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The Palm Leaf Skeletonizer, *Homaledra sabalella* (Lepidoptera: Coleophoridae): Status and Potential Pest Management Options

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The present status of the palm leaf skeletonizer [*Homaledra sabalella* (Lepidoptera: Coleophoridae)] in Florida and Puerto Rico is discussed. This insect is native to both localities, where its natural hosts are native palms, especially *Sabal palmetto* in Florida and *S. causiarum* in Puerto Rico. A complex of natural enemies is associated with it, historically maintaining a satisfactory natural control. In the 1990s, unprecedented outbreaks in both localities of an insect identified as *H. sabalella* occurred on coconut palms (*Cocos nucifera)*, which was previously considered a marginal host of this insect. A similar outbreak was not observed on *Sabal* spp. The possibility that the *Homaledra* sp. on coconut palm may represent a distinct biotype of *H. sabalella* or a cryptic species is under investigation. The palm leaf skeletonizer outbreak on coconut palms has subsided in Florida during rcent years, but not in Puerto Rico. An undescribed and apparently adventive species of tachinid fly [*Phytomyptera* sp. (Diptera: Tachinidae)], may be a major factor in the decline of palm leaf skeletonizers in Florida. It is suggested that currently in Florida, control of palm leaf skeletonizers by natural enemies is generally adequate. Chemical or physical control options may be appropriate in limited situations.

The palm leaf skeletonizer [*Homaledra sabalella* (Chambers)] is a species of moth that in its larval stage feeds on palm fronds (Fig. 1). It is common throughout Florida and other southeastern states on its native host, cabbage palmetto [*Sabal palmetto* (Walter) Schultes & Schultes f.]. The natural range of the species extends to the Greater Antilles, including Cuba, Hispaniola, and Puerto Rico (Lepesme, 1947). Its principal natural host in Puerto Rico seems to be the Puerto Rico hat palm [*Sabal causiarum* (O.F. Cook) Beccari]. The first author has seen this insect's damage on fronds of palma cana (*Sabal domingensis* Beccari) in the Dominican Republic. The larvae feed on the surfaces of the host fronds, producing tubes of silk interlaced with their frass within which they reside as they feed (Figs. 2, 3, 4a–c, and 5). They seldom attack young fronds, but prefer the older fronds, which are lower in the crown, a behavioral trait that is characteristic of many species of caterpillars that feed on palm foliage (Howard et al., 2001). The larvae consume superficial tissue of the lamina, preferring the abaxial surface, leaving the leaf veins intact. The result is a "skeletonized" area on the surface upon which they have fed, and a necrotic and eventually desiccated area on the opposite surface that mirrors the "skeletonized" area (Figs. 2 and 3). We have observed that the larvae remain in the tubes while feeding, altering the direction and extending the lengths of their tubes so as to find fresh leaf tissue.

Homaledra heptathalama Busck is a similar species known to attack cabbage palmettos in Florida (Lepesme, 1947). *Homaledra* sp. was reported on coconut palms in Guerrero, Mexico, in the early 1990s (Noriega et al., 1991).

Creighton's (1937) characterization of this insect 70 years ago as "the major pest of palms in Florida" has been perpetuated in later reviews (e.g., Johnson and Lyon, 1991). However, at least

Fig. 1. Larvae of palm leaf skeletonizer (*Homaledra sabalella).*

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Fig. 2. Palm leaf skeletonizer damage to the abaxial (lower) surface of cabbage palmetto (*Sabal palmetto*).

Fig. 3. Necrotic area on the adaxial (upper) surface of cabbage palmetto, caused by palm leaf skeletonizer feeding damage on the opposite surface.

under current conditions, some other insect species rival or surpass *H. sabalella* as pests of palms in Florida. Until recently in southern Florida, where the senior author has conducted research on insects associated with palms since the mid-1970s, the palm leaf skeletonizer was considered an occasional pest of cabbage palmetto and some other palm species, especially palmate or costapalmate species such as the chinese fan palm [*Livistona chinensis* (Jacquin) R.B. ex Martius], mexican fan palm (*Washingtonia robusta* H. Wendland), and red latan palm [*Latania lontaroides* (Gaertner) H.W. Moore] (Fig. 4a–c) (Howard et al., 2001).

In 1995 the senior author first noticed extensive infestations of coconut palm foliage (*Cocos nucifera* L.) at the Fort Lauderdale Research and Education Center (FLREC) by an insect that we identified as the palm leaf skeletonizer. Curiously, there was minimal damage attributable to this caterpillar on cabbage palmettos that were in the vicinity of the coconut palms. When numerous sites with palms throughout the southeastern coastal area from Miami to the Palm Beaches were examined, heavy infestations of palm leaf skeletonizers were observed on many

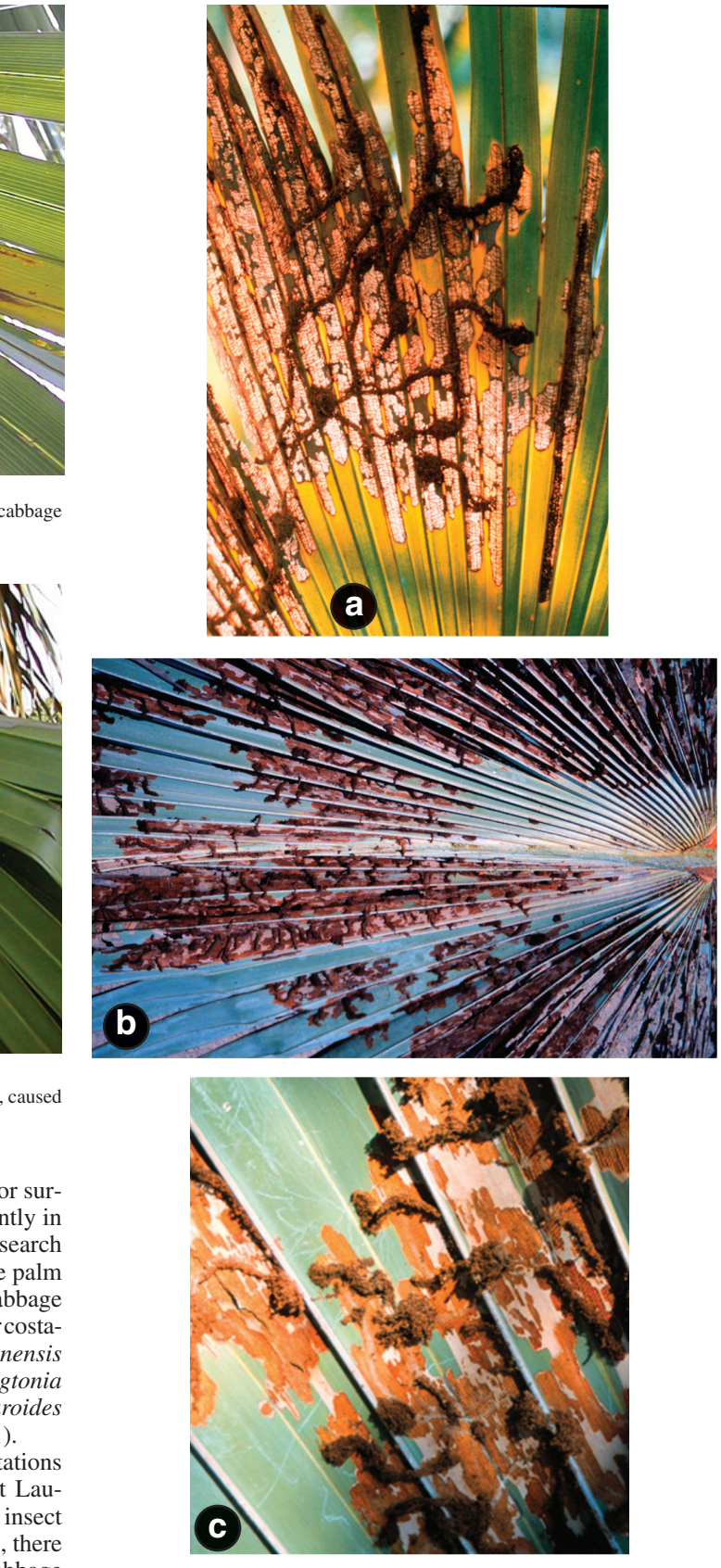

Fig. 4. Palm leaf skeletonizer damage on fronds of exotic palmate palms in Florida: (**a, top**) mexican fan palm (*Washingtonia robusta*); (**b, middle**) red latan palm (*Latania lontaroides*), showing extensive feeding damage by palm leaf skeletonizers: (**c, bottom**) red latan palm, (closeup of damage). Note frass tubes, dilated terminal portions of which usually contain the pupae.

Fig. 5. Palm leaf skeletonizer damage on leaflets of coconut palm (*Cocos nucifera).*

coconut palms, while infestations on cabbage palmettos and other costa-palmate and palmate leaf palms appeared to be sporadic as usual. During this period, extension agents with the University of Florida Cooperative Extension Service in the southeastern Florida counties informed us that they had been receiving an increased number of calls from the public reporting palm leaf skeletonizer damage to coconut palms.

In the late 1990s, the second author noticed a similar situation in Puerto Rico, i.e., an explosive outbreak of palm leaf skeletonizers on coconut palm on that island (Figs. 5, 6, and 7). Specimens of palm leaf skeletonizers collected on coconut palm in both Florida and Puerto Rico were confirmed as *H. sabalella* by Dr. John B. Heppner, Florida State Collection of Arthropods (FSCA), Gainesville. In Oct. 2000, *H. sabalella* was identified for the first time on palms near San Diego, CA (Howard 2001), where it is assumed to have been accidentally introduced from Florida.

To attempt to explain the outbreak of palm leaf skeletonizers on coconut palm, we hypothesized that this insect may have changed its host preferences. However, there was no obvious factor that would have induced a host shift. Our alternate hypothesis was that the palm leaf skeletonizer that preferred coconut palms was a cryptic species closely related to *H. sabalella*, or a biotype of the latter species. We surmised that it had probably been introduced into Florida and subsequently into Puerto Rico, ultimately from an unknown locality in tropical America. Thus far, no morphological differences have been found to separate "the coconut palm leaf skeletonizer" from the "cabbage palmetto leaf skeletonizer," and we are currently collaborating with Dr. Robin Giblin-Davis, FLREC, who is conducting molecular analyses to search for possible genetic differences.

The change in the pest status of palm leaf skeletonizers motivated us to scrutinize palms in Florida and Puerto Rico for them, and we have now observed palm leaf skeletonizers and their damage on a total of 78 species of palms. However, uncertainties remain regarding the taxonomy of the skeletonizers on different palms.

In recent years, the palm leaf skeletonizer outbreak has declined in southern Florida, and they seem to be generally under adequate natural control, especially on coconut palm. Their damage, especially to tall palms, is often unnoticeable, and their impact on the vigor of their palm hosts is undoubtedly negligible, but they may still cause enough aesthetic damage to particular

Fig. 6. Coconut palm in Isabela, PR, with extensive necrosis on lower fronds.

Fig. 7. Coconut palms in 2003 on the Agricultural Experiment Station, Isabela, PR, with damage on lower fronds due to palm leaf skeletonizers.

palms to be considered pests. For example, the red latan palm, a palm that is highly valued as an ornamental, is slow-growing so that even older specimens are typically of low stature; thus their foliage is highly visible to anyone in the vicinity. Their large fronds, smooth and gray-green in color, are perhaps their most aesthetic feature. Thus, the damage to these fronds by palm leaf skeletonizers may be objectionable (Fig. 4b–c).

Assuming that the "coconut palm leaf skeletonizer" and "cabbage palmetto leaf skeletonizer" are two different species, subspecies, or biotypes, pest management options for both may be essentially the same. Control by natural enemies may be the same, as we have reared some of the same species of parasitoids from palm leaf skeletonizers infesting coconut palms and on cabbage palmettos. In situations in which chemical or physical

control might play a role in managing palm leaf skeletonizers, methods effective against "the coconut palm leaf skeletonizer" would undoubtedly be equally effective against the "cabbage palmetto leaf skeletonizer."

Chemical control of palm leaf skeletonizers is not a practical option for widespread use because it would be economically costly, potentially disruptive of natural enemies, of transitory value because of reinfestation unless the treatments were repeated indefinitely, and could result in environmental contamination especially if tall palms are sprayed, resulting in insecticidal drift.

However, because chemical control may be appropriate for limited situations, we conducted some preliminary tests with three different chemicals. A topical treatment with bifenthrin was tested. Although this insecticide killed 100% of the larvae in a laboratory test, and was often effective on individual palms in the field, our results in field tests in Florida and Puerto Rico were uneven, possibly because the frass tubes may have protected the larvae in some cases. A root drench with imidacloprid resulted in only a slight reduction in palm leaf skeletonizer damage to foliage of tall coconut palms, possibly because imidacloprid is thought to be translocated primarily to new growth tissue (Dr. Marco Toapanta, Bayer CropScience, personal communications), but palm leaf skeletonizer feeding is confined to older fronds. Because there is widespread interest in the potential use of biorational chemical control of pests, we tested azadirachtin as a topical spray for preventing palm leaf skeletonizer damage. After biweekly treatments for 18 weeks, although there were about half the numbers of skeletonizer damage sites in the treated palms than in the controls, the degree of control obtained was not sufficient to justify the efforts invested.

A method of physical control that is probably often employed is to prune infested leaves. This method might be effective for eradicating the pest in a locality where it is introduced and detected early, especially if the infested fronds are destroyed, e.g., by burning them. However, in Florida and Puerto Rico, where palm leaf skeletonizers are already established, periodic pruning of fronds to eliminate the caterpillars may do more harm than good; horticulturists generally recommend that green fronds even with some damage may contribute significantly to the vigor of a palm, thus should not be removed.

We have found that a very effective physical method of removing palm leaf skeletonizer larvae along with their frass tubes is to wash them off with a wet synthetic sponge. Some people have reported similarly effective results with a forceful spray from a garden hose. Both methods are probably more appropriate for fan palms such as red latan palm, i.e., with relatively rigid palmate or costa-palmate fronds, than for palms such as coconuts, which have pinnate, highly flexible fronds. Although the caterpillars and their damage can be removed by this method, any necrotic areas caused by feeding are permanent as long as the damaged frond remains on the palm. Thus, frequent inspection of a palm with early detection and removal of caterpillars would be necessary to keep a palm free of skeletonizer damage.

Several species of hymenopterous parasitoids plus a predaceous beetle [*Plochionus amandus* Newman (Coleoptera: Carabidae: Harpalinae)] associated with palm leaf skeletonizer were reported as natural enemies of palm leaf skeletonizer (Creighton, 1937). We have occasionally found *P. amandus* in the frass tubes (identified by Dr. Michael Thomas, FSCA), but have not verified that they prey on palm leaf skeletonizers. We have reared several species of hymenopterous parasitoids from skeletonizer larvae in both Florida and Puerto Rico, some of which are apparently species previously reported as parasitoids of *H. sabella* by Creighton (1937), but confirmed identification of the hymenopterous species is pending.

A parasitoid fly has been reared frequently from the larvae of both "the coconut palm leaf skeletonizer" and the "cabbage palmetto leaf skeletonizer" from various sites in southern Florida, and identified as an undescribed species of the neotropical genus *Phytomyptera* (Diptera: Tachinidae) by Dr. James E. O'Hara, Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa. It has not been found in surveys of natural enemies of palm leaf skeletonizers in Puerto Rico, and the observation that palm leaf skeletonizer damage there has not declined as it has in Florida suggests that this tachinid fly should be studied as a possible effective natural enemy for biocontrol of palm leaf skeletonizers in Puerto Rico.

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