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Control of Royal Palm Bug, *Xylastodoris luteolus* (Hemiptera: Thaumastocoridae), With Imidacloprid: A Refinement in the Method

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ABSTRACT

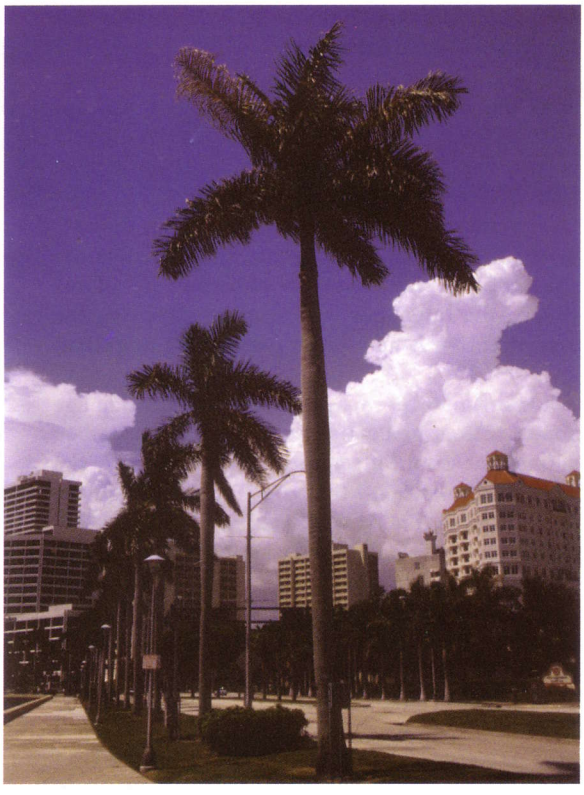
Imidacloprid at 45, 22.5, and 11.3 g per palm applied as a root drench in late winter was effective in preventing damage to royal palms (*Roystonea regia* (Kunth) O. F. Cook) by the royal palm bug, *Xylastodoris luteolus*, Barber (Hemiptera: Thaumastocoridae) in a test in Florida, USA. Based on damage assessment, the treatment was effective for at least five months during the spring, i.e., the main season of activity of this insect on royal palm foliage.

Previously, we reported results of tests of imidacloprid for control of the royal palm bug, *Xylastodoris luteolus* Barber (Hemiptera: Thaumastocoridae), on Cuban royal palms (*Roystonea regia* (Kunth) O. F. Cook (Howard and Stopek 1998). This species of insect damages royal palms mostly in spring and early summer, after which the insect populations apparently decline until the following spring. The method that we tested involved drenching the root zones with imidacloprid at a rate of 42.5 g per palm. Palms given a single treatment in January were protected from bug damage in the spring and early summer, remaining free of royal palm bug damage for more than a year. One palm treated with 21 g of imidacloprid, i.e., half of the above rate, likewise remained free of the damage, serving as inconclusive evidence that this lower rate may be effective against this insect.

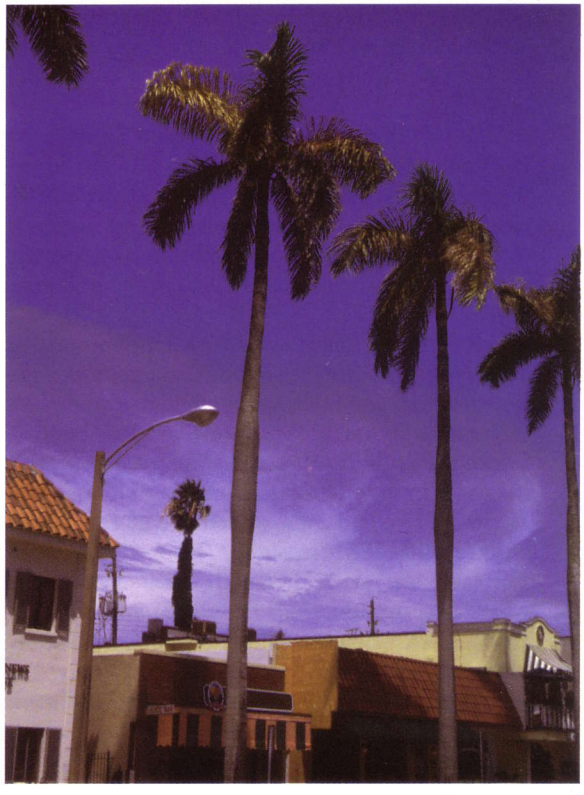
Applied at 42.5 g, imidacloprid costs over US$30 per palm at prices then current. This would be a prohibitive cost in many cases, especially where numerous royal palms are involved. We thus conducted an experiment comparing imidacloprid at approximately the rate tested last year and at two lower rates, and the results are reported in this paper.

Methods

The experiment was conducted on Cuban royal palms growing on Flagler Drive, West Palm Beach, Florida (Fig. 1). This avenue is in the city's central district and borders a large lake, Lake Worth. Soil and other environmental conditions where the palms grown are similar to those in the previous experiment (Howard and Stopek 1998). The 36 palms selected for study each had a trunk height of ca. 14 m and were in a single row at a spacing of ca. 15 m. Four treatments were tested, including imidacloprid at 45, 22.5 and 11.3 g, and an untreated control. We used a randomized complete block experimental design: the palm planting was divided into nine successive groups (blocks) of four palms each. One of the four treatments was assigned randomly to each of the palms in each block, so that there were nine replications per treatment. Merit 75WP (Bayer Corporation) was applied as described previously (Howard and Stopek 1998). The drenches were applied on 17 February 1998. Since royal palm bugs attack young fronds as they are unfolding, damage assessment was conducted by examining the four youngest fronds of each palm for evidence of damage by this bug. We made most of the observations of palm foliage from the ground, frequently using binoculars to study damage symptoms in greater



1. Royal palm bug control experiment, West Palm Beach, August 1998. Untreated royal palm in foreground has royal palm bug damage, while adjacent palms were treated with imidacloprid and were not damaged by the royal palm bug.



2. Royal palm in Palm Beach, August 1998, with severe royal palm bug damage from the past spring.

detail. Occasionally, we verified damage diagnoses by using a hydraulic lift truck to get up into the crowns and examine foliage closely for the presence of royal palm bugs. The palms were examined monthly until August. On that date, a conclusive difference was seen between treated palms and untreated controls. An additional examination was conducted in November 1998 to verify that there was no further bug damage.

The data were tested with a chi-squared test for an association between imidacloprid treatments and the presence or absence of royal palm bug damage.

Results and Discussion

Prior to application of treatments on 17 February, there was no damage due to royal palm bugs. No damage that could be unequivocally attributed to this insect was apparent until 13 May, when bug damage was visible on three of the untreated palms but on none of the treated palms. In June and July, there was indistinct damage that we tentatively diagnosed as royal palm bug damage on four additional untreated palms, but no bug damage on treated palms. [Thus, for the first five months there was no conclusive difference between treatment and controls.] When the palms were examined on 27 August, i.e., 191 days after application of imidacloprid treatments, seven of the nine untreated palms had damage due to royal palm bug. In contrast, the fronds of all of the treated palms remained free of royal palm bug damage (Fig. 1).

Control of some insect pests of palms and trees cannot be achieved by treating individual plants. If, for example, the insect pest is highly mobile, entire blocks may have to be treated, and plants on the periphery of the block may sustain some damage. In this study, the palms free of bug damage, i.e., those that were treated, were 15 m distant from untreated controls which were severely damaged. This indicates that it should be

possible to achieve control with the method described here, whether or not the bugs are controlled on nearby palms (e.g., on a neighbor's property).

The fact that two of the untreated palms were not damaged by royal palm bugs was not unexpected. Based on our observations at various localities in southern Florida where large numbers of royal palms are attacked by this bug, usually some of the palms escape damage for unknown reasons.

All of the palms treated with imidacloprid at all three rates were free of bug damage. Since the lowest rate is the most economical, we compared the results at this rate with the untreated control, finding that there was a significant association between imidacloprid treatments at the lowest rate tested and absence of damage by royal palm bugs (chi-square test, $P<0.001$).

Based on research mostly with dicotyledonous plants, imidacloprid tends to accumulate in new growth. (Dr. John Page, Bayer Corporation, *personal communication*). This is probably true in palms, and may be one reason that this chemical was effective against royal palm bug, which feed on the new, opening fronds.

We did not sample bug populations, and therefore did not obtain data indicating how long it took for the treatments to affect bug populations. The appearance of damage would not be an accurate indicator of when the insecticide was effective, because there is probably much variability in the period between when the bugs feed and when the damage becomes visible. Imidacloprid is known to be absorbed and accumulated slowly by many kinds of plants (Dr. John Page, Bayer Corporation, *personal communication*). Presumably, the treatments in this experiment were not effective for at least a month.

The earliest that bug damage was observed was on three palms in May. In August, the damage on most of the untreated palms was on the third youngest frond, and on two to four successively older fronds. The two youngest fronds were free of damage. Since royal palms produce a new leaf approximately once a month (Baranowski 1958), the royal palm bug activity had apparently declined by June. It also appeared that bug feeding was intense on some untreated palms for up to five months, since there were five damaged fronds on some of the untreated palms. Examinations in November revealed that royal palm bug damage had been confined to the spring season, as expected.

It was encouraging that the lowest dosage level was effective. This dosage, 11.3 g, was applied as 15 g (0.52 oz.) of Merit 75W. At current prices, the insecticide at this rate would cost from $7.00–10.00 per palm per year.

The imidacloprid drench treatment that we tested is a preventative treatment. Because the substance is known to be absorbed by plants slowly, the later that it is applied in spring the less effective it may be in preventing bug damage.

Unfortunately, by applying it before damage appears, treatments may sometimes be wasted on palms that would not have been attacked by the bugs, since we know that some palms escape attack. In fact, highly destructive populations of royal palm bugs have been unpredictable, occurring at intervals of variable periods of years (Baranowski 1958, Reinert 1975). In the past several years, the bugs have damaged royal palms extensively each spring throughout southern Florida. Thus, preventive treatments may be worthwhile each spring until we see evidence that this high level of bug activity has diminished.

Royal palms have been planted abundantly in landscapes as urban areas have expanded in southern Florida in recent years, and currently there are probably more of these palms in this region than at any previous time. The present frequency of this palm in the landscape may be one factor influencing the increased activity of the royal palm bug. Additionally, the weather may have been more favorable for this insect. There has not been an extensive, severe frost in southern Florida since 1989.

During the spring season, damage by royal palm bugs may cause complete necrosis on three to six fronds. The fronds produced from summer until the following spring are generally not attacked by this bug. Thus, in late spring or early summer, both the youngest and oldest fronds of a palm that was attacked during the current and previous spring season are necrotic, and the fronds in the middle of the crown are green. The loss of these fronds presumably has a negative effect on the palm's vigor, but this has not been quantified. Certainly, the extensive necrosis caused by this bug is detrimental to the palm's aesthetic value, which is important in urban environments (Fig. 2). *(Continued on p. 181.)*

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Centerfold: *Coccothrinax munizii* in its natural habitat, between Cajobabo and Jauco, Cuba. (Photo by Carlo Morici)