Original Research Article

Seed germination and seedling growth of different Adenium hybrids (*Adenium arabicum*) under Prayagrajagro-climatic conditions

ABSTRACT

An experiment was conducted in the Department of Horticulture, Sam Higginbottom University of Agriculture Technology And Sciences, Prayagraj, during the 2023-2024 period. The study employed Completely Randomized Design (CRD) with 10 hybrids, each replicated thrice. The hybrids tested were Godji x Nomsod, Godji x Ara Champ, Godji x Emerald Tank, Bangkla, Dynamo, Tropido, Dino King, Peth Dino, Susthaskorn, and Peth Phunlan. Among these hybrids the hybrid Godji x Ara Champ exhibited significantly better performance in several parameters, including germination percentage, days to 50% germination, seedling vigor index, seedling height, germination speed index, survival percentage, number of leaves per seedling, leaf area, caudex diameter.This hybrid's performance was found to be at par with the hybrid Dino King in terms of plant height, leaf area, caudex diameter, survival percentage. Consequently, hybrids Godji x Ara Champ and Dino King demonstrated superior performance in both germination and seedling growth under the agro-climatic conditions of Prayagraj.

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Key words: *Adenium, germination, growth, hybrids, seed*

1.INTRODUCTION

Adenium, a genus belonging to the family Apocynaceae, is renowned as a striking exotic houseplant, often recognized by its distinctive appearance resembling a bush or tree, commonly referred to as the desert rose. Highly favored for its low maintenance and ornamental appeal, Adenium holds significant relevance in the market due to its sculptural aspect, remarkable resistance to drought stress, glossy leaves, and strikingly vibrant flowers [8].*Adenium arabicum*, a species of succulent plant, exhibits a striking resemblance to a miniature baobab tree, characterized by its grotesquely swollen trunk. While traditionally considered a distinct species, it is now recognized as a local or morphological form of Adenium obesum. Nonetheless, it remains highly popular among collectors of 'fat plants' [16].

Adenium arabicum shares similarities in appearance with *Adenium obesum*, but is distinguished by its notably massive, squat, and fat caudex, with minimal differentiation between trunk and branches. The bark of this species often displays hues ranging from purplish to dark brown, evoking a distinctively desert-like aesthetic. Its fleshy trunks and short, naked branches are further accentuated by a purple to dark brown coloration. Additionally, *Adenium arabicum* is characterized by larger, thick, fleshy leaves that boast a shiny surface on both the upper and lower sides. Despite variations in habit, most cultivated plants are hybrids, and only a few cultivar names have a formally recognized description.

Plants grown from seed often develop the most astonishing shapes of caudex within just 10 years of growth. Propagation by seeds is preferred to ensure the optimal development of the caudex, the distinctive swollen trunk characteristic of Adenium plants. Desert rose can be propagated via seeds or cuttings, with vegetative propagation methods including root cuttings, grafting, and air layering also being viable options. Modern hybrids of Adenium exhibit luxurious flowering, adding to their ornamental appeal. Even during dormancy, when the plant is not actively growing, its beauty is retained due to the captivating shape of the caudex, often characterized by a thickening below the main trunk [13].

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The propagation of the species occurs mainly by seeds, whereas plants from seeds present more developed caudex and main root when compared to the ones propagated by cuttings.To ensure optimal seed germination and seedling growth, selecting the appropriate substrate is crucial for these species when produced on a large scale. Although the easiest method of propagation is through cuttings, plants obtained via this method are often not well received in the ornamental market. This is because they tend to produce underground caudex and lack the same exuberance as plants propagated from seeds . Therefore, it is essential to prioritize seed propagation and evaluate the seedling growth of different adenium hybrids to ensure the propagation of species with well-developed caudex.

2. MATERIALS AND METHODS

The present investigation entitled **Seed germination and seedling growth of different Adenium hybrids (*Adenium arabicum*) under Prayagrajagro-climatic conditions** was carried out in the Department of Horticulture, Sam Higginbottom University of Agriculture Technology and Science, Prayagraj, during 2023-2024.The experimental material consisted of 10 adenium hybrids *viz.*,Godji x Nomsod, Godji x Ara Champ, Godji x Emarald Tank, Bangkla, Dynamo, Tropido, Dino King, Peth Dino, Susthakorn and Peth Phunlan.whereas 15 number of plants per hybrids were used respectively.The experiment was laid out in Completely Randomized Design (CRD) with 10 hybrids and each hybrid was replicated thrice. The data recorded during the experiment were subjected to statistical analysis by using analysis of variance (ANOVA).

Comment [MP3]: Please mention the details of the data recorded

3.RESULT AND DISCUSSION

3.1 SEED GERMINATION PARAMETERS

Among the seed germination parameters studied, significant variations were observed among the 10 Adenium hybrids and the data is presented in Table 1.

Significantlyhigher germination percentage (100%) was observed in hybrid H_2 (Godji x Ara Champ) which was found to be at par with hybrid H_7 (Dino King, 93.33%) while lesser germination (60%) was observed in H_8 (Peth Dino). Variation in germination percentage could be influenced by the parental genotypes, their genetic makeup as well as prevailing temperature during the growing period. Similar results are recorded in adenium by [2]. Significantly, the lesser number of days to 50% germination (5.33) was observed in hybrid H_2 (Godji x Ara Champ) which was found to be at par with hybrid H_4 (Bangkla, 5.57) while more number of days to germination (8.40) was observed in H_8 (Peth Dino).The variation in germination days can be influenced by the genetic makeup of the parental genotypes and the environmental conditions during the growing period. Similar results have been recorded in adenium by [2] indicating that these factors play a significant role in germination percentages. Similar findings were observed in [15], [1], [11], [18] and [12].

Significantly, higher seedling vigour index (1576) was observed in hybrid H_2 (Godji x Ara Champ) which was found to be at par with hybrid H_7 (Dino King, 1080) while lesser seedling vigour index (440) was observed in H_8 (Peth Dino) Variation in seedling vigour index depends upon the shoot length of the seedlings and influenced by the parental genotypes, their genetic makeup as well as prevailing temperature during the growth period. Similar results recorded in tuberose by [14] Significantly, higher germination speed index (1.22) was observed in hybrid H_2 (Godji x Ara Champ) which was found to be at par with hybrid H_7 (Dino King, 1.02) while lesser germination speed index (0.77) was observed in H_8 (Peth Dino) Difference in germination speed index may be due to the inheritant character and genetic makeup of the hybrids and the prevailing environmental conditions. Similar results were recorded in adenium by [5].

3.2 VEGETATIVE PARAMETERS

From the present investigation, it is concluded that significant variations were observed among the 10 Adenium hybrids studied across all the vegetative parameters and the data is presented in Table 2.

Significantly, higher seedling height (13.03) was observed in hybrid H_2 (Godji x Ara Champ) which was found to be at par with hybrid H_7 (Dino King, 12.57) while lesser seedling height (7.67) was observed in H_8 (Peth Dino) Difference in seedling height can be attributed to their genetic makeup and environmental conditions prevailed. Similar results were recorded in desert rose by [4].Significantly, more number of leaves (23.33) was observed in hybrid H_2 (Godji x Ara Champ) which was found to be at par with hybrid H_7 (Dino King, 22) while lesser number of leaves (16.67) was observed in H_8 (Peth Dino). The variation in number of leaves per plant among the hybrids might be due to the rate of vegetative growth among the hybrids that could be attributed to genetic makeup and could

have been further influence by environmental conditions. Similar results were recorded in adenium by [6].

Significantly maximum leaf area (12.83) was observed in hybrid H_2 (Godji x Ara Champ) which was found to be at par with hybrid H_7 (Dino King, 12.17) while minimum leaf area (5.37) was observed in H_8 (Peth Dino)leaf area of all the hybrids were recorded and significant differences were observed at 360 days after transplanting. Significant variation in leaf area can be attributed to parental genotypes of the hybrids along with environmental conditions. Similar results were shown in adenium by [13].Significantly, higher survival percentage (100%) was observed in hybrid H_2 (Godji x Ara Champ) which was found to be at par with hybrid H_7 (Dino King, 93%) while lesser survival percentage (53%) was observed in H_8 (Peth Dino).Germinated seeds are highly vulnerable to lack of moisture for growth, fire, herbivores, burial under litter, being washed away by rain, and heat on bare soil, and hence up to 90 % of released seed will not make it past the seedling stage were recorded in adenium by [16]. Significantly maximum caudex diameter (4.10) was observed in hybrid H_2 (Godji x Ara Champ) which was found to be at par with hybrid H_7 (Dino King, 3.80) while lesser germination (1.17) was observed in H_8 (Peth Dino) caudex diameter of all hybrids were recorded and significant differences were observed at 360 days after transplanting. Significant variation in caudex diameter can be attributed to genetic variability of the hybrids along with environmental conditions which govern the plant growth were recorded in adenium by [7]and [17].

Table 1. Seed Germination parameters of different adenium hybrids

Hybrids	Germination percentage	Days to 50% germination (days)	Seedling vigour index (%)	Germination speed index
Godji x Nomsod	80	6.07	546.67	0.75
Godji x Ara Champ	100	5.33	1576.67	1.22
Godji x Emarald Tank	80	7.83	588.67	0.73
Bangkla	86	5.57	1043.33	0.96
Dynamo	73	6.27	606.67	0.86
Tropido	66	7.75	583.33	0.91
Dino King	93	5.80	1080.00	1.02
Peth Dino	60	8.40	440.00	0.77
Susthakorn	80	6.33	856.67	0.84
Peth phunlan	73	8.20	637.33	0.78
F- Test	**S**	**S**	**S**	**S**
SE(d)±	**8.43**	**1.04**	**129.07**	**0.03**
$CD_{(0.05)}$	**17.59**	**2.17**	**269.23**	**0.07**

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CV(%)	**13.02**	**18.82**	**19.86**	**4.63**

Table 2. Vegetative parameters of different adenium hybrids

Hybrids	Seedling height(cm)	Number of leaves/ seedling	Leaf area (cm^2)	Caudex diameter(cm)	Survival Percentage (%)
Godji x Nomsod	9.9	18.6	10.73	2.83	73
Godji x Ara Champ	13.0	23.3	12.83	4.10	100
Godji x Emarald Tank	9.0	18.0	8.83	3.0	80
Bangkla	12.0	21.0	11.83	3.57	86
Dynamo	9.9	19.3	9.67	2.80	66
Tropido	9.2	19.0	8.20	3.17	66
Dino King	12.5	22.0	12.17	3.80	93
Peth Dino	7.6	16.6	5.37	1.17	53
Susthakorn	8.8	19.0	7.17	2.53	73
Peth phunlan	9.2	19.6	7.0	2.17	73
F- Test	**S**	**S**	**S**	**S**	**S**
SE(d)±	**0.28**	**0.67**	**0.42**	**0.19**	**9.89**
$CD_{(0.05)}$	**0.59**	**1.39**	**0.88**	**0.40**	**20.63**
CV(%)	**3.42**	**4.15**	**5.54**	**8.05**	**15.80**

CONCLUSION

From the present investigation, it is concluded that the 10 Adenium hybrids under study exhibited significant variation across all observed parameters. The hybrid Godji x Ara Champ demonstrated superior performance in parameters such as germination percentage, days to 50% germination, seedling vigour index, seedling height, germination speed index, survival percentage, number of leaves per seedling, leaf area, caudex diameter. Additionally, its performance was comparable to that of the hybrid Dino King in plant height, leaf area, caudex diameter, survival percentage. Therefore, the hybrids Godji x Ara Champ and Dino King showed exceptional performance in both germination and seedling growth under the agro-climatic conditions of Prayagraj.

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