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THE LOBATE LAC SCALE INSECT, A NEW PEST OF TREES AND SHRUBS IN FLORIDA: IMPLICATIONS FOR THE CARIBBEAN REGION

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ABSTRACT: The lobate lac scale insect, *Paratachardina lobata* (Hemiptera: Coccoidea: Kerriidae), a species native to India and Sri Lanka, was found for the first time in Florida in 1999 and it appears to be widespread in the Bahamas. In Florida, it has already spread over an area of about 6400 km². It has been reported on more than 150 species of woody plants. Most host plants that are native to southern Florida are also native to the Caribbean Region, implying that the pest threatens natural areas in the whole Region. These scale insects infest the woody portions of small branches, causing branch dieback. Severe infestations of some plants are lethal. The duration of development from egg to adult is under investigation. Two species of Encyrtidae (Hymenoptera), *Metaphycus* sp. and *Ammonoencyrtus* sp., both probably undescribed, were reared from lobate lac scales. Only a few specimens were reared from thousands of lobate lac scales held in emergence containers. Application of imidacloprid as a root drench to infested trees is effective in controlling the scale insect, but biological control is viewed as the only practical option in the long term to control this pest, especially in natural areas. Therefore, a program to obtain natural enemies of this scale insect from India has been initiated.

RESUMEN: La escama lobada de laca, *Paratachardina lobata* (Hemiptera: Coccoidea: Kerriidae), una especie oriunda de la India y Sri Lanka, fue encontrada por primera vez en las Bahamas en 1992 y en la Florida en 1999. En la Florida, el insecto ya está distribuido sobre un área de 6400 km². Se le ha reportado en más de 150 especies de plantas de madera. Las infestaciones severas son mortales para algunas especies de plantas. Casi todas las plantas hospederas nativas de la Florida meridional son también nativas de la región del Caribe, implicando que la plaga amenaza a las áreas naturales de toda la región. Estas cochinillas infestan a la madera de ramitas pequeñas, causándoles la muerte. Se está investigando la duración del desarrollo desde huevo hasta adulto y al parecer ésta es mucho más larga que en la mayoría de las cochinillas. Se ha observado un índice muy bajo de parasitismo. Dos especies de Encyrtidae (Himenóptera), *Metaphycus* sp. y *Ammonoencyrtus* sp., ambas probablemente no registradas, se crearon de escama lobada de laca. Solamente unos pocos especímenes crecieron de millares de escamas en jaulas de crecimiento. La aplicación de imidacloprid en las raíces de árboles infestados controla con eficacia la cochinilla, pero el control biológico se ve como la única opción práctica a largo plazo para manejar esta plaga, especialmente en áreas naturales. Por eso, se ha comenzado un programa para obtener enemigos naturales de la India.

KEY WORDS: scale insect, host plants, invasive species, natural areas, chemical control, parasites

INTRODUCTION

The lobate lac scale insect, *Paratachardina lobata* (Chamberlin) (Hemiptera: Sternorrhyncha: Coccoidea: Kerriidae), a species native to southern India and Sri Lanka, was found for the first time in Florida in Broward County in 1999. Subsequent to its discovery in Florida, specimens of this scale insect collected in the Bahamas in 1992 were found in the Florida State Collection of Arthropods. This highly invasive species currently has a patchy distribution in urban and natural habitats within a total area of about 6400 km² in Broward, Palm Beach, and Miami-Dade counties, Florida and large areas of New Providence and Grand Bahama, Bahamas. *Paratachardina lobata* was recently collected for the first time on Christmas Island by Ms. Kirsti Abbott, Monash University, Australia (personal communications) and identified by Dr. Penny Gullan, University of California, Davis (personal communications).

DESCRIPTION OF LOBATE LAC SCALE

It is a very distinctive scale insect (Figure 1). The mature female, about 1.5-2 mm long, and of slightly less width, has two pairs of prominent lobes; its appearance has been likened to that of a bowtie. With some experience, the scale insect in this stage can be easily discerned with the naked eye. The first instars are maroon colored, elliptical, and about 0.4 mm in length. The lobed condition develops in the second instar. The covering of the third instar and mature female is extremely hard and brittle, glossy and of a dark reddish brown color, but is often coated with black sooty-mold. White wax bands are produced in the spiracular furrows. Males of this species have not been observed in Florida.

HOST RANGE AND PROPENSITY TO SPREAD

Nearly all the hosts of lobate lac scale are dicotyledonous trees and shrubs. It infests twigs, small branches, and stems of less than 2 cm in diameter. It is not found on foliage. Up to 46 mature females have been counted per 100 mm² of twig on highly susceptible hosts. Dense infestations may result in branch dieback of some plant species. High infestations have been lethal to some species of shrubs. Wax-myrtle (*Myrica cerifera*) is especially susceptible to the effects of dense populations of lobate lac scale insect. Some plant species appear to tolerate dense infestations, but this may be illusory, as the long-term effects of such infestations are not yet known.

As of October 2002, i.e., a few months after studies of this insect were initiated in Florida, host plants reported for lobate lac scale insect numbered more than 120 species in 44 families (Howard et al., 2002). These included more than 39 plant species native to Florida. Various observers in Florida have noted other hosts but these records have not yet been compiled, and additional host plants were recently detected during surveys for the scale insect on New Providence and Grand Bahama (Pemberton, unpublished). Almost 2/3 of the 108 native plants examined in that survey were infested, many of them heavily. Plants native to Florida and the Bahamas that are often highly infested include, in addition to wax-myrtle, cocoplum (*Chrysobalanus icaco* L., Chrysobalanaceae), buttonwood (*Conocarpus erectus* L., Combretaceae), myrsine (*Myrsine guianensis* (Aublet) Kuntze, Myrsinaceae), and wild-coffee (*Psychotria* spp., Rubiaceae). There is very little known about the susceptibility of most of the host species, and species that harbored only light infestations when first observed have often become highly infested later or at other sites. Several exotic fruit trees attacked by lobate lac scale insect in Florida are widely grown in the Caribbean Region, e.g., several species of *Annona* (Annonaceae), star-fruit (*Averrhoa carambola* L., Oxidaceae), lychee (*Litchi chinensis*

Sonnerat, Sapindaceae), and mango (*Mangifera indica* L., Anacardiaceae).

The lobate lac scale insect may attack a high portion of the woody plants at a particular site. For instance, on one site sampled in 2002, 55% of the species in 63.3% of the plant families and 55% of the individual plants examined were infested (Pemberton, 2003a).

Invasion of natural areas is of paramount concern. A cursory examination of several tropical hardwood hammocks in southern Florida revealed that there were heavy infestations on diverse species over large areas. Most of the native host plants of *P. lobata* identified in Florida are also distributed in the Caribbean Region, and if the insect were to be introduced into Puerto Rico or other Caribbean countries, natural areas there would likewise be threatened.

The lobate lac scale insect is native to India and Sri Lanka, and introduced in the localities listed above. This implies a potential further spread of this species in tropical areas of the Western Hemisphere (Pemberton, 2003b). Vigilance should be exercised to prevent the introduction of this scale insect into Puerto Rico and other localities of the Caribbean Region, Texas, California, Hawaii, and other warm areas where plants are imported from Florida.

The lobate lac scale insect belongs to the lac scale insect family, Kerriidae, one of 28 families of the scale insect superfamily Coccoidea (Ben-Dov et al., 2003). The best-known species of Kerriidae is the true lac scale insect, *Kerria lacca* (Kerr). The scale of the true lac scale insect has been utilized since antiquity for making shellac and similar products. However, the lobate lac scale insect, like most species of Kerriidae, does not produce any material of known commercial value. Of the 87 described species of this family, 64 are distributed in the Eastern Hemisphere. Of the species native to the Western Hemisphere, 13 are reported from South America, six from Mexico (two of which are also reported in the southwestern U.S.), three reported only in the southwestern U.S., and one from Jamaica (Ben-Dov, 2003).

BIOLOGY AND CONTROL

The biology of lobate lac scale insect has not been studied in its native range. Studies are in progress in Florida to elucidate the bionomics of this scale insect and develop pest management methods for it.

The authors have initiated research to develop chemical control for this pest for the short term and biological control for the long term. An application of imidacloprid as a root drench on infested trees is effective in controlling the scale insect (Howard unpublished data). Biological control is seen as the best long-term option.

Biological control research on the scale insect is in progress. To determine whether natural enemies of this scale insect were already present in Florida, sections of branches infested with lobate lac scale were kept in plastic bags for rearing and identifying parasitoids. Two species of Encyrtidae (Hymenoptera), *Metaphycus* sp. and *Ammonoencyrtus* sp., both probably undescribed, were reared from lobate lac scales. These were identified by Michael W. Gates and Michael E. Schauff, respectively, both of the USDA, ARS, Systematic Entomology Laboratory, Beltsville, MD. They include *Ammonoencyrtus* sp. (identified by Schauff) and *Metaphycus* sp., (identified by Gates). The *Metaphycus* sp. is possibly undescribed and the *Ammonoencyrtus* sp. has been described previously, but its generic placement will be formally changed in a forthcoming paper (Schauff and Gates, Personal Communication). Only a few specimens of each were reared from thousands of lobate lac scales held on branches in plastic bags.

Promising natural enemies are known to attack the lobate lac scale insect in India, and few related native scale insects that could be non-targets of introduced biocontrol agents occur in Florida or the Caribbean, thus suggesting that the prospects are good for effective and environmentally safe biological control (Pemberton, 2003b).

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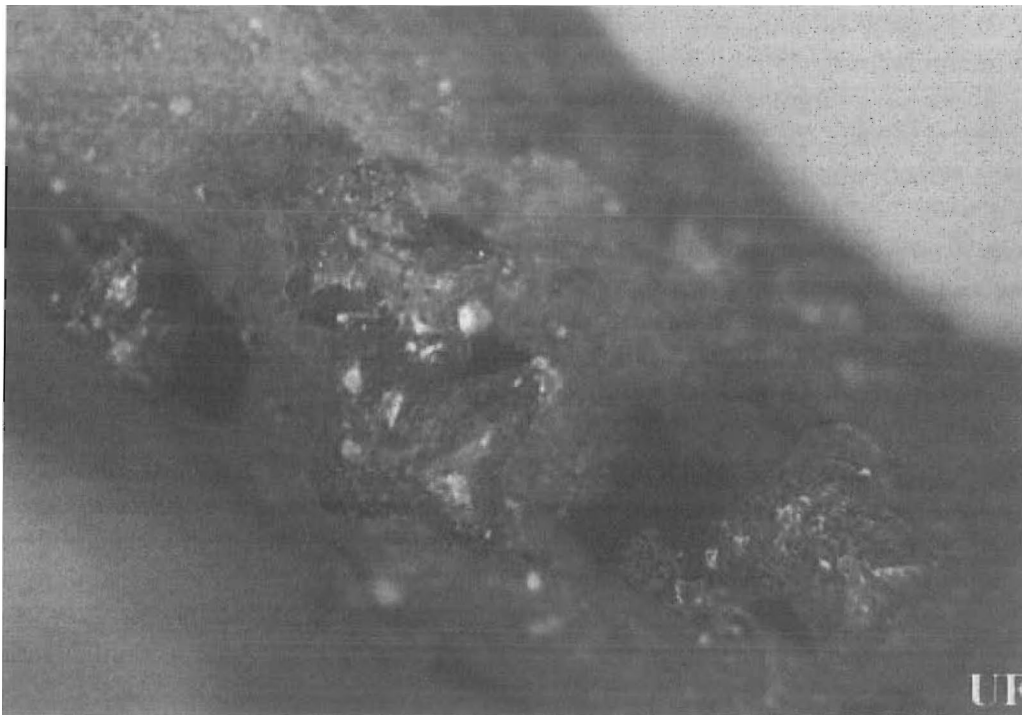


Figure 1. *Paratachardina lobata*, mature female scales on twig.