

# Germination Induction of Pygmy Date Palm Seed

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## ABSTRACT

Three groups of 121 seeds each of *Phoenix roebelenii* O'Brian were either water-soaked for 24 hours, scarified at the micropylar end, or left untreated. After 72 days, 53.7% scarified seed, 38% non-scarified seed, and 20% of the 24-hour water-soaked seed germinated.

*Phoenix roebelenii* O'Brian, the pygmy date palm, has slender, soft, pinnately compound leaves and a trunk that rarely reaches 2.7 m (McCurrach 1960, Bailey and Bailey 1978), which, together with its good tolerance of low light levels, makes it well suited to interior spaces. However, small plants are usually in short supply, largely due to the fact that seedlings take a long time to attain marketable size. Often, growers must germinate their own seed to obtain plants for potting up into larger sizes. The germination of seeds is slow and erratic and the small plants are slow-growing.

There are a number of methods described for the germination of palm seeds and a few selected references important to this paper will be described here. Poole and Conover (1974) recommend planting *Chamaedorea elegans* Mart. as soon as the seeds are mature. The medium should be well aerated, approximately 1 cm deep and moist but not wet, with germination temperatures of 23.9 to 26.7° C. Schmidt and Rauch (1982) suggested that although no chemical inhibitors have been found in

palm seeds to date, presoaking *Chrysalidocarpus lutescens* H. Wendl (Areca) palm seeds in water and gibberellic acid accelerated germination.

Nagao and W. S. Sakai (1979) reported increased germination of *Archontophoenix alexandrae* [F. S. Muell], H. Wendl, and Drude seeds by presoaking in water for 24 to 72 hours. They also found that treatments of 100 or 1,000 ppm gibberellic acid further enhanced the effect.

Nagao, Kanegawa, and Sakai (1980) stated that accelerated germination of *Ptychosperma macarthurii* H. Wendl Nichols seeds was achieved following scarification or presoaking in 1,000 ppm gibberellic acid (GA). Greatest acceleration occurred when scarification, GA presoak and bottom heat were combined.

Although the data were not statistically analyzed, Koebernik (1971) indicated it took 38 days to germinate *P. roebelenii* O'Brian seed. He suggested using fresh seed and planting in perlite for best results.

The purpose of this study was to determine if scarification or presoaking in water for 24 hours plus the use of bottom heat would enhance *P. roebelenii* O'Brian seed germination.

## Materials and Methods

*Seed treatments.* Three hundred and sixty-three seeds that were available for use were divided equally into three groups, one group scarified with a file at the micropylar end, cutting deep enough to break the seed coat (approximately 0.5 to

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Table 1. The Chi Square Test of Independence  $3 \times 2$  contingency table for *Phoenix roebelenii* O'Brian palm seed germination, scarified vs. non-scarified vs. 24-hour water soak seed treatment after 72 days.

Treatments	Germination	%	Non-Germination	%	Total
Scarified	65	53.7	56	46.3	121
Non-scarified	38	31.4	83	68.6	121
24-hour soak	20	16.5	101	83.5	121
Total	123	33.9	240	66.1	363

$\chi^2 = 37.849^{**}$ ;  $\chi^2 .05$ , 2 df = 5.99;  $\chi^2 .01$ , 2 df = 9.21

1 mm deep). Another group was immersed in tap water for 24 hours, then planted, including all seeds whether floating or not. The third group was planted without treatment. All were planted in a medium consisting of equal parts by volume of screened sphagnum peat moss and No. 2 grade vermiculite, covered with about 6 mm of the medium and bottom heated to maintain 24° C.

### Results and Discussion

Fifty days after planting 41 of the scarified seeds and only 9 from the non-scarified group germinated. Seven seeds which underwent the 24-hour water presoak and sank germinated as opposed to none from the presoaked group that floated.

After 72 days, 65 of the scarified seeds and 38 of the non-scarified seeds germinated. Nineteen seeds that sank germinated and only one that floated germinated from the 24-hour water presoak group.

A Chi Square Test for Independence in a  $3 \times 2$  contingency table was calculated for the total number of seeds germinating in each treatment. There was a highly significant difference between seed treatment ( $\chi^2 = 37.849^{**}$ , Table 1).

When the scarified seed treatment was compared with the non-scarified seed treatment in a Chi Square Test for Independence in a  $2 \times 2$  contingency table, there was a highly significant difference between seed treatments, with scarified seeds germinating better (Table 2).

When the scarified seed treatment was compared with the 24-hour water presoak treatment, in the same statistical test, there was a highly significant difference between seed treatments with scarified seeds germinating better (Table 3).

To determine if there were significant differences between germination of 24-hour water presoak floating seeds compared to those seeds that sank, a one-tailed Fisher Exact Test was calculated.

Table 2. The Chi Square Test of Independence  $2 \times 2$  contingency table for *P. roebelenii* O'Brian palm seed germination, scarified vs. non-scarified seed treatment after 72 days.

Treatments	Germination	%	Non-Germination	%	Total
Scarified	65	53.7	56	46.3	121
Non-scarified	38	31.4	83	68.6	121
Total	103	42.6	139	57.4	242

$\chi^2 = 12.32^{**}$ ;  $\chi^2 .05$ , 1 df = 3.84;  $\chi^2 .01$ , 1 df = 6.63

Table 3. The Chi Square Test of Independence  $2 \times 2$  contingency table for *P. roebelenii* O'Brian palm seed germination, scarified vs. 24-hour water soak seed treatment after 72 days.

Treatments	Germination	%	Non-Germination	%	Total
Scarified	65	53.7	56	46.3	121
24-hour soak	20	16.5	101	83.5	121
Total	85	35.1	157	64.9	242

$\chi^2 = 36.71^{**}$ ;  $\chi^2 .05, 1 \text{ df} = 3.84$ ;  $\chi^2 .01, 1 \text{ df} = 6.63$

Of the 121 seeds presoaked, 99 sank and 22 floated. Of the 99 seeds that sank, 19 germinated. Likewise, of the 22 seeds that floated, 1 germinated. The Fisher Exact Test was used rather than the Chi Square Test because the number of floating seeds expected to germinate was less than the number required for the Chi Square Test. Under the Null Hypothesis, of no relationship of germination to sinking or floating, the probability of obtaining germination of either 0 or 1 of the seeds that floated was at the .079 level. These data suggest that 92.1 percent of the time floating seed will not germinate. However, it is not statistically significant at the 95 or 99 percent level.

This study indicated that seed scarification did enhance germination but 24-hour presoak treatments did not. Although not statistically significant at the 0.05

probability level, floating seeds did not germinate as well as seeds that sank.

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#### PALM BRIEF

The Hawaii Tropical Botanical Garden has opened to the public in the lush setting of Onomea Bay on the Island of Hawaii. This 17 acre Nature Preserve is the newest Botanical Garden in the Hawaiian Islands and shows promise of being an outstanding example of tropical horticulture.

Among the collections presently on inventory at the Garden is a surprisingly diverse collection of palms. With the help of many friends and supporters the collection includes *Areca triandra*, *Elaeis guineensis*, *Hyophorbe lagenicaulis*, *Reinhardtia gracilis*, and *Veitchia winin*. At press the inventory showed 44 genera represented by 74 species. A further inventory of currently unidentified species