

Biological Control for Air Potato Has Arrived!

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Figure 1a. Adult *Lilioceris cheni*, Chinese.



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Figure 1b. Adult *Lilioceris cheni*, Nepalese.



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Figure 2. Cluster of *Lilioceris cheni* eggs on the underside of an air potato leaf.



W. OVERHOLT

Figure 3. Larvae feeding on the underside of an air potato leaf.

Air potato (*Dioscorea bulbifera*) in Florida may have finally met its match — a voracious leaf-feeding beetle from Asia named *Lilioceris cheni*. The beetle was first discovered in Nepal by scientists from the USDA/ARS Invasive Plant Research Laboratory in Fort Lauderdale (IPRL), and later the same species was found in the Yunnan Province of China. Adult beetles are either bright red (Chinese biotype) or brown (Nepalese biotype), and about 9 mm (3/8") long (Figure 1). They live for up to six months, during which they lay as many as 4,000 eggs. Females lay eggs in clusters on the undersides of young, expanding air potato leaves (Figure 2). Adult females bite the veins of the leaves on which they oviposit, causing the expanding leaves to curl at the edges and cup the eggs, perhaps providing some protection from inclement weather or egg predators. Eggs hatch in about 4 days, and the reddish colored larvae feed on leaves for around 10 days (Figure 3). Late stage larvae and adults occasionally feed on bulbils (aerial tubers). Fully mature larvae drop to the ground and burrow into the soil where they secrete a whitish oral substance that hardens into a cocoon. Several pupae often clump together within this material. Adults emerge from the soil after about 16 days and begin to lay eggs 15 days later (Tishechkin et al. 2011). Larvae are often found feeding in groups on the growing tips, which inhibits vine elongation and reduces the ability of the plant to climb vertical structures. The leaves and vines of air potato die back in the winter, depriving the beetles of a food source. During this time, the adult beetles enter a resting state beneath leaf litter or other debris on the ground. The overwintered adults emerge during spring when air potato vines sprout from bulbils and subterranean tubers, and the adults begin once again to feed and lay eggs.

Host range testing conducted at the IPRL quarantine facility prior to field-release demonstrated that both Nepalese and Chinese biotypes of the air potato beetles would only feed and complete development on *Dioscorea bulbifera* (Pemberton et al. 2010, Center et al. 2013). They do not even feed on other species of *Dioscorea*. Based on this safety data, a permit for field release was granted in February 2011. The first beetle field-releases were made by the IPRL in November 2011 at the Long Key natural area in Broward County and at Kendall Indian Hammock Park in Miami-Dade County. The Florida Department of Agriculture and Consumer Services, Division of Plant Industry (DPI) joined the rearing and release program in 2012, and the combined efforts by the IPRL and DPI resulted in the release of over 145,000 beetles at 175 sites in 32 counties in 2013.

The future is bright! Some beetles released in 2011 successfully overwintered and dispersed to neighboring air potato infestations. Beetle survival and establishment was demonstrated at some of the 2012 release sites while other sites required supplemental releases in 2013. As vines sprouted in the spring of 2013, beetle populations at several sites began increasing rapidly at the beginning of the growing season and this abundance of beetles caused extensive feeding damage (Figure 4). Sites that received beetles in 2012 experienced the greatest impact, including reduced height of vines, decreased bulbil production and, most importantly, an increase in native vegetation. Beetle performance at 2013 release sites will be monitored through 2014.

Long-term research sites have been established at several locations in Florida to investigate the impact of beetles on air potato vine growth and bulbil production. These research sites will also provide information on changes in

vegetation structure and composition as air potato vines are reduced over time. Studies to determine the optimal number of beetles to release at a site and the rate of beetle dispersal are also in progress. These studies will make the project more cost effective and will help formulate release strategies to increase beetle establishment at different air potato infested sites throughout Florida. A collaboration between the IPRL and the University of Florida will further our knowledge of the beetles' biology by investigating overwintering success at several locations across Florida and by examining the influence of temperature on beetle development.

If you are interested in obtaining beetles for release, please contact Dr. Eric Rohrig at the Florida Department of Agriculture and Consumer Services (Eric.Rohrig@freshfromflorida.com). Priority is currently being given to releases on public lands, but it is hoped that a sufficient number of beetles will soon be available to supply private landowners as well. Hopefully, the Florida-wide air potato menace can soon be tamed once and for all!



Figure 4. A patch of air potato vines heavily damaged by beetles in August 2013. Beetles were released at the site in 2012.

References

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SE-EPPC Award of Excellence presented to Chuck Bargeron

SE-EPPC Award Committee
Members: Karen Brown
Nancy Loewenstein
Lee Patrick

In 2013, the SE-EPPC Award Committee chose Charles T. (Chuck) Bargeron to receive the **SE-EPPC Award of Excellence** for an "outstanding record of service to exotic pest plant research, education, outreach and control in the southeastern United States." The award was presented during the conference via Skype since Chuck was unable to attend in person. Chuck is known literally across North America and has assisted every invasive species organization known to most mortals. Chuck does it all, from the most mundane of website fixes to building EDDMapS, approximately 63 websites (and counting) and 16 phone apps. Chuck has served as president of SE-EPPC, National EPPC, currently serves on the National Invasive Species Advisory Council and is Chair-Elect of the North American Invasive Species Network. He has also been a cover-guy for *Wildland Weeds* magazine (see the Summer 2010 issue at se-eppc.org).

Chuck has been nominated for this award in the past but, as a member of the SE-EPPC Award Committee, always felt that the award should go to worthy colleagues who were closer to retirement. Even though Chuck has plenty of mileage left, we (without consulting him) decided that we could wait no longer. (We can give him another award when he's old and crusty.)

Chuck is one of the most entertaining guys to work with. He is smart, funny, and as unpretentious as they come. He scowls a lot but he laughs more. He often responds to EPPC emails at 11pm, 7am, on weekends, during meetings and conference calls, and from planes, trains and automobiles. If you have benefited from Chuck's assistance in any of your programs, please send him your congratulations. With this award, we say, "Thank you, Chuck!"