



Assessment of Seed Germination and Growth of Seedling in Different Adenium Hybrids (*Adenium arabicum*) under Prayagraj Agro-climatic Conditions

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

The experiment was carried out during May, 2023 to April, 2024 to study the effect of seed germination and seedling growth of different Adenium hybrids in naturally ventilated polyhouse in the Department of Horticulture, SHUATS, Prayagraj. The different hybrids used in the experiment were White Zombie, Green Arabicum, Hulk, Super Dork Dork, RCN, KHZ, PBN, Godji x Red Bangle, Godji F2 and Gc x GT in completely randomized design and each hybrid was replicated thrice. The experimental results revealed that hybrid PBN reported significantly better performance

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in parameters like germination percentage (100%), days to 50% germination (4.4), seedling vigour index (1813.33), germination speed index (1.15), survival percentage (100%), seedling height (11.07cm), number of leaves per seedlings (16.67), leaf area (15cm²) and caudex diameter (3.93cm) which was found to be at par with hybrid RCN. Hence, hybrids PBN and RCN could be recommended for Prayagraj agro-climatic conditions.

Keywords: *Adenium*; caudex; seed germination; seedling establishment; growth; adenium hybrids.

1. INTRODUCTION

Adenium has gained prominence in the ornamental and landscape gardening because of its striking caudex forms and flower colour. *Adenium arabicum* is a succulent plant characterized by its broad, swollen trunk and short branches, resembling a miniature baobab tree, often considered a distinct species and is popular among succulent collectors [1].

“It is cultivated for its shiny leaves, growth form and flowering characteristics. It is a highly prized ornamental flowering plant suitable for outdoor cultivation and bonsai development. *Adenium arabicum* is also known as desert rose”, elephant’s foot and Adan bush [2].

With its succulent nature and distinctive swollen trunk resembling a miniature baobab tree, it has become a popular choice for xeriscaping, contributing significantly to ornamental markets. Growth form is squat and fat, with a definite caudex and without much differentiation between trunk and branches. The plants are primarily regarded for its structure and development of larger caudex [3]. It is the most valuable species because of its larger caudex.

The continuous evolution of new hybrids necessitates evaluating the seed germination and seedling growth performance in different *Adenium* hybrids. Hence, the aim of this experiment is to evaluate the seed germination and seedling growth of different *Adenium* hybrids, specifically *Adenium arabicum*, under Prayagraj agro-climatic conditions.

2. MATERIALS AND METHODS

The current experiment was carried out in naturally ventilated polyhouse in the Department of Horticulture, SHUATS, Prayagraj, during May, 2023 to April, 2024. The experiment was laid out in completely randomized design (CRD) with 10 hybrids and each hybrid was replicated thrice. Total number of 150 plants consisting of 10 adenium hybrids viz., White Zombie, Green

Arabicum, Hulk, Super Dork Dork, RCN, KHZ, PBN, Godji x Red Bangle, Godji F2 and Gc x GT were taken for the study. The recommended cultural practices was followed for raising the crop. Seeds were sown using pro-trays filled with a mixture of cocopeat and compost in equal volumes (1:1 ratio) and prior to sowing, the seeds were treated with the fungicide Bavistin to prevent pest and disease infections. The data recorded during the experiment were subjected to statistical analysis by using analysis of variance (ANOVA).

3. RESULTS AND DISCUSSION

3.1 Germination Parameters

Significant variations were observed among the 10 adenium hybrids studied across all the germination parameters and the data is presented in Table 1.

The data presented in Table 1 shows significantly higher germination percentage (100%) in hybrids H₇ (PBN) and H₅ (RCN) which was found to be at par with hybrid H₆ (KHZ, 93.33%), while lesser germination percentage (60%) was observed in hybrid H₃ (Hulk). Significantly lesser number of days to 50% germination (4.4) was observed in the hybrid H₇ (PBN) which was found to be at par with H₅ (RCN, 5.4), while more number of days to 50% germination (7.6) was observed in hybrid H₃ (Hulk). Variation in germination percentage and number of days to 50% germination could be influenced by the parental genotypes, their genetic makeup as well as prevailing temperature and other environmental conditions during the growing period. These findings are consistent with findings of Baskin et al. [4] in adenium and Ranchana et al. [5] and Raja et al. [6] in tuberose.

Significantly higher seedling vigour index (1813.33) was observed in the hybrid H₇ (PBN) which was found to be at par with hybrid H₅ (RCN, 1588), while lesser seedling vigour index (520.33) was observed in hybrid H₃ (Hulk). Significantly higher germination speed index

(1.15) was observed in the hybrid H₇ (PBN) followed by hybrid H₅ (RCN, 1.01), while lesser germination speed index (0.55) was observed in hybrid H₃ (Hulk). Variation in germination speed index and seedling vigour index may be due to the inheritant character and genetic makeup of the hybrids and environmental conditions. Similar results was recorded in tuberose by Raja et al. [3].

3.2 Vegetative Parameters

Significant variations were observed among the 10 adenium hybrids studied across all the vegetative parameters and the data is presented in Table 2.

“Significantly taller seedlings (11.07cm) were observed in hybrid H₇ (PBN) which was found to be at par with hybrid H₅ (RCN, 10cm), while shorter seedlings (5.8cm) were observed in hybrid H₃ (Hulk)”. [7] Variation in plant height among the hybrids prevails due to genetic inheritance and growing environmental conditions. Significantly more number of leaves (16.67) was observed in the hybrid H₇ (PBN) which was found to be at par with hybrid H₅ (RCN, 15.33), while minimum number of leaves (5.33) was observed in hybrid H₃ (Hulk). These findings were consistant in adenium by Varella et al. [8].

Table 1. Germination parameters of different Adenium hybrids

Hybrids	Germination Percentage (%)	Seedling vigour index	Days to 50% germination	Germination speed index
White Zombie	80.00	909.33	6.2	0.78
Green Arabicum	73.33	758.67	6.8	0.75
Hulk	60.00	520.33	7.6	0.55
Super dork dork	66.67	570.00	7.2	0.67
RCN	100.00	1588.00	5.4	1.01
KHZ	93.33	1446.67	5.6	0.91
PBN	100.00	1813.33	4.4	1.15
Godji x Red bangle	86.67	947.33	5.6	0.89
Godji F2	73.33	566.67	6.47	0.72
Gc x GT	80.00	1096.67	5.8	0.87
F- TEST	S	S	S	S
SE(d)±	8.43	201.71	0.17	0.03
CD _{0.05}	17.59	420.76	0.36	0.06
CV (%)	12.70	24.18	3.49	4.38

Table 2. Vegetative parameters of different Adenium hybrids

Hybrids	Survival percentage (%)	Seedling height at 360 DAS (cm)	Number of leaves at 360 DAS	leaf area (cm ²)	Caudex diameter (cm)
White Zombie	73.33	7.67	13.33	12.50	2.50
Green Arabicum	66.67	6.57	10.67	11.67	2.00
Hulk	46.67	5.8	5.33	7.67	0.83
Super dork dork	53.33	8.43	11.67	11.07	1.78
RCN	93.33	10	15.33	14.63	3.27
KHZ	66.67	9	14.00	13.93	3.00
PBN	100.00	11.07	16.67	15.60	3.93
Godji x Red bangle	80.00	8.07	12.67	13.50	1.93
Godji F2	73.33	7.27	11.00	11.73	1.53
Gc x GT	60.00	7.53	12.33	13.07	2.23
F- TEST	S	S	S	S	S
SE(d)±	7.89	0.41	0.42	0.4	0.11
CD _{0.05}	16.45	0.86	0.88	0.83	0.23
CV (%)	13.5	6.23	4.2	3.87	5.84

“Significantly maximum leaf area (15.60 cm²) was observed in the hybrid H₇ (PBN) which was found to be at par with hybrid H₅ (RCN, 14.63cm²), while lesser leaf area (7.67cm²) was observed in hybrid H₃ (Hulk). Significantly maximum caudex diameter (3.93cm) was observed in the hybrid H₇ (PBN) which was found to be at par with hybrid H₅ (RCN, 3.27cm), while minimum caudex diameter (0.83cm) was observed in hybrid H₃ (Hulk). Significant variation in leaf area and 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 Dimmit [9] and Varella et al. [8].

Significantly higher survival percentage (100%) was observed in the hybrid H₇ (PBN) which was found to be at par with hybrid H₅ (RCN, 93.33%), while lesser survival percentage (46.67%) was observed in hybrid H₃ (Hulk). “A germinated seed is 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 Vander et al. [10], [11,12].

4. CONCLUSION

It is concluded from the present investigation that the ten adenium hybrids under study showed significant variation in all the parameters observed. Adenium hybrid PBN recorded significantly better performance in parameters like germination percentage, days to 50% germination, seedling vigour index, germination speed index, seedling height, number of leaves per seedling, leaf area, caudex diameter and survival percentage. Hence, hybrid PBN is better performing in terms of germination and seedling growth under Prayagraj agro-climatic conditions.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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