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Effect of different substrates on germination of *Adenium Arabicum*

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Abstract
In recent times, the Adenium has gained prominence in the ornamental and landscape gardening because of its striking Caudex forms and flower colour. However, commercial production of these species is relatively new in crop management, especially recommended substrates for germination is not yet standardized. The goal of this experiment was to know, how different media affect seed germination and seedling production in Adenium Arabicum. Seeds of Adenium were sown in various substrates like Sand, Redsoil+Sand+FYM (2:1:1), Red soil, Perlite, Vermicompost, Redsoil+Sand+Coir compost (2:1:1), Vermiculite and Coir compost. The results of this study revealed that vermiculite had a greater germination rate (82%) and produced higher quality seedlings in terms of shoot length (5.20cm), taproot length (3.84cm), plant height (9.04cm) and caudex diameter (3.8cm). As a result, media containing Vermiculite is best suitable for Adenium Arabicum rootstocks for both better germination and seedling growth.

Keywords: Adenium Arabicum, Seeds, Germination, Substrates

1. Introduction
Adenium is member of the botanical family Apocynaceae. It includes about 215 genera and about 2100 species of mainly tropical trees, shrubs and vines with opposite leaves. Adenium contains whitish mostly poisonous milky sap that exudes from any cut surface that serves against grazing animals. Adenium are characteristics plants of hotter, drier regions of Africa and their origin extends from East Asia to Socotra. These species are Caudiciform, with swelling stems and roots that serve as the principal organ for water storage. The flowers have five sepals and five petals of varied colours united into a floral tube (Dimmitt *et al*., 2009) [3]. Despite its wide floral diversity, the plants are primarily regarded for the structure and development of larger Caudex. *Adenium Arabicum* is the most valuable species because of its larger Caudex. The plant is sold as seedlings or flowering vases or other similar containers. As a result, the use of proper substrate is critical for the large scale production of these species in order to give physical and chemical support as well as to ensure better seed germination and seedling development.
Ornamental plants are grown on variety of substrates. However, in order to get appropriate results, it is necessary to characterize the physical and chemical properties of the media which are critical during potting stages (Pacheco *et al*., 2006) [7]. Among physical properties density and porosity of substrates are related to availability of water and air to the media. They may have a direct impact on seedling emergence. Among chemical qualities pH and EC are important (Kampf *et al*., 2006) [6]. Constant monitoring of these qualities provides the grower with an overview of media salinization and acidification, which in turn help in fertilization of substrates without harming seedling growth. Considering the importance and ornamental value, the experiment was conducted to study the effect of different media on seed germination and seedling production in *Adenium Arabicum*.

2. Materials and Methods
The study was carried out at the Tamil Nadu Agricultural University's Department of Floriculture and Landscape Architecture in Coimbatore during 2022. *Adenium Arabicum* seeds were tested for germination in various growing media. A completely randomized design (CRD) with eight treatments having three replications and 30 seeds per treatment was employed in this study. Seeds were planted in protrays having 50 cells each of depth 5 cm with different substrates like Sand (T_1), Redsoil+Sand+FYM (2:1:1) (T_2), Red soil (T_3), Perlite (T_4), Vermicompost (T_5), Redsoil+Sand+Coir compost (2:1:1) (T_6), Vermiculite (T_7) and Coir

compost (T_8). The pH of the media was tested before seed sowing. The seeds were sown at a depth of 2 cm in protray and were covered with respective media. As seed germination is very vulnerable to lack of moisture, these seeds with protrays are kept in the shade for one month and irrigated daily to keep the water retention capacity of substrates between 80-90%. After a month protrays were moved from semi shade condition to open sun light. The sprouting of seedlings was recorded on daily basis until it ceased. The percentage of germination and growth of the seedlings was calculated in each treatment. After the last emergence, the growth parameters of the seedlings such as Caudex diameter, shoot length, root length and height of seedlings were recorded. By using AGRIS (International System for Agricultural Science and Technology) for significance the data was subjected to analysis of variance (ANOVA) and the turkey test (t-test) was used to compare the means at a 5% probability level.

3. Result and Discussion

In this experiment different media exhibited significant difference on both germination percentage and the growth parameters such as Caudex diameter, shoot length, taproot length and total plant height of seedlings. Impact of different media on seedling emergence of *Adenium Arabicum* was detailed in Table 1. The observations were recorded at 15 days interval. The maximum (82%) and early germination was observed in Vermiculite (T_7). Vermiculite showed highest initial germination of seeds within 15 days. Next to Vermiculite, Perlite (T_4) and Sand (T_1) showed maximum emergence percentage of 62% and 53% respectively. Whereas, other treatments i.e., Redsoil+FYM+S and (2:1:1) (T_2), Red soil (T_3), Redsoil+Sand+Coir compost (2:1:1) (T_6) and Coir compost (T_8) showed less than 50% of emergence. The least germination percentage of 13% was recorded in Vermi compost (T_5) (Table 1).

Effect of different media on shoot length of *Adenium Arabicum* was detailed in Table 2. The observation was recorded with 20 days interval. The maximum shoot length (5.2 cm) was recorded in Vermiculite (T_7). Next to Vermiculite, Sand (T_1) and Red soil (T_3) showed increase in shoot length of 4.7 cm and 4.6 cm respectively. The least shoot length of 3.6 cm was observed in Coir compost (T_8).

Impact of different substrates on the tap root length of *Adenium Arabicum* was detailed in Table 3. The highest taproot length was recorded in Vermiculite (T_7) with 1.8 cm, 3.1 cm and 3.84 cm on 40th day, 60th day and 80th day respectively. After Vermiculite, Coir compost (T_8) had the maximum taproot length of 3.23 cm. whereas, the minimum taproot length of 2.2 cm was recorded in Vermicompost (T_5) (Table 3). Effect of different substrates on total plant height of *Adenium Arabicum* was detailed in Table 4. The maximum height (9.04 cm) of seedling was recorded in Vermiculite (T_7). Next to Vermiculite, Red soil (T_3) showed the maximum height (7.6 cm). Among all treatments the minimum plant height (6.1 cm) was recorded in Red soil+FYM+S and (2:1:1) (T_2) (Table 4).

Impact of different media on Caudex girth of *Adenium Arabicum* seedlings was detailed in Table 5. The maximum Caudex girth (3.8 cm) was recorded in Vermiculite (T_7). Perlite (T_4) showed second maximum Caudex girth (3.2 cm). The minimum Caudex diameter (2.6cm) was observed in Redsoil+FYM+S and (2:1:1), (T_2), (Table 5). The seeds after sowing was placed in shade as seedlings survival was greatly influenced by shading (Vander Walt, 2017) [11]. After emergence the seedlings was kept in full sun for faster growth of seedlings. From the above mentioned results of emergence percentage and growth parameters of seedlings, Vermiculite showed the best effect on seed emergence, Caudex girth, shoot length, taproot length and total plant height. This results may be due to the pH of substrate, Vermiculite have pH of 7.23 which is neutral pH that provides better growth of plants. The Vermicompost showed least emergence as it has nearly acidic pH of 6.2. The availability of nutrients for plants as well as complexation and adsorption nutrient reactions are directly related to the pH of substrates (Kamf *et al.*, 2006) [6]. Vermiculite helps in removal of Fulvicacid concentration by intercalation with polycations (Gilberto Abateo, 2006) [5].

Vermiculite is composition of Aluminum-iron magnesium silicates and the particle size of Vermiculite is 0.1 mm to 15 mm, which helps to aerate soil easily. In addition to the above, Vermiculite has the heat stability and expands 10 times more than its original volume on watering. Vermiculite has the best water retention capacity and pH that helps in providing proper drainage, nutrients and easy aeration which in turn helps for better germination of seeds and growth of seedlings. This might have exerted the better performance on germination and establishment of Adenium seeds. This is in line with the findings of Gairola (2011) [11], Bita Wisdom *et al.* (2017) [2] and Tanya.

Table 1: Impact of different media on seedling emergence of *Adenium Arabicum*

Treatments	Germination %		
	15th day	30th day	45th day
T_1 - Sand	28.00	46.00	53.00
T_2 - Red soil+ FYM + Sand	16.00	26.00	33.00
T_3 - Red soil	10.00	22.00	28.00
T_4 - Perlite	46.00	54.00	62.00
T_5 - Vermicompost	3.00	6.00	13.00
T_6 - Red soil + Sand + Coir compost	30.00	43.00	48.00
T_7 - Vermiculite	73.00	78.00	82.00
T_8 - Coir compost	30.00	38.00	42.00
Mean	29.50	39.13	45.12
S.Ed Value	1.27	1.32	1.91
CD Value	2.95	2.80	4.07

Table 2: Impact of different media on Shoot length of *Adenium Arabicum* seedlings

Treatments	Shoot length (cm)		
	40th day	60th day	80th day
T_1 - Sand	3.50	4.30	4.70
T_2 - Red soil+ FYM + Sand	1.60	2.60	3.70
T_3 - Red soil	3.60	4.20	4.60
T_4 - Perlite	2.80	4.50	4.50
T_5 - Vermicompost	2.20	3.50	4.20
T_6 - Red soil + Sand + Coir compost	1.80	3.20	3.80
T_7 - Vermiculite	3.60	4.80	5.20
T_8 - Coir compost	2.60	3.10	3.60
Mean	2.71	3.77	4.28
S.Ed Value	0.12	0.145	0.19
CD Value	0.25	0.31	0.40

Table 3: Impact of different media on Tap root length of *Adenium Arabicum* seedlings

Treatments	Root length (cm)		
	40th day	60th day	80th day
T_1 - Sand	0.80	2.00	2.60
T_2 - Red soil+ FYM + Sand	1.20	1.70	2.40
T_3 - Red soil	1.60	2.60	3.00
T_4 - Perlite	1.40	2.16	2.80
T_5 - Vermicompost	0.90	1.80	2.20
T_6 - Red soil + Sand + Coir compost	0.80	1.66	2.80
T_7 - Vermiculite	1.80	3.10	3.84
T_8 - Coir compost	1.50	3.00	3.23
Mean	1.25	2.25	2.87
S.Ed Value	0.04	0.09	0.11
CD Value	0.94	0.19	0.24

Table 4: Impact of different media on Total plant height of *Adenium Arabicum* seedlings

Treatments	Plant height (cm)		
	40th day	60th day	80th day
T_1 - Sand	4.30	6.30	7.30
T_2 - Red soil+ FYM + Sand	2.80	4.30	6.10
T_3 - Red soil	5.20	6.80	7.60
T_4 - Perlite	4.20	6.60	7.30
T_5 - Vermicompost	3.10	5.30	6.40
T_6 - Red soil + Sand + Coir compost	2.60	4.80	6.60
T_7 - Vermiculite	5.40	7.90	9.04
T_8 - Coir compost	4.10	6.10	6.83
Mean	3.95	6.01	7.13
S.Ed Value	0.19	0.28	0.35
CD Value	0.41	0.59	0.74

Table 5: Impact of different media on Caudex girth of *Adenium Arabicum* seedlings

Treatments	Caudex girth (Cm)		
	40th day	60th day	80th day
T_1 - Sand	2.10	2.83	3.40
T_2 -Red soil+ FYM + Sand	0.70	1.83	2.60
T_3 - Red soil	1.80	2.30	2.80
T_4 - Perlite	2.10	2.80	3.20
T_5 – Vermicompost	1.60	2.40	2.80
T_6 - Red soil + Sand + Coir compost	1.20	2.60	3.10
T_7 - Vermiculite	2.50	3.10	3.80
T_8 - Coir compost	1.40	2.80	3.60
Mean	1.52	2.54	3.18
S.Ed Value	0.09	0.10	0.13
CD Value	0.19	0.21	0.29

4. Conclusion

Effect of different substrates on germination of *Adenium Arabicum* are significant. Out of all treatments, the maximum seed germination (82%), shoot length of seedlings (5.20 cm), taproot length (3.84 cm), plant height of seedlings (9.04 cm) and caudex diameter (3.8 cm) were recorded in Vermiculite (T_7). Based on the experiment conducted and the results obtained, it is evident that Vermiculite (T_7) stands out among the other treatments. Hence, it is concluded that Vermiculite is the best suitable substrate for *Adenium Arabicum* for both seed emergence and effective growth of quality seedlings.

5. References

1. Alves GAC, Freiria GH. *Pilea microphylla* chemical control in desert rose production. International Journal of Current Research. 2016;(8):35624-35627.
2. Bita Wisdom, Kamota Agathar. Effect of different Vermiculite and pine bark media substrates mixtures on physical properties and spiral rooting of Radish (*Raphanus Sativus* L.). Rhizosphere. 2017;(3):67-74.
3. Dimmitt M, Joseph G. Adenium: Sculptural Elegance. Floral Extravagance. Tucson: Scathingly Brilliant Idea, 2009, 152.
4. Gairola KC, Nautiyal AR. Effect of temperatures and germination media on seed germination of *Jatropha curcas Linn*. Advances in Bioresearch. 2011;2(2):66-71.
5. Gilberto Abate, Luciana Bo, Dos Santos. Removal of fulvic acid from aqueous media by adsorption onto modified Vermiculite. Applied Clay Science. 2006;32(3-4):261-270.
6. Kampf AN, Takane RJ. Floricultura: Substrate preparation techniques, Brasilia LK, 2006, 132.
7. Pacheo MV, Motos V, Effect of temperature and substrate on seed germination of Myracrodruon urundev. 2006;(30):359-367.
8. Plaizer AC. A revision of Adenium Roem & Schults and Diplorhynchus Welw. Rx Fic & Hiern (Apocynaceae). Mededlingen Landbouwhogesch. Wageningen Ned, 1980, 80-120.
9. Ronan Carlos Columbo, Vanessa Favetta. Production of desert rose seedlings in different potting media. Ornam. Hortic, (23), 250-256.
10. Tanya Thakur, Harpinder Singh, Influence of potting media compositions on flower production of (*Chrysanthemum Morifolium* Ramat) cultivar Kikiobiory. Journal of Plant Nutrition. 2017;42(15):1861-1867.
11. Vander Walt K, Witkowski ETF. Seed viability, germination and seedling emergence of the critically endangered stem succulent *Adenium Swazicum*, in South Africa, South African Journal of Botany. 2017;(10):1016-1026.