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EENY-547

Air Potato Leaf Beetle (Suggested Common Name), *Lilioceris cheni* Gressitt and Kimoto (Insecta: Coleoptera: Chrysomelidae: Criocerinae)[1]

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Introduction

Air potato (*Dioscorea bulbifera* L., Dioscoreaceae) is a herbaceous, perennial twining vine that attains lengths of 20 m or more, rendering it capable of climbing over and smothering native vegetation (Schmitz et al. 1997, Overholt et al. 2008, Figure 1).

Figure 1. Air potato infestation at Snyder Park in Fort Lauderdale. Credits: Ted D. Center, USDA/ARS Invasive Plant Research Laboratory, Fort Lauderdale, FL.

The native range of air potato includes much of Asia and Africa, and recent molecular evidence suggests that air potato in Florida originated from China (Croxton et al. 2011). Air potato was introduced to Florida in 1905 when it was sent to the USDA by Henry Nehrling, who later noted its invasive potential (Morton 1976). It has since become extremely aggressive (Hammer 1998). By the 1980s, air potato vines were growing in thickets, waste areas, and hedges or fencerows in many parts of south and central Florida (Bell and Taylor 1982). By 1999, air potato was recognized as an invasive exotic that alters plant communities by displacing native species, changing community structure, and disrupting ecological functions (FLEPPC 2003). A leaf feeding beetle, *Lilioceris cheni,* was recently introduced into Florida from China for biological control of air potato.This article provides information on the distribution, appearance, life cycle, host range and importance of the beetle.

Distribution

The air potato leaf beetle is native to Asia. Country records include China, India, Nepal, Laos, and Thailand (Kimoto and Gressitt 1979, Tishechkin et al. 2011). The beetle was first released in Florida in 2012 for biological control of air potato.

Description

Adult

Lilioceris cheni adults are about 9 mm long and 4 mm wide. The color of the elytra ranges from brown to orange or red, and the abdomen, thorax, head, and legs are black. The

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beetle is elongate, with a rectangular-shaped abdomen, a thorax about half as wide as the abdomen, and a narrow head with bulging eyes. The shape somewhat resembles a square violin with a short neck (Figure 2).

Figure 2. Adult *Lilioceris cheni.*
Credits: Ted D. Center, USDA/ARS Invasive Plant Research Laboratory, Fort Lauderdale, FL.

Egg

Pale white, oblong and about 1 mm in length. Eggs become yellowish as the embryo develops (Figure 3) and hatch after four days.

Figure 3. *Lilioceris cheni* eggs.
Credits: Melissa C. Smith, USDA/ARS Invasive Plant Research Laboratory, Fort Lauderdale, FL.

Larva

There are four larval instars. First instars are yellowish to reddish (Figure 4), and later instars are grayish to reddish, with black legs, head capsule, and prothoracic shield (Figure 5). Larvae are often covered with a sticky secretion to which fecal material adheres.

Figure 4. *Lilioceris cheni* first instar.
Credits: Gloria L. Witkus, USDA/ARS Invasive Plant Research Laboratory, Fort Lauderdale, FL

Figure 5. *Lilioceris cheni* late instar larva
Credits: Melissa C. Smith, USDA/ARS Invasive Plant Research Laboratory, Fort Lauderdale, FL.

Pupa

Fully grown larvae enter the soil and produce a whitish oral secretion that hardens into a foam-like cocoon that is about 7 mm in length. Pupation occurs gregariously, often with several pupae clumped together within a matrix of the foam-like material that becomes covered with soil and other substances (Figures 6 and 7).

Life Cycle and Biology

Females deposit pale white, oblong eggs in loosely aggregated clusters on the undersides of young, expanding leaves of air potato. The process of oviposition apparently deforms the expanding leaf causing it to curl at the edges becoming cup-like around the eggs (Figure 8).

Females deposit more than 1200 eggs on average during their lifetime. The eggs become yellowish as the embryo develops, and dark reddish eye spots appear mid-way through the incubation period. Embryonic development

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Figure 6. *Lilioceris cheni* pupal aggregation covered with soil particles. Credits: William A. Overholt, UF/IFAS Indian River Research and Education Center, Fort Pierce, FL.

Figure 7. *Lilioceris cheni* pupa within a partially removed cocoon. Credits: Gloria L. Witkus, USDA/ARS Invasive Plant Research Laboratory, Fort Lauderdale, FL

Figure 8. A deformed expanding air potato leaf. Credits: Ted D. Center, USDA/ARS Invasive Plant Research Laboratory, Fort Lauderdale, FL.

requires about four days. Larvae feed gregariously and skeletonize the leaves from the underside (Figures 9).

Young tender leaves are preferred but they also consume older, tougher leaves and are able to feed on the aerial

Figure 9. An aggregation of late instar *Lilioceris cheni* larvae skeletonizing air potato leaves.

bulbils. Complete development of the four instars requires about eight days, with each stage lasting about two days. When fully grown, larvae descend from the host plant and enter the soil where they produce a whitish oral secretion that hardens into a foam-like cocoon. Pupation occurs gregariously, often with several pupae clumped together within a matrix of this material. Adults emerge in 12 to 16 days, begin mating after about 10 days, and initiate oviposition five days later. The adults live for five months or longer. Both adults and larvae feed on the foliage.

Larvae can often be found in aggregations on the growing tips of air potato vines. The host plant senesces during the winter, forcing the adult beetles to go several months without food, presumably in diapause beneath leaf litter and other debris. The overwintered adults emerge in the spring, and females begin laying eggs.

Host

Extensive host range testing by scientists at the USDA/ARS Invasive Plant Research Laboratory in Fort Lauderdale demonstrated that the air potato leaf beetle is a specialist feeder on air potato. It will not complete development on any other plant found in Florida and is only known to feed on *Dioscorea bulbifera* in its native range (Pemberton and Witkus 2010).

Importance

Larvae and adults of the air potato leaf beetle consume leaf tissue and occasionally feed on bulbils, thereby negatively affecting plant growth and reproduction. Damage to growing tips inhibits vine elongation and may reduce the ability of air potato to climb vertical structures. At initial release

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sites, extensive damage to air potato was evident within three months after the first release.

Although it is too early to determine the long-term impacts of the beetle on air potato, initial results are very promising. If you think you have found this beetle in your area, please send a photograph for identification along with locality data (GPS coordinates preferred) to Paul.Pratt@ars.usda.gov and we will add this information to our locality map.

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