

Research Article

***In vivo* seed germination and seedling morphology of *Phoenix dactylifera* L. and *Phoenix sylvestris* (L.) Roxb.**

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Abstract

A comparative study of *Phoenix dactylifera* L. and *Phoenix sylvestris* (L.) Roxb. has been done in the Medicinal Plant Garden in North Bengal University. The germination status of mature seeds of two species *in vivo* condition was recorded. It was seen that *Phoenix dactylifera* prefers natural pH (4.5) where as *Phoenix sylvestris* prefer acidic soil with pH (6-7). During this study total seed output, times of germination, first aerial leaf, veneration pattern and reproductive capacity were calculated.

Key words: Seed germination, Seedling morphology, *Phoenix dactylifera*, *Phoenix sylvestris*, West Bengal, India.

Introduction

The family Arecaceae (Palmae) is one of the largest monocotyledonous family, comprising over 212 genera with about 2,779 species distributed worldwide (Basu and Chakraverty, 1994). *Phoenix dactylifera* L. and *Phoenix sylvestris* (L.) Roxb. belongs to the Subfamily Coryphoideae, tribe Phoeniceae of the family Palmae (Arecaceae). Basu and Chakraverty (1994) reported a total of 17 species of *Phoenix* are growing in different parts of the World. Species of *Phoenix* are growing in diverse habitats that occupy swamps, deserts, mangroves and coastal areas. Most of *Phoenix* species originate in semiarid region, but usually occur near high ground water levels, riverside or springs. About 92 species and 4 varieties of wild and semi wild palms representing of 21 genera are distribution in India. They are chiefly occurring in three major geographical regions, viz. Peninsular India, Eastern and North-Eastern India and Andaman & Nicobar Islands. A very few species of palm taxa are also occur in the rest parts of India, particularly in the sub-

Himalayan valleys and plains of northern India, semi-arid parts of Western India, Gangetic plains, estuarine or mangrove forests of Ganga and Mahanadi delta, moist hilly tracts of Orissa, South and North Bihar (Basu and Chakraverty, 1994). *Phoenix dactylifera* and *Phoenix sylvestris* are distributed from Canary Islands through sub-tropical and tropical Africa, the Arabian Peninsula, the Indian subcontinent and Indo-china to Hongkong (Uhl and Dransfield, 1987). In India these palms are grown as ornamentals because of their beautiful showy structures. Apart from the ornamental use, both the species having great economic values due to their delicious nuts, sweet sap, timber etc.

Materials and Methods

Mature fruits of both the species have been collected from the natural sources during the month of July, 2015 and 20 numbers of seeds of each species were sown in pot with three replica. The standard pH for germination and growth of seedlings of each species were tested in laboratory. Progress of seeds germination were studied after regular interval. To record the seed behavior and seedling morphology, conventional methods were

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Table 1: Seed shape, size and weight measurements

Taxa	Ave. Length (cm)	Ave. Breadth (cm)	Shape index	Size index	Seeds Weight (gm)	
					1 seed	100 seed
<i>Phoenix dactylifera</i>	1.86	0.94	1.98	1.75	1.34	134
<i>Phoenix sylvestris</i>	2.28	1.32	1.73	3.01	1.73	173

Table 2: Seed output and Reproductive capacity

Taxa	Seed output			Reproductive capacity			
	Fruits/ plant	Seeds/ Fruit	Seed output	Germination %	Viable %	NonViable %	RC Value %
<i>Phoenix dactylifera</i>	2013	1	2013	71.67	71.67	28.33	131.15
<i>Phoenix sylvestris</i>	3341	1	3341	93.33	93.33	6.67	239.87

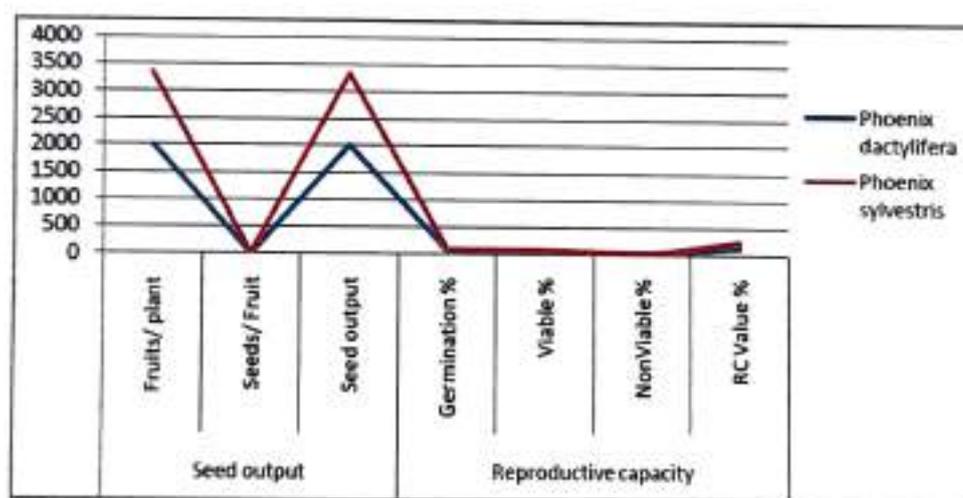


Fig. 1. Graph showing comparative study of Reproductive capacity and Seed output of *Phoenix sylvestris* and *Phoenix dactylifera*.

followed as suggested by Chowdhury (2009), Bose and Paria (2015).

This part of work also attempt to determined the average seed output and average seed germination for both the species. The average seed output of a plant is determined by taking 10 plants that were selected at random and counted separately.

Mean value is calculated for average seed output. The collected seeds were then dried out in air and stored in a desiccator. During seed count, number of fruit per plant, seeds per fruit also counted. Seed shape, seed

colour and other seed morphology along with seed weight were also been noted. Seed shape and size, germination Percentage, reproductive capacity and seed output were calculated following the methods as suggested by Hill et al. (1986), Salisbury (1942) and Chowdhury (2009).

Result and discussion

Present study mainly focused on the entire seed morphology and reproductive capacity of *Phoenix dactylifera* and *Phoenix sylvestris* at garden condition at University of North Bengal (Figure 2). It was clearly recorded that the

seeds of *Phoenix dactylifera* preferred acidic (pH 6-7) soil for germination where *Phoenix sylvestris* prefer germination in sandy soil with basic (pH 45.5) condition. During this study it was found that the rate of seed germination of *Phoenix dactylifera* is very less where as *Phoenix sylvestris* showing good and satisfactory result. The first seedling leaf tip is more or less obtuse in *Phoenix sylvestris* whereas acute leaf tips in *P. dactylifera*. During germination in *P. dactylifera* the length of the remote tubule is on average 7cm whereas around 19 cm in *P. sylvestris* were recorded. It was also seen that first aerial leaf of the seedling of *Phoenix dactylifera* consists of 7 parallels veins where as *phoenix sylvestris* consists of 5 parallel veins with vigorous rooting system.



Fig. 2. Mature tree (A); seeds (C); seedlings (F); undivided main root system (J) of *P. sylvestris*; Mature tree (B); germinated seeds (D & E); seedlings (G & H); divided main root from the adjacent point (I) of *P. dactylifera*.

The details of the seed output, '% of germination and Reproductive capacity for both the species were also calculated and given in Table 1 & 2. The entire calculated data shows that the *P. sylvestris* showing the higher seed production and also reproductive capacity (239.87%) than that of *P. dactylifera*

(131.15%) and the comparative analysis was given in fig. 1.

Conclusion

Further detail studies regarding the seedling morphology of *Phoenix dactylifera*, *P. sylvestris*, *P. paludosa*, *P. acualis* will be taken for better understanding of the taxa through seedling morphology. Because of the genus *Phoenix* needs a long time for flowering which is very much essential for taxonomical identification, moreover the genus *Phoenix* is also dioecious in nature, so the study of seed and seedlings morphology can help us to during the segregation of male and female plants at juvenile stage for cultivation for better yield.

Acknowledgment

University Grant Commission (BSR fellowship) is highly acknowledged for the financial support to complete the said work.

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