

The Effects of Several Pre- and Postemergent Herbicides on Ornamental Palms

HENRY DONSELMAN AND TIMOTHY K. BROSCAT

*University of Florida, IFAS, Ft. Lauderdale Research and Education Center,
3205 College Ave., Ft. Lauderdale, FL 33314*

Palms are an important component of the nursery industry. In Florida, most palms for interior use are container grown. Landscape material may be either container or field grown. Both situations have associated weed control problems.

Competition for water and nutrients by weeds is known to reduce the growth rate of many ornamental plants. Hand weeding, although a common practice in Florida nurseries, is costly and labor intensive. Tillage is often used as part of an effective weed control program in field nurseries but does not eliminate all weeds, particularly those adjacent to the desired crop.

Little is known about the effects of pre- and postemergent herbicides on palm species (Schubert et al. 1986). Neel (1977) reported on the safety of Ronstar (oxadiazon) granular preemergent on *Chrysalidocarpus lutescens* (areca palm) and *Livistona chinensis* (Chinese fan palm). Reports to the authors by local nurserymen and preliminary research indicated that other commonly used preemergent herbicides may be causing problems with palms. Two experiments were designed to determine whether three preemergent herbicides and one postemergent herbicide commonly used in nurseries affected the growth of several palm species frequently grown by the nursery industry.

Materials and Methods

Experiment 1 (Preemergent Herbicides): Palm seedlings with 3-4 leaves were transplanted into 10 cm plastic con-

tainers with a pine bark, Florida peat, and sand (5:4:1, v:v:v) medium amended with 3.6 kg of dolomite, .68 kg of Micromax® (Sierra Chemical Co., Milpitas, CA) and 4.5 kg of Osmocote 18-6-12 (Sierra Chemical Co.) per m³ of soil. Six weeks after transplanting, 7 replicate palms of *Carpentaria acuminata* (carpentaria palm), *Chamaedorea elegans* (parlor palm), *Chrysalidocarpus lutescens* (areca palm), and *Ptychosperma elegans* (solitaire palm) were treated with Ronstar® (oxadiazon, Rhone-Poulenc, Inc.), Rout (oxyfluorfen & oryzalin, Sierra Chemical Co.) and Ornamental Herbicide 2® (oxyfluorfen & pendimethalin, O. M. Scott & Sons Co., Marysville, OH) at 0, 1, and 4 times their recommended rates (Table 1). No granules were allowed to contact foliage during application as direct contact is known to produce lesions in many palms. Plants were grown under 73% shade cloth and received about 1.2 cm of water daily from overhead irrigation. Palms were rated (0 = no damage, 5 = dead) for herbicide phytotoxicity 1 month after application.

Experiment 2 (Post-Emergent Herbicide): Fifteen replicate palms of *Syagrus romanzoffiana* (queen palm), *Carpentaria acuminata* (carpentaria palm), *Chamaedorea cataractarum* (cat palm), *Chamaedorea elegans*, *Chrysalidocarpus lutescens*, *Cocos nucifera* (coconut palm), *Phoenix roebelenii* (pygmy date palm), *Ptychosperma macarthurii* (Macarthur palm), and *Roystonea regia* (Cuban royal palm) were selected and divided into three

Table 1. Phytotoxicity of 3 preemergent herbicides on 4 species of palm seedlings.

Treatment	Rate ^z	Species			
		<i>Carpentaria acuminata</i>	<i>Chamaedorea elegans</i>	<i>Chrysalidocarpus lutescens</i>	<i>Ptychosperma elegans</i>
Control	0.000	0 ^y	0	0	0
Ronstar ×	3.13	0	0	0	0.1
Ronstar 2×	6.26	0.7	0.1	0.1	0.2
Ronstar 4×	12.52	1.4	0.4	0.9	0.8
Rout ×	2.20	0.8	1.0	0.9	1.2
Rout 2×	4.40	1.7	2.1	0.9	1.7
Rout 4×	8.80	3.1	1.5	1.4	2.7
OH2 ×	2.50	1.4	1.5	1.4	2.4
OH2 2×	5.00	1.3	2.5	1.9	2.4
OH2 4×	10.00	2.6	2.3	2.1	3.2

^z In lbs/1,000 ft².

^y Rating scale: 0 = no damage to 5 = dead.

treatments of five palms each. Soil, watering, and fertilization were the same as in Experiment 1. All palms were well established and grown under 73% shade except for the coconut palms which were grown under full sun. All palms were in 10 cm plastic containers except for the *Chamaedorea cataractarum* (16 cm containers) and the *Cocos nucifera* (25 cm containers).

Roundup (glyphosate, Monsanto) was applied to all palm foliage to runoff. Treatment 1 consisted of the low recommended rate for weed control in a field situation (11 ml/L). Treatment 2 was at the high recommended rate (21 ml/L) and treatment 3 was a water control. After 8 weeks, the number of deformed leaves per palm was counted.

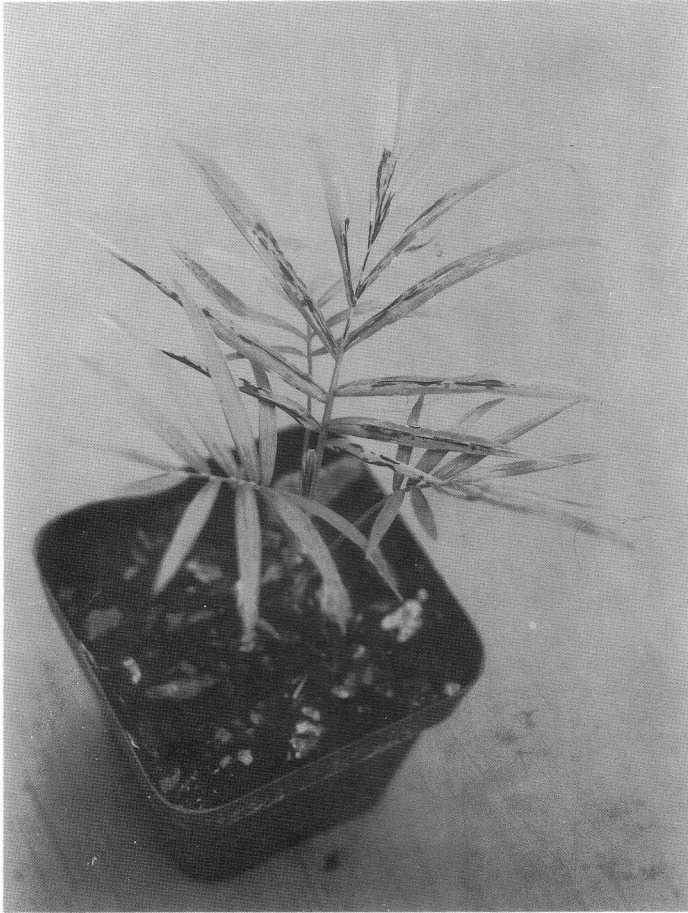
Results and Discussion

Experiment 1. Phytotoxicity of pre-emergent herbicides on most species of palms appeared primarily on newly emerging foliage as necrotic blotches (Fig. 1). The first leaf produced following application of these herbicides was often the only leaf affected and the time required for such a leaf to emerge after application had little effect on the symptom severity. *Carpentaria*

acuminata generally showed few signs of phytotoxicity until the next leaf emerged 4 to 6 weeks after herbicide application.

Of the three products evaluated, Ronstar appeared to be safe on all four species of palms at rates up to twice that recommended by the manufacturer (Table 1). At 4×, Ronstar caused minor injury to some palm species. Damage to *Chrysalidocarpus lutescens* by Rout was less than that sustained by the other species, but even at its recommended rate, this product caused some injury to all four species. Ornamental Herbicide 2 was the most phytotoxic of the three products tested on all four palm species.

Although Rout and Ornamental Herbicide 2 may give slightly better control of some weeds in container grown palms, these products should not be used on palms grown as foliage plants where leaf appearance is important. Ronstar is safe on these palms when applied at the recommended rate. It is important to remember that, although these materials are registered for use on a broad variety of ornamental plants, they are not labelled for use on palms. This experiment illustrates the fact that application rate and method of application are critical to the safe use of pre-emergent herbicides on palms.



1. Typical preemergent herbicide phytotoxicity symptoms on *Chamaedorea elegans*.

Experiment 2. Direct foliar spraying of the postemergent herbicide Roundup was phytotoxic at both low and high recommended rates on all palms except for *Cocos nucifera* (Table 2). Distortion in the newly emerged leaves often resulted in reduced leaf size or necrosis of the leaflets. An average of two leaves per palm were affected by the low rate in *Phoenix roebelenii*, *Ptychosperma macarthurii*, *Chrysalidocarpus lutescens*, and *Chamaedorea cataractarum*, while only one leaf was distorted in *Carpentaria acuminata*, *Chamaedorea elegans*, and *Roystonea regia*. At the high rate leaf distor-

tion was generally more severe with the greatest effect on the *Roystonea regia*. *Cocos nucifera* palms showed no leaf distortion at either rate. Two *Carpentaria acuminata* palms died when sprayed with the high rate although all other palm species survived and resumed normal growth within 2-3 months. Except for the *Cocos nucifera*, growth rate appeared to be slowed down for a period of time in the treated plants. All species of palms except for *Ptychosperma*, *Syagrus*, and *Cocos* palms showed a tendency to exhibit a lighter foliage color when sprayed with Roundup.

Palms appear to be quite resistant to

Table 2. Effects of Roundup spray application on number of deformed leaves per palm.

Application rate (ml/l)	Species									
	<i>Chrysalidocarpus lutescens</i>	<i>Chamaedorea cataractarum</i>	<i>Cocos nucifera</i>	<i>Phoenix robelenii</i>	<i>Pythosperma macarthurii</i>	<i>Carpentaria acuminata</i>	<i>Chamaedorea elegans</i>	<i>Roystonea regia</i>	<i>Syagrus romanzoffianum</i>	
0	0.0b ^a	0.0b	0.0a	0.0b	0.0b	0.0b	0.0c	0.0c	0.0c	
11	2.0a	2.2a	0.0a	1.8a	1.6a	1.2ab	1.0b	1.0b	1.0b	
21	2.4a	2.6a	0.0a	2.2a	1.6a	2.4a	2.0a	2.8a	2.0a	

^a Mean separation by Waller-Duncan K-ratio method, 5% level.

the herbicide Roundup when applied under the conditions of this experiment. Although distortion occurred in most palm species, the plants recovered and resumed normal growth. This herbicide is widely used in field nurseries to control weeds and, although one should avoid directing the spray to the leaves of palms to prevent leaf distortion, it appears to be safe with a single application, to a wide variety of palm species.

Acknowledgments

Both authors would like to acknowledge gratefully the financial support of the South Florida Palm Society for partially funding this research. This paper reports the results of research only. Mention of a commercial or proprietary product or pesticide does not constitute a recommendation by the authors or the University of Florida, IFAS, nor does it imply registration under FIFRA as amended or its approval to the exclusion of other products that may be suitable. Before using any of the products mentioned in this research paper, be certain of their registration by appropriate state and/or federal authorities.

LITERATURE CITED

- NEEL, P. L. 1977. Effects of oxadiazon preemergence herbicide on weed control and growth of sixteen species of containerized ornamental plants. Proc. Fla. St. Hort. Soc. 90: 353-355.
- SCHUBERT, O. E., R. A. CREAGER, J. R. FRANK, P. R. SCHUBERT, G. E. SCHUBERT, AND G. K. EISENBEISS. 1986. A compendium of weed control research in ornamentals in the United States. (1944-1985). HortScience 21(2): 1-137.