Fungicide Treatment of Pygmy Date Palm Seeds Affects Seedling Emergence

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Additional index words. *Phoenix roebelenii*, captan, thiram

Palm seeds are often stored in polyethylene bags after the pericarps are cleaned from the seed. Dusting with fungicide usually is recommended before seeds are placed in bags (Meerow, 1991; Wagner, 1982). Full-strength, wettable powder (WP) formulations of *N*-trichloromethyl-thio-3a,4,7,7a-tetrahydrophthalimide (captan) or tetramethylthiuram disulfide (thiram) are the most common seed protectants used (Meerow, 1991). Seeds of exotic species received from overseas frequently arrive with a substantial fungicide coating, usually captan (personal observation), although the effect of fungicide treatment on seedling emergence in palms is unknown.

Dry-matter concentration in maize seedling roots (*Zea mays* L.) was reduced but germination was not impaired by thiram or captan seed treatments (Levic et al., 1991). Maize germination was lowered with captan or thiram seed treatments, but only in combination with various insecticides (Baca et al., 1989). Neither fungicide reduced rice (*Oryza sativa* L.) germination (Sader et al., 1990). Dusting poplar (*Populus nigra* L.) seed with a 1 thiram : 1 talc (w/w) mixture had no effect on germination or seedling vigor (Spiers and Wenham, 1983). Captan seed initially inhibited wheat (*Triticum aestivum* L.) germination, but the effect faded with time (Clark and Scott, 1982). Walker (1976) found no inhibition of *Eremochloa ophiuroides* (Munro) Hack germination by thiram seed treatment. Captan at 2500 ppm did not affect seed germination of *Pinus resinosa* Ait., but contact of seedling

roots, stems, and cotyledons with captan at 500 ppm caused injury (Kozlowski, 1986).

My experiment tested the effects of captan or thiram seed treatment on pygmy date palm (*Phoenix roebelenii* O'Brien) seedling emergence.

On 8 Oct. 1992, 150 freshly cleaned, ripe seed of pygmy date palm were treated with 100 g captan 50% WP, 100 g thiram 75% WP, or no fungicide. Seeds and each fungicide were placed in a plastic bag and shaken until the seeds were coated uniformly. The seeds were sown shallowly (half-covered) on 8 Oct. 1992 in small flats containing 1 sphagnum peat : 1 perlite (v/v) and placed under a greenhouse mist (10 sec/15 min). Treatments were arranged in a randomized complete-block design with 10 replications of 15 seeds each. Maximum and minimum temperatures during the experiment were 27 and 20°C, respectively, and maximum PPF was 750 $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$. The number of emerged seedlings (cotyledonary petiole >0.5 cm long) was counted every 2 weeks from date of sowing until 7 Jan 1993. Arcsin-transformed values of total percentage emergence at each sampling date were subjected to analysis of variance and Waller-Duncan mean separation (SAS Institute, Cary, N.C.).

No seedlings emerged before 7 weeks after sowing (WAS). The greatest inhibitory effect of seed fungicide treatment on percentage seedling emergence occurred by 7 WAS, but diminished thereafter (Table 1). Although captan caused greater reduction in the percentage of seedling emergence than thiram at 7 WAS, the two fungicides resulted in similar seedling emergence at 9 and 11 WAS.

By 13 WAS, there was no significant difference in the total percentage of seedling emergence between nontreated and thiram-treated seeds (Table 1), but the final percentage of seedling emergence for the captan treatment was 20% and 17% lower than the control

Table 1. Effects of captan and thiram seed treatments on emergence of pygmy date palm seedlings.

Fungicide	% Seedling emergence			
	Weeks after sowing			
	7	9	11	13
None	34.0 a ^z	67.3 a	77.3 a	79.3 a
Captan	2.0 c	24.0 b	54.0 b	58.7 b
Thiram	12.0 b	38.7 b	66.7 ab	76.0 a

^zMean separations within columns by the Waller-Duncan k ratio method (k = 100) on arcsin-transformed percentage data. Mean separation in columns at $P \leq 0.05$.

and thiram-treated seeds, respectively. Seedlings from captan-treated seeds had necrosis of the cotyledonary petiole. The reduced percentage of seedling emergence and seedling injury due to captan suggests greater residual inhibitory activity with this fungicide than with thiram. These results support the anecdotal observations of commercial palm growers who state that direct contact of palm seed with full-strength seed protectant fungicides may inhibit seedling emergence. Although thiram and captan seed treatments reduced percentages of early seedling emergence, only captan reduced seedling emergence percentage by 13 WAS. Palm growers are advised to wash residual fungicide from stored seeds before sowing seed.

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Received for publication 18 Apr. 1994. Accepted for publication 25 May 1994. Florida Agriculture Expt. Station Journal Series no. R-03622. The cost of publishing this paper was defrayed in part by the payment of page charges. Under postal regulations, this paper therefore must be hereby marked *advertisement* solely to indicate this fact.