

# Frequently Asked Questions

## Air potato vine

### ➤ *Why should I care about air potato vine?*

Air potato vine, *Dioscorea bulbifera*, is an invasive vine with large heart-shaped leaves and herbaceous stems. It climbs vertically into the canopy and has been known to smother or strangle existing vegetation, including trees! Air potato vine can grow over 65 feet in height, thrive in poor soil, and occupy almost any habitat in Florida.

While the vine does flower occasionally, the flowers are not fertilized and do not produce seeds in their introduced range. Instead, the primary method of reproduction is asexual via aerial bulbils (air potatoes). These bulbils are highly successful and do not need soil, water, or sunlight to grow. They are easily dispersed to new areas by water, wind, wildlife, and accidental transport. After the bulbils sprout and a new vine grows, the vine will begin forming an underground tuber.

As the seasons change, the vines begin sending energy to their roots to form underground storage organs called tubers. The tuber stays dormant and viable through the winter and sends up new sprouts the following spring.

The vine is listed by the Florida Exotic Pest Plant Council as a Category I invasive plant. These are species that are altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives. It is also listed as a noxious weed by the Florida Department of Agriculture, which means **the plant can no longer be introduced, possessed, moved, or released without a permit.**

### ➤ *What is the native range of air potato vine? What is the current range?*

The native range of air potato vine includes much of Asia, tropical Africa, and northern Australia. Currently, Florida, Georgia, Hawaii, Puerto Rico, Louisiana, Mississippi, Alabama, South Carolina, and Texas have thriving air potato populations. The vine has been occasionally reported in other states but is not believed to be established. Air potato vine does not thrive in cold climates or in marine estuaries, but otherwise most natural and disturbed habitats are susceptible to infestation, including floodplain forests, marshes, scrub forest, sinkholes, tropical and subtropical hammocks, waterways, and urban lots.

## Identifying air potato vine

### ➤ *How can I be sure I have air potato vine?*

If you ever have any question about the identity of your vine, you can email a picture to [DPI-Permits@FDACS.gov](mailto:DPI-Permits@FDACS.gov). We will be happy to confirm the species of your plant. Alternatively, you can visit our website at [FDACS.gov](http://FDACS.gov). In the search bar type air potato, our web page will be the first link to appear. On the right-hand side of the page, under "Additional Information:" is a link to an air potato vine identification guide ("Do I Have Air Potato Vine? Quick Identification Guide").

## Air Potato Beetle

➤ **What is their life cycle?**

Adult beetles lay their eggs on the underside of leaves, usually biting the leaf veins and causing them to curl into a cupped shape. Eggs take approximately four days to hatch. Larvae feed for five to seven days, cycling through four instars before reaching the pupation stage. When ready to pupate, the larvae drop to the soil and form a protective casing by secreting a white foamy substance which eventually hardens. After about two weeks, they emerge as fully formed adult beetles. In a single lifetime, a female beetle can lay over 1,000 eggs and their average lifespan is six months to a year.

➤ **When were air potato beetles first released?**

The permit for air potato beetle release in Florida was granted in 2009, once the air potato beetle had been proven to be environmentally safe. Limited air potato beetle releases occurred in the summer of 2012, followed by widespread releases in spring of 2013, and residential releases in 2014. To date, our program is still releasing air potato beetles in all 67 counties, on federal parks, preserves, forests, other public lands, as well as residential properties.

➤ **What is "Biotype"?**

A biotype is a group of organisms that are genetically similar but different morphologically. The air potato beetle biotypes that underwent host specificity testing are the same species of beetles but are different in appearance. One biotype is red, and the other biotype is an orange-brown color. Both biotypes were scientifically identified as *Lilioceris cheni* by Dr. Alex Konstantinov at the USDA- ARS- Systematic Entomology Laboratory (2010), where the species identification was verified through molecular and taxonomic study.

## Biological control

➤ **What is Biological control?**

Biological control can be defined as the utilization of natural enemies to **reduce** the damage caused by destructive organisms to tolerable levels. Biological control can involve the use of parasites, predators, pathogens or a combination of the above to control a pest species. There are several types of biological control as follows:

Conservation Biological Control- Conservation of natural enemies

Augmentation Biological Control- Supplemental releases of natural enemies

Classical Biological Control- Importing natural enemies from the native area

The air potato beetle program is a type of classical biological control. The beetles were discovered in 2002 and underwent several years of host-specificity testing to determine their safety and effectiveness.

➤ **Is Biological control safe?**

YES! During the host specificity testing, *Lilioceris cheni* was exposed to over 40 different species to test if they would feed on other native plants or agricultural crops. As a result of this testing, it was determined

they are only able to survive on air potato vines. Air potato beetles and larvae (babies) will not greatly damage or harm any other plants.

➤ ***Why were the air potato beetles brought here?***

Initially introduced in 1905, air potato has been considered one of Florida's more invasive species since 1993, earning it a spot on the Florida Noxious Weed list in 1999. As a species that grows rapidly and reproduces extensively, it can quickly cause ecological and economic harm. Invasive species have no natural enemies in the ecosystems to which they're introduced. Over time this results in a reduction in native species as the introduced species takes over. In 2002 *Lilioceris cheni* (air potato beetles) were discovered attacking *D. bulbifera* (air potato vine) in its origin country of Nepal. In 2005, air potato beetles were imported into the USDA-ARS Invasive Plant Research Laboratory quarantine (IPRL), Ft. Lauderdale, for host specificity testing. Soon after testing had begun, another biotype was found in China.

Air potato vine reports, beetle shipments, and beetle releases

➤ ***When can I report the air potato vine?***

Please only report the air potato vine once the vines on your property have been growing for at least six weeks. This means when the vines die back in the winter, wait until new green vines have been growing for six weeks in the following spring/summer. Why wait? Our beetles require enough tissue to feed and lay their eggs on. This also allows time for you to determine if beetles have returned on their own.

➤ ***When do you ship beetles and conduct releases?***

Over winter, the air potato beetles enter a state of hibernation called diapause. For this reason, most of our releases and shipments are done in summer/fall. However, this depends entirely on environmental conditions and colony numbers.

➤ ***Does it cost anything to receive beetles?***

No, participation in the program is free of charge.

➤ ***How are the beetles shipped?***

Beetles are delivered with FedEx priority overnight shipping. They are placed in a container with breathing holes and leaves to eat. They are boxed up with an ice pack so they do not overheat, and packaging material so they do not get too banged up. Tracking information will be sent to your email the day before a scheduled shipment.

➤ ***If I am selected to receive beetles, how many beetles will I get?***

The number of beetles will be determined at the time of shipment. It is decided based upon current colony size, environmental conditions, and size of the infestation they will be sustained by.

➤ ***Can I submit an air potato beetle report for a neighbor/park/conservation area that has air potato vine?***

No, please have your neighbor or park manager contact us if they would like to participate in our program.

➤ ***What is the best way to release the beetles? Is there a specific time of day?***

The best time to release beetles is right away, as they can only survive a limited period in their shipping boxes. Most weather conditions are ideal for a beetle release! When releasing the beetles, you don't need to make sure every individual beetle goes onto an air potato leaf. Just empty out the container on the air potato vine infestation and they will begin their hard work. If a few beetles fly out right away when you take the lid off, that's okay too. They will quickly find the infestation.

➤ ***There is a lot of air potato vine on my property, should I spilt up the beetles or help the beetles get to the other patches?***

No, the beetles will disperse themselves. They can fly up to 6 miles!

➤ ***Will the rain hurt the beetles? What to do if it rains when the beetles arrive?***

The beetles are adapted to live in the outdoors in a tropical environment and they are adept at dealing with heavy rainfall. They hide under the leaves of the vine and along it's stems until the weather becomes more suitable again. If it is raining when you release, do not leave the beetles in the deli cup to crawl and fly out on their own. They are not good swimmers and are likely to drown. Instead, dump the entire container of beetles onto one spot of your infestation and allow them to find their way.

➤ ***I found beetles on my property already! Where did they come from?***

There are a few possibilities. If you have released beetles previously and then found them again the following spring, your beetles most likely survived their winter diapause and are on their way to repopulating themselves. If you haven't released beetles previously, it is likely they came from a natural population or release that occurred nearby.

➤ ***What do I do with the packaging materials I received? How do I attach the return label and where do I take the box to return it?***

We ask that you please return everything you received with your shipment of beetles. This includes the box, the cooler in the box, the ice pack, and the plastic deli cup. If you want to wash the deli cup with dish soap and water, we greatly appreciate it, but it is not necessary.

To return the box, simply reseal the top and attach the pre-paid return label that you received with the release instructions. It does not matter how you attach the return label, as long as the bar code is visible to scan, and the old shipping label is either covered or has been removed. You may drop the box off at your local FedEx store or FedEx drop site: [www.fedex.com/locate](http://www.fedex.com/locate).

### How to tell if air potato beetles are working on your property

➤ ***How soon can I expect to see the beetles damage my air potato vines? What does the damage look like?***

The adult beetles will create oval holes that look like the leaves have been hole-punched. You should see this damage within a few hours after your release. Approximately two to three weeks after your release, larvae should begin to appear on your infestation. Larval damage looks different from adult feeding, causing the leaves to take on a transparent, “lacey” appearance.

➤ ***I released beetles and see leaf damage, but I can't find them- where are they?***

The beetles can often be difficult to find, especially as the initial population grows. They may avoid being seen by resting under the leaves, on the stems, or high in the new growth above eye-level. The adults also “play dead” and will fall to the ground if disturbed. While they have bright red elytra (wings), their undersides are black, allowing them to blend in with the soil and leaf litter on the ground.

➤ ***Will the beetles disperse themselves across my property as well as in my local area?***

Yes, the beetles do disperse themselves- particularly after they've laid their eggs or following a successful overwintering period.

➤ ***How can I help my beetles survive the winter?***

There's nothing you can do to help your beetles survive the winter. Many of them will survive overwintering and re-emerge from diapause.

### Managing air potato vine with help from air potato beetles

➤ ***Will the beetles eradicate my air potato vine?***

The beetles **will not** eradicate your air potato vine. However, when paired with other management strategies, the beetles can be very effective for control of your infestation. Beetle damage slows the growth of the vine, giving native vegetation a chance to compete. They also cause the vines to produce fewer bulbils, their sole vessel for reproduction and spread. Overall, the beetles help to limit the amount, size, and spread of the air potato vine.

To achieve complete eradication, an Integrated Pest Management (IPM) strategy is recommended. This involves removing all the bulbils (“potatoes”) that drop to the ground and digging up all tubers which the vines resprout from each year. To view the full strategy, please see our management guide:

<https://www.fdacs.gov/content/download/98247/file/Air-Potato-Vine-Management-Guide-02163.pdf>

➤ ***The beetles didn't eat my vine! What's the matter?***

It may be that you don't have air potato vine. Please see our identification guide for more guidance at: <https://www.fdacs.gov/Agriculture-Industry/Pests-and-Diseases/Plant-Pests-and-Diseases/Biological-Control/Air-Potato-Vine-Biological-Control> to double-check the identity of your vine. If you have confirmed that you do have air potato vine, there may be some other factors to consider. If you have recently sprayed for mosquitos or otherwise applied pesticides those poisons could have harmed your beetles. Also, be aware that there can be a bit of delay before you start to see damage. If you have just released beetles, you will likely see evidence of feeding right away. However, it will likely take about a month before you start to see extensive damage. Additionally, the beetles might initially damage tissue high in the canopy where feeding is harder to observe.

➤ ***Will the beetles eat my sweet potato/morning glory/etc.?***

No, the beetles have been extensively host-tested and found to only survive on the air potato vine. You may find the beetles sitting on other plants, especially as their population becomes dense and they have less space among the air potato vines. However, this does not mean that they are feeding on the plant you found them on.

Other miscellaneous questions

➤ ***Will mosquito spray hurt the beetles?***

Absolutely! Most mosquito sprays are broad spectrum pyrethroids and will kill most insects. It is likely that mosquito treatments targeting adult mosquitos will negatively affect air potato beetle populations.

➤ ***Do the air potato beetles have natural predators?***

Yes, there is predation by toads, frogs, wasps, predatory bugs, carpenter ants, birds, armadillos, and lizards. Basically, anything that eats insects will probably prey on adult beetles and their larvae.

➤ ***Is air potato vine poisonous?***

Wild varieties of air potato vine growing in the Southeastern US are poisonous and should not be consumed nor fed to animals. The plant contains diosgenin, which is also used in synthetic steroidal hormones such as birth control and if eaten they can cause paralysis, severe discomfort, and possibly death. Interestingly, this property is utilized sometimes by creating extracts of the toxins which can be used in fishing to immobilize fish and facilitate capture. Zulus use this yam as bait for monkeys and hunters in Malaysia use it to poison tigers. In Indonesia an extract of *D. bulbifera* is used in the preparation of arrow poison. (Coursey, 1967)

➤ ***What agencies are involved in the air potato beetle program?***

FDACS is currently the only organization with an active mass rearing program in the state of Florida. In the past, the UDSA and UF/IFAS have collaborated with FDACS to create the release program we have today. However, those agencies concluded their air potato programs in 2019.

➤ ***How is the air potato beetle program funded?***

FDACS-DPI mass rearing and release of *Lilioceris cheni* is funded, in part, by a Cooperative Agreement from United States Department of Agriculture-Animal and Plant Health Inspection Service (USDA-APHIS).