

Use of Glyphosate to Suppress Basal Suckers on Mediterranean Fan Palm (*Chamaerops humilis* L.)

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Pruning and/or removal of small, short suckers or offshoots (basal, vegetative lateral shoots) from the base of trunks of multi-trunked palms to manipulate clump density and eventual height is a time-consuming and costly procedure. In a study in San Diego, California we applied glyphosate, the active ingredient in Roundup® and other herbicides, to recently pruned suckers of the Mediterranean fan palm (*Chamaerops humilis* L.) to inhibit or retard their regrowth, thus eliminating or at least much reducing the need to reprune them in the future.

Palms are important constituents of landscape plant palettes in subtropical and tropical regions. They are exceedingly popular and lend to the atmosphere a dramatic, exotic, tropical ambience or motif that few other plants can duplicate. Some of the most picturesque and versatile landscape palms are those that form

graceful, multi-trunked clumps naturally through the production of suckers or offshoots that arise from the base of an existing trunk. Unfortunately, suckers must be pruned or removed periodically to manipulate clump density and eventual height to maintain the clump's functional landscape use. Pruning and

removal of suckers is a difficult, tedious, time-consuming, costly, and, because of some palms' spiny nature, dangerous procedure.

Several landscape maintenance professionals and palm collectors have asked about chemical control for retarding or prohibiting growth of suckers on clumping palms. However, research-based information is lacking on the effectiveness of herbicides or growth regulators in retarding growth of palms. In a phytotoxicity study of several herbicides for weed control of container-grown palms, though, Donselman and Broschat (1986) found that some species appeared rather resistant to foliar applications of glyphosate and, while distorted growth occurred in most species, the plants recovered and resumed normal growth after several months. The apparent relatively high resistance of palms to glyphosate, Michael's anecdotal observations of the effect of glyphosate on palms in the landscape and the availability of glyphosate, encouraged us to consider it for controlling suckers of clumping palms. Thus, we conducted a two-year study to determine the effectiveness of glyphosate in inhibiting or retarding growth of suckers of the Mediterranean fan palm.

Materials and Methods

In September, 2008 we selected 10 clumps of the Mediterranean fan palm of more or less equal size, vigor and quality at Golden Hill Park in San Diego, California. All clumps were two to three meters high and wide and had four to five tall, main trunks (Fig. 1) and numerous small, short, basal suckers with little or no visible trunk and composed primarily of small leaf blades, petioles and leaf bases. We pruned off all small, short suckers of each of the 10 clumps (Figs. 2 & 3), pruning sufficiently low to remove all green tissue (leaf blades and petioles) but not damaging the apical meristem. Pruned suckers appeared as a low, tight bundle of white, truncated, short petiole stubs (Fig. 4). We randomly selected five of the 10 clumps and applied a three percent solution of glyphosate to their just-pruned suckers (Fig. 5). We made the three percent solution by diluting Ranger Pro® (Monsanto, Inc, St. Louis, MO) according to product label directions. We sprayed the solution to the cut surface of each sucker to run off. We made no applications to the remaining five clumps. We randomly selected five pruned suckers from each of the 10 clumps to track their growth for two years. Every six months (February and September, 2009 and 2010) we

1. All clumps of the Mediterranean fan palm used in the study were two to three meters high and wide and had four to five main trunks and numerous small, short basal suckers (D.R. Hodel).





2 (top). Work crews pruned the suckers of all 10 clumps of Mediterranean fan palms used in the study (D.R. Hodel). 3 (bottom). One of the workers poses with a clump of the Mediterranean fan palm with the pruned suckers (D.R. Hodel).

repruned all suckers of each of the 10 clumps back to their original pruning point (initial pruning of September, 2008) and collected, dried and weighed the clippings (regrowth) of

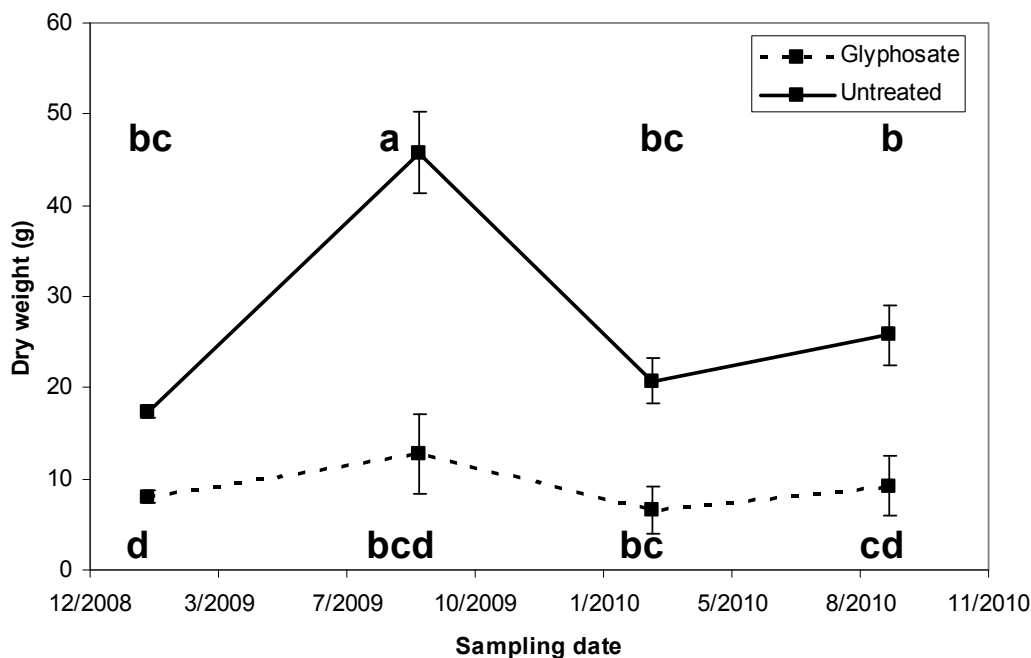
the five selected suckers from each of the 10 clumps. We dried the clippings at 65°C for five days and then averaged the weights within each clump of the two treatment classes. After



4 (top). Suckers were pruned back sufficiently low to removed all green tissue without damaging the apical meristem; pruned suckers appeared as a tight bundle of white, truncated, short petiole stubs (D.R. Hodel). 5 (bottom). Co-author Michael Marika sprays the three percent solution of glyphosate to the just-pruned suckers (D.R. Hodel).

six months, in February, 2009, we made a second application of glyphosate to the same five clumps to which it was originally applied. We assessed overall quality of each clump in

2010 (canopy fullness, leaf color) and leaf production of one large trunk from each of the 10 clumps from February, 2009 to September, 2010.



6. Mean dry weight of clippings from glyphosate-treated and untreated suckers of *Chamaerops humilis*, Golden Hill Park, San Diego, CA.

The experimental design was completely randomized with five replications. Because we collected clippings from the same suckers and plants in multiple sampling dates, we used the Mixed Procedure (v. 9.2, SAS Systems, Cary, NC) to perform repeated measures analysis of variance to account for potential auto-correlation. We selected the Heterogeneous

Compound Symmetry (CSH) covariance model based on measures of relative fit of competing covariance models.

Results and Discussion

Glyphosate-treated suckers produced significantly less growth than untreated suckers during the two years of the study (Table

Table 1. Mean dry weight of clippings, number of new leaves, and overall quality from glyphosate-treated and untreated suckers of *Chamaerops humilis*, Golden Hill Park, San Diego, CA.

Treatment	Dry weight of clippings, g		New leaves, no. ^Y		Quality, 1=dead, 5=perfect	
	Feb. 2009	Sept. 2009	Feb. 2010	Sept. 2010	Feb. 2010	Sept. 2010
Glyphosate	8 c ^Z	13 bc	7 c	9 cd	7 b	4.2 a 4.4 a
Untreated	17 b	46 a	21 b	26 b	9 a	4.2 a 4.2 a

P value 0.0029 0.02 0.75

^ZMeans followed by the same letter are not significantly different at $P < 0.05$.

^YTotal new leaves from Feb 2009 to Sept. 2010.

The same letters denote non-significant comparisons ($P < 0.05$) of the same treatment over time. The effect of time and interactions between treatment and time were significant ($P = 0.0029$).



7 (top). Glyphosate-treated suckers produced significantly less growth than untreated suckers, shown in Fig. 8 (bottom). (both by D.R. Hodel).

1, Figs. 6–10). Clumps with glyphosate-treated suckers tended to produce slightly fewer leaves overall (7 treated vs. 9 untreated) on the large trunks but quality of the clump was unaffected (Table 1). From a commercial landscape

management strategy, suppression of growth without loss of quality is desirable because it reduces the amount of green waste entering the urban waste stream and helps to promote sustainability in the landscape.



9 (left). Glyphosate-treated sucker. Compare with untreated sucker in Fig. 10 (right). (both by D.R. Hodel).

In a few cases the glyphosate applications terminated regrowth of suckers completely and they died. Less frequently even a few of the suckers not treated with glyphosate died. Death of suckers may be undesirable in some instances. For example, retarding regrowth rather than killing the sucker enables landscape managers to use that sucker in the future to maintain or enhance clump density, height and functional use if the need arises.

In some instances dead suckers or those with retarded growth were somewhat less esthetically pleasing than suckers not treated with glyphosate, appearing slightly frayed, tattered or “ratty” from stunted partial regrowth or death, particularly when viewed within five meters. However, from more than five meters, their less-than-optimal esthetic quality was not distracting to the entire clump. Nonetheless, landscape managers should be aware of this aspect of glyphosate when considering its use.

In summary, glyphosate or similar materials may hold promise for retarding or eliminating small, short, unwanted basal suckers of clumping palms. Further work is needed, though, to determine more accurately frequency and rates of application and long-term (five years or more) effect on clumps.

Acknowledgments

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LITERATURE CITED

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