year 2020-21, 2021-22 and in pooled data respectively. The results are in close conformity with the findings of Bijewar *et al.* (2021) in adenium seed growth and Bhardwaj (2014) in papaya. The media composition of cocopeat + vermicompost in 1:1 ratio (v/v) as substrate resulted in maximum caudex diameter this might be due to the modification and improvement in the physical properties of the media and nutritional factors. Better nutrient availability leading to higher production of photosynthetically functional leaves in this treatment might be reason for subsequent better girth of seedling. The microorganisms present in vermicompost and microbial consortium synthesize plant growth hormones mainly auxin, gibberellin and cytokinin. The maximum root growth might be due to more availability of auxin in this growing media. Cocopeat helped the media to acquire good physical and chemical properties by decreasing compactness and increasing the porosity of the media which helps in better root growth. Moreover, vermicompost is reported as having bioactive principles considered to be beneficial for root

Table 2: Effect of different media on seedling growth parameters at 90 days of seed sowing

Treatments	Number of leaves			Caudex diameter (cm)			Caudex length (cm)			Tap root length (cm)		
	2020-21	2021-22	Pooled	2020-21	2021-22	Pooled	2020-21	2021-22	Pooled	2020-21	2021-22	Pooled
T_1 – Sand	11.60	13.27	12.43	1.01	1.15	1.08	2.76	2.78	2.77	3.97	4.80	4.39
T_2 - Coco peat	8.07	7.67	7.87	1.02	0.99	1.01	2.53	2.57	2.55	4.20	5.03	4.62
T_3 – FYM	14.2	14.07	14.13	1.53	1.49	1.51	2.77	2.67	2.72	3.89	3.97	3.93
T_4 – Vermicompost	20.27	20.33	20.30	1.90	1.78	1.84	2.85	2.73	2.79	6.67	6.63	6.65
T_5 - Sand + Coco peat (1:1 v/v)	10.40	11.00	10.70	1.02	0.91	0.96	2.82	2.85	2.84	3.67	3.87	3.77
T_6 - Sand + FYM (1:1 v/v)	18.20	16.93	17.57	1.29	1.40	1.35	2.87	2.73	2.80	4.47	4.60	4.54
T_7 - Sand +Vermicompost (1:1 v/v)	20.07	20.47	20.27	1.67	1.66	1.66	2.90	2.87	2.88	6.78	6.33	6.55
T_8 - Cocopeat + FYM (1:1 v/v)	12.93	13.67	13.30	1.24	1.43	1.34	2.94	2.91	2.93	5.14	5.22	5.18
T_9-Cocopeat+Vermicompost (1:1 v/v)	22.07	22.33	22.20	2.36	2.28	2.32	3.10	3.16	3.13	7.24	7.47	7.36
T_{10} - FYM + Vermicompost (1:1 v/v)	15.53	16.73	16.13	1.24	1.26	1.25	2.79	2.79	2.79	4.93	4.28	4.60
S. Em±	0.60	0.64	0.44	0.05	0.05	0.03	0.06	0.08	0.05	0.22	0.24	0.16
C.D. at 5%	1.79	1.90	1.27	0.15	0.17	0.11	0.18	0.24	0.14	0.64	0.72	0.47

growth, root initiation, germination and growth of the plant (Colombo *et al.* 2016 and Dharmveer *et al.* 2016).

CONCLUSION

From this study, it could be concluded that Sand as well as Cocopeat both can be used for getting higher germination percentage of adenium seeds while faster germination can be achieved by using sand as media. For better growth and development of seedlings, cocopeat + vermicompost 1:1 v/v is best media composition.

REFERENCES

Abad M, Noguera P, Puchades R, Maquieira A and Noguera V. 2002. Physico-chemical and chemical properties of some coconut dusts for use as a peat substitute for containerized ornamental plants. *Bioresource Technology* **82**(3): 241-24.

Agrawal RL. 1995. *Seed technology* (2nd ed.) Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi, Seed vigour test 583-590.

Bhardwaj RL. 2014. Effect of growing media on seed germination and seedling growth of papaya cv. 'Red lady'. *African Journal of Plant Science* **8**(4): 178-184.

Bijewar AL, Gajbhiye RP, Panchbhai DM, Thakare AA and Ladhi DP. 2021. Effect of media and GA_3 on growth of Adenium (*Adenium obesum*). *J. Soils and Crops* **31**(1): 134-138.

Colombo RC, Favetta V, Yamamoto LY, Alves GA, Abati J, Takahashi LS and Faria RT. 2015. Biometric description of fruits and seeds, germination and imbibition pattern of desert rose [*Adenium obesum* (Forssk.), Roem. & Schult.]. *Journal of Seed Science* **37**(4): 206-213.

Colombo RC, Favetta V, Melo TR, Faria RT and Silva MA. 2016. Potting media, growth and build-up of nutrients in container-grown desert rose. *Australian Journal of Crop Science* **10**(2): 258-263.

Colombo RC, Favetta V, Carvalho DU, Cruz MA, Roberto SR, Faria RT 2017. Production of desert rose seedlings in different potting media. *Ornamental Horticulture* **23**(3): 250-256.

Dharmveer, Sood M, Aziem S, Iqbal K, Hussain A and Mahato S. 2016. Effect of different growing media on seed germination and growth parameters of *Angelica glauca* Edgew. *Indian Forestor* **142**(11): 1093-1099.

Plaizier AC. 1980. A revision of Adenium Roem. and Schult. and of Diplorhynchus Welw. Ex Fic. and Hiern (Apocynaceae). *Mededelingen Landbouwhoge school*, 80-12, 1–40.

Santos CA, Guilherme AH, Gomes GA, Rafaela AP, Sodre GA, Rafael MB. 2020. Seed germination and development of desert rose seedlings (*Adenium obesum* Roem. & Schult) on different substrates. *Ciencia Rural* **50**(12):20190691.

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