Palm Seed Germination

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INTRODUCTION

The production of indoor tropical foliage plants in Hawaii has increased significantly over the past 20 years. This growth peaked in 1990 at a wholesale value of $14.6 million with about 30% of this production in palms.

Palms are generally slow-growing, but the growing conditions found in Hawaii give our growers an advantage. Palms are generally propagated from seeds, but growers have reported that many palm species are slow to germinate or are irregular in their germination pattern. I would like to summarize some of our observations and research findings relative to palm seed germination.

PROPAGATION

Seed Collection. It is generally recommended to collect mature seeds from the tree, as those from the ground are often infested with seed weevils. Maturity is indicated by a color change, usually from green to that appropriate for the species (red, yellow, black, etc.). Most tropical seeds have a short storage life, so they should be planted when fresh.

We also recommend removal of the fleshy seed coat, as it often contains a germination inhibitor, unless you have had experience with the species. This is illustrated in Table 1 which shows a difference between two species of *Pritchardia* (Yoshii and Rauch, 1989a). T50 is a measure of how long it takes 50% of the seeds to germinate (Orchard, 1977).

Table 1. The effect of seed coat removal on germination of palm seeds.

Treatment	T50[1] (weeks)	Final germination (%)
Pritchardia hillebrandi		
With	7.6	90
Without	1.9	76
Pritchardia thurstonii		
With	2.9	96
Without	2.1	96

[1] $T50 = D = \Sigma fx / \Sigma f$.

We tried a simple bioassay of the seed coat of areca palm (*Chrysalidocarpus lutescens*) by removing the fleshy pericarp, macerating the pulp in a blender, and filtering through cheesecloth and then filter paper (Rauch and Crivellone, 1989).

This solution was used to germinate lettuce seeds compared to seeds watered with deionized water (Table 2).

Table 2. Bioassay test of areca palm seed pericarp solution.

	Lettuce seed germination (%)	
Days	Water control	Pericarp solution
1	86 7	0
2	89.3	0
7	91.3	0

Preplant Treatments. There have been a number of other preplant seed treatments proposed to improve the germination of palm seeds, such as soaking in water with or without chemicals. In earlier trials we found that presoaking the seeds in water or gibberellic acid GA_3 solutions increased the germination percent of areca palms (Rauch et al., 1982). However, with bamboo palm (*Chamaedorea seifrizii*), the water soak proved beneficial, but there was no response to the GA_3 treatment (Yoshii et al., 1989). Our current recommendation is to soak cleaned palm seeds in water for 3 days prior to planting, changing the water each day.

Postplant Treatments. There is very little information on the best medium for germinating palm seeds. To date, the results are somewhat mixed with well-drained cinder or perlite resulting in better germination percentages than peat moss as shown in Table 3 for the germination of *Ptychosperma macarthurii* seeds. However, there was no difference due to the medium in the germination percent of *Pritchardia thurstonii* seeds (Table 4) (Yoshii and Rauch, 1989a).

Table 3. The effect of media on germination of *Ptychosperma macarthurii* seeds, after 14 weeks.

Treatment	T50[1] (wks)	Final germination (%)
Cinder	8.5 a[2]	60 ab
Peat : cinder	8.2 ab	35 c
Peat	7 3 bc	46 bc
Peat : perlite	7 l c	32 c
Vermiculite	7.0 c	56 ab
Perlite	6.7 c	63 a
Perlite : vermiculite	6 5 c	60 ab

[1] T50 = D = Σ fx/ Σ f.
[2] Mean separation in columns by Duncan's multiple range test, 5% level.

Table 4. The effect of media on germination of *Pritchardia thurstonii* seeds, after 12 weeks.

Treatment	T50[1] (wks)	Final germination (%)
Perlite	3.1 a[2]	97 ab
Cinder	2.5 b	93 c
Vermiculite	2.4 bc	97 abc
Perlite : vermiculite	2.4 bc	94 bc
Peat	2.3 bcd	98 a
Peat : perlite	2.1 cd	98 a
Peat : cinder	2.1 cd	96 abc

[1] T50 = D = Σ fx/ Σ f.
[2] Mean separation within columns for each treatment group by Duncan's multiple range test, 5% level.

One of the more beneficial treatments for enhancing the germination of palm seeds is bottom heat. The suggested medium temperature is 95 to 105F. This is especially beneficial for slow-to-germinate seeds such as bamboo palm (Table 5). Germination time can be reduced from 8 months to 8 weeks (Yoshii et al., 1989).

We were interested in the effect of combinations of some of these treatments, so we set up a trial using areca palm. While most of the treatments proved beneficial in improving the germination rate, the best was a combination of water presoak and bottom heat (Yoshii and Rauch, 1989b) (Table 6). It should be pointed out that for the most part we have only been able to improve the rate of germination and not the germination percentage.

Table 5. Effect of medium temperature on germination of *Chamaedorea seifrizii* seeds after 20 weeks.

Temperature (±1C)	T50[1] (wks)	Final germination (%)
Unheated control	0.0 a[2]	0 b
25	0.0 a	0 b
30	10.8 b	60 a
35	9.0 c	62 a

[1] T50 = D = Σ fx/Σ f.
[2] Mean separation in columns by Duncan's multiple range test, 5% level.

Table 6. The effect of temperature, water, and GA_3 combinations on germination of areca palm seeds, *Chrysalidocarpus lutescens* Wendl., after 20 weeks.

Treatment	T50[1] (wks)	Final germination (%)
Control—no treatment	6.4 a[2]	94 ab
100 ppm GA_3 pre-soak	6.2 ab	89 b
Water pre-soak	6.1 bc	95 ab
Bottom heat	5.8 c	93 ab
100 ppm GA_3 pre-soak + bottom heat	5.4 d	95 ab
Water pre-soak + bottom heat	5.1 e	97 a

[1] T50 = D = Σ fx/Σ f.
[2] Mean separation in columns by Duncan's multiple range test, 5% level.

TRANSPLANTING

In trials to determine the best time to transplant palm seedlings, we found that the spike or 1st leaf stage was best (Murakami and Rauch, 1984). This resulted in less transplant shock and plant loss.

SUMMARY

- Use fresh seeds harvested from the tree.
- Remove fleshy seed coats.
- Use a preplant water soak treatment.
- Plant shallow in a well-drained mix.
- Use 95F bottom heat.
- Transplant at spike or 1st leaf stage.

LITERATURE CITED

Murakami, P.K. and **F.D. Rauch.** 1984. The effect of age and handling on the subsequent growth and development of *Chrysalidocarpus lutescens* seedlings. J. Environ. Hort. 2(3):91- 93.

Orchard, T.J. 1977. Estimating the parameters of plant seedling emergence. Seed Sci. Tech. 5:61-69.

Rauch, F.D., L. Schmidt, and **P.K. Murakami.** 1982. Seed propagation of palms. Comb. Proc. Intl. Plant Prop. Soc. 43:341- 347.

Rauch, F.D. and **C.F. Crivellone.** 1989. Palm seed inhibitor study. Hawaii Nursery Research. Univ. of Hawaii Res. Ext. Series 103:27.

Yoshii, C.M. and **F.D. Rauch.** 1989a. The effect of media and seed cleaning on the germination of selected palm seed. Hawaii Nursery Research. Univ. of Hawaii Res. Ext. Series 103:25-26.

Yoshii, C.M. and **F.D. Rauch.** 1989b. The influence of treatment combinations on areca palm seed germination. Hawaii Nursery Research. Univ. of Hawaii Res. Ext. Series 103:22-23.

Yoshii, C.M., F.D. Rauch and **C.I. Okazaki.** 1989. Treatments influencing the germination of bamboo palm seeds. Hawaii Nursery Research. Univ. of Hawaii Res. Ext. Series 103:23-24.