Pest Alert

Florida Department of Agriculture and Consumer Services
Division of Plant Industry

Lepidosaphes chinensis Chamberlin (Hemiptera: Diaspididae), an Armored Scale Infesting Lucky Bamboo

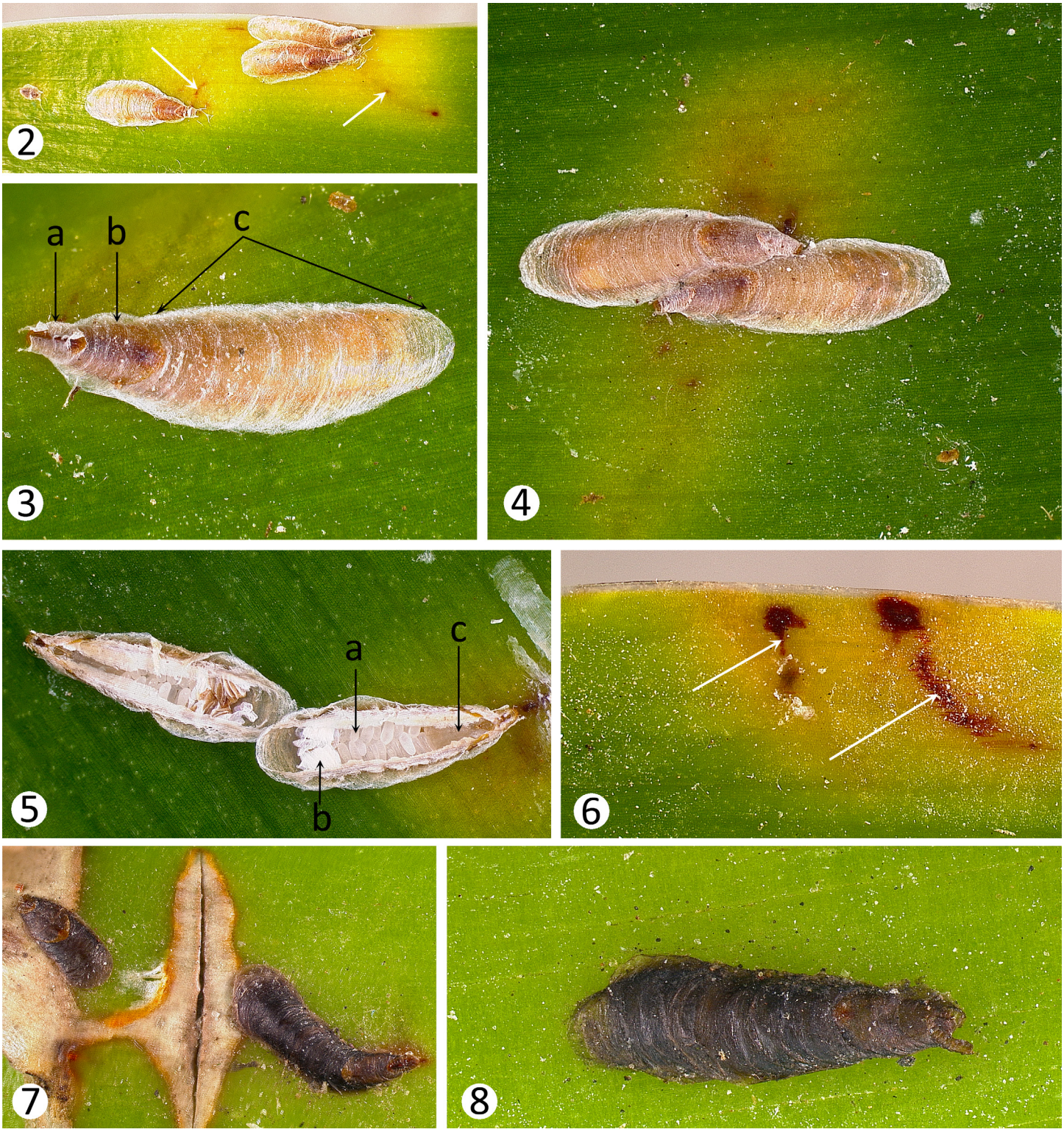
Ian C. Stocks, Ian.Stocks@FreshFromFlorida.com, Biological Scientist IV, Florida Department of Agriculture and Consumer Services, Division of Plant Industry

INTRODUCTION: Recent inspections of several retail nurseries in Alachua County by FDACS-DPI inspectors Theresa Estok and Cheryl Jones revealed that numerous lucky bamboo (Ruscaceae: *Dracaena braunii* Engl.) plants were infested with *Lepidosaphes chinensis*, known by the common names Chinese lepidosaphes scale and Chinese mussel scale (Malumphy *et al*. 2012). This species is not known to occur in the United States, but is a potentially serious pest of both *Dracaena* spp. and orchids (Ben-Dov *et al*. 2014). Lucky bamboo is a popular indoor ornamental with flexible stems that may be trained into various forms (Fig. 1). Previously, lucky bamboo was known as *Dracaena sanderiana* Sander and is still commonly sold under that name. Because the plants quarantined in Alachua County were sourced from major grower-distributors, infested plants were probably distributed throughout Florida and possibly other states. This pest species has been intercepted 45 times since 1992 at Florida U.S. ports-of-entry, primarily on *Dracaena* spp. from Asia, but also on orchids, palms (*Licuala* sp., *Areca* sp.), *Aglaonema* sp. (Araceae), *Cordyline* sp. (Laxmanniaceae), and *Michelia* sp. and *Magnolia* sp. (Magnoliaceae) (Dr. G. Evans, USDA-APHIS, personal communication).

Fig. 1. Decorative lucky bamboo, *Dracaena braunii* Engl., in various forms commonly sold in nurseries. Photography credit: I.C. Stocks, FDACS-DPI.

DESCRIPTION: This scale resembles many other species in the genus *Lepidosaphes* (mussel scales) such as glover scale (*L. gloverii*), purple scale (many common names, *L. beckii*) and camellia scale (*L. camelliae*), in that the scale cover of a mature female resembles in shape that of mussels, which is a convex, elongated and tapered “tear-drop” shape (Figs. 2–4). Color of the insect beneath the scale, scale cover and shape of the scale margin vary amongst species, but the specimens examined from this infestation have a tan to light brown scale cover; the insect beneath the cover is primarily pearly-white with a light yellow posterior. Although host data are informative, identification requires that females be slide-mounted.

Scales on the lucky bamboo examined were most obvious on the leaves, especially along the margins. However, the most heavily infested plants not only had high numbers on the leaves, but especially dense populations of all ages on lateral shoots developing between the tightly adhered leaf sheath and the stem itself. In such manner, each successive node of the newly forming stem developed heavy populations encircling the stem, but they were hidden somewhat by the leaves of the lower nodes. Such heavily infested stems displayed extensive chlorosis and wilting and appeared to be in decline. Several of the larger single-stemmed plants also had scales scattered along the stem and at the nodes on the stem, but most of the insects were dead. Dead scales on the larger stems had noticeably darker scale covers, suggesting that the covers darken as they age (Figs. 7 and 8).



Figs. 2–4. Adult female *Lepidosaphes chinensis* on lucky bamboo. 2) Arrows pointing to necrotic spots inside chlorotic area. 3) Components of the scale cover of adult female. a-crawler skin; b-second stage skin; c-progressively molded cover of adult female. 4) Two adult females surrounded by developing necrosis and chlorosis. Photography credit: I.C. Stocks, FDACS-DPI. **Fig. 5.** Adult female *Lepidosaphes chinensis* on lucky bamboo, flipped over. a) unhatched eggs; b) egg shells after hatching; c) shriveled post-oviposition female. Photography credit: I.C. Stocks, FDACS-DPI, **Fig. 6.** Leaf chlorosis and necrosis on the leaf surface obverse to the attached scale. White arrows point to the necrotic region and indicates the direction taken by the inserted mouthparts. Photography credit: I.C. Stocks, FDACS-DPI. **Fig. 7.** Scale covers of dead adult female *Lepidosaphes chinensis* on lucky bamboo stem. Photography credit: I.C. Stocks, FDACS-DPI. **Fig. 8.** Close-up of scale cover of a dead adult female *Lepidosaphes chinensis* on lucky bamboo stem. Photography credit: I.C. Stocks, FDACS-DPI.

BIOLOGY: The infestation documented by Malumphy *et al*. (2012) was sufficiently extensive that the authors were able to collect life-history data. At least for populations living for an undetermined period of time in conservatory conditions at 30°C, this species reproduces sexually, females lay up to 38 eggs, and all life-stages co-occur. As seen in Fig. 4, the eggs are laid in two parallel rows. Armored scales, unlike their relatives the mealybugs and soft scales, do not feed by inserting their mouthparts into the vascular system and ingesting photosynthates. Instead, they 'snake' their mouthparts through the cellular layer and puncture and drain individual cells. Cell death by puncturing and toxicity from salivary fluids frequently leave yellow chlorotic areas on leaves that vary from nearly linear to patchy (Figs. 2–4). Chlorosis and necrosis are often visible on the surface obverse to the scale, and provide an easily observed indication that scales are present (Fig. 6). Similar brown patches also occur on the stem beneath the scale cover. At high densities, the chlorotic and necrotic patches merge throughout the leaf, which leads to the death of the leaf. What life-history pattern or pest status this species may take if it becomes established in Florida is speculation, but throughout the 20th century, several species of *Lepidosaphes* became major pests of various hosts, including citrus and camellia.

HOSTS: Since this species is potentially a significant pest in Florida, the full published host listed is presented below (modified from Ben-Dov *et al.* 2014). Inspectors should be especially attentive to the various forms of *D. braunii* sold as lucky bamboo (Fig. 1). Related genera that are commonly sold in Florida are included.

Ruscaceae—*Beaucarnea recurvata* Lem.; *Dracaena braunii* Engl.; *Sansevieria trifasciata* Prain, *Liriope* sp.
Agavaceae—*Yucca gigantea* Lem. (syn. *Y. elephantipes* Regel ex Trel.)
Elaeagnaceae—*Elaeagnus umbellata* Thunb.
Euphorbiaceae—*Euphorbia elegans* Spreng.
Fabaceae—*Indigofera tinctoria* L.
Magnoliaceae—*Magnolia* sp.
Orchidaceae—*Cymbidium* spp.
Pandanaceae—*Pandanus* sp.
Lamiaceae—*Caryopteris incana* (Thunb. ex Houtt.) Miq.

Host data from ScaleNet and the USDA-APHIS port interception database indicate that there is a marked preference for hosts belonging to a group of related genera that are considered to be members of a more broadly delimited Asparagaceae. Inspectors bearing this in mind should also examine other related genera, such as *Agave*, *Asparagus*, *Beschorneria*, *Chlorophytum*, *Cordyline*, *Dracaena*, *Furcraea*, *Hosta*, *Ophiopogon* (e.g., mondo grass, lillyturf) and *Ruscus* spp., which are commonly grown in Florida for the landscape plant and cut-flower trade (Marc Frank, FDACS-DPI, personal communication).

DISTRIBUTION: The main, presumably natural, distribution for this scale is the Oriental biogeographic region, including China, Taiwan, Philippines and Singapore (Ben-Dov *et al*. 2014). In 2012, an infestation was discovered in a conservatory in the north of England (Malumphy *et al*. 2012), but was restricted to plants that can survive in that climate only when grown indoors. Based on the discovery in 1934 and 1935 of populations of this scale on feral orchids (*Cymbidium* sp.) in Lincoln Park, Los Angeles, Ferris (1938) stated that this species should be considered as established in the United States. Since there were no further reports that appeared in the literature in the following decades, Gill (1997) stated that it had been eradicated.

ECONOMIC IMPORTANCE: There is no evidence that this scale is established anywhere in the New World, at least on hosts that can survive outside year-round. Florida nurseries are major importers, growers and distributors of many ornamental species that are suitable hosts for this scale. Also, there are many species of native orchids in Florida, some of which are threatened or endangered, that are potentially suitable hosts. Therefore, there is potential for this scale to become a significant economic and ecological pest. The most heavily infested lucky bamboo plants showed extensive chlorosis and subsequent necrosis of the leaves as a result of insect feeding.

NATURAL ENEMIES: No parasitoid or predator are reported in the literature, and none of the specimens from the plants examined showed signs of parasitism. However, other species of *Lepidosaphes* in Florida are generally held at low levels by parasitoids.

REFERENCES:

Ben-Dov, Y., D.R. Miller and G.A.P Gibson. 2014. ScaleNet. *Lepidosaphes chinensis*. http://www.sel.barc.usda.gov/catalogs/diaspidi/Lepidosapheschinensis.htm [accessed 2014 September 11]

Ferris, G. 1938. SII–143. *Lepidosaphes chinensis* Chamberlin. In: Atlas of the scale insects of North America. Series 2. Stanford University Press, Palo Alto, California.

Gill, R. 1997. The scale insects of California: Part 3. The armored scales (Homoptera: Diaspididae). California Department of Food and Agriculture, Sacramento, California. 307 pp.

Malumphy, C., A.J. Halstead and A. Salisbury. 2012. First incursion of Chinese mussel scale *Lepidosaphes chinensis* (Hemiptera: Diaspididae) in Europe, with a review of Lepidosaphes species found in Britain. British Journal of Entomology and Natural History 25: 65–73.