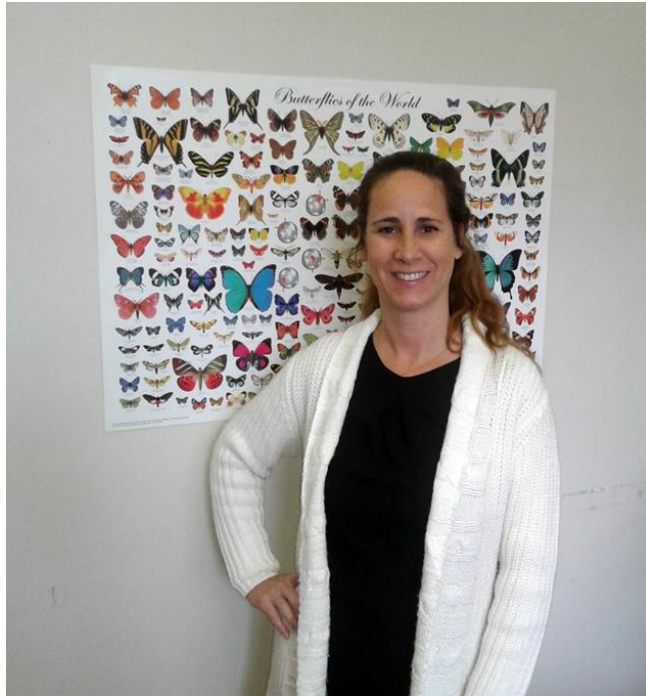


# What's bugging you?

## Welcome to the Entomology Laboratory



**Veronica Manrique, PhD**

Southern University A&M College

Department of Urban Forestry and Natural Resources





**Department of  
Urban Forestry, Environmental  
Sciences & Natural Resources**

**BS, Master, and PhD programs**



## ACADEMIC EXCELLENCE

- High quality education through updated curriculum
- Well prepared lectures using different medias
- Guest speakers with different expertise
- **Experiential learning** through laboratories, field trips, research, etc.



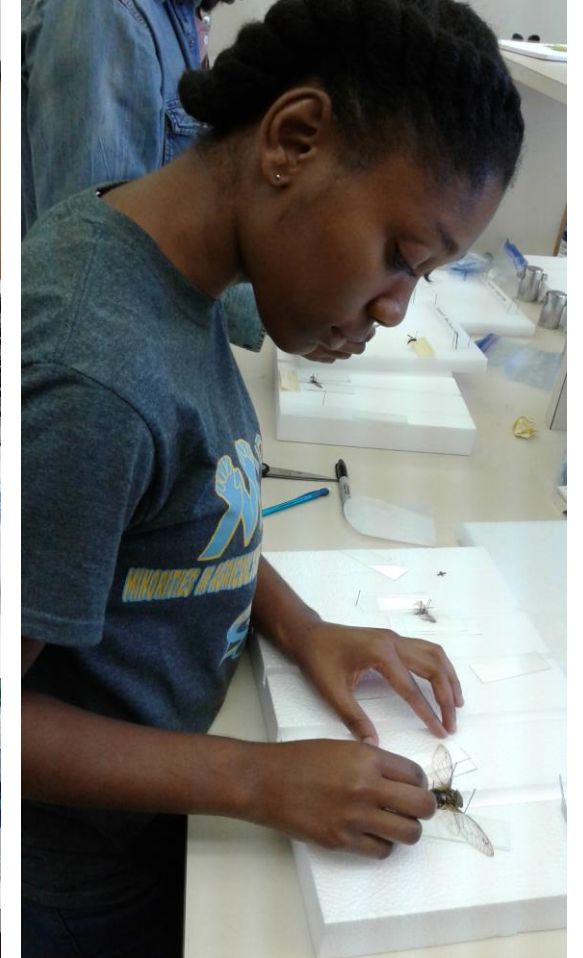
# Field trips and Labs in Entomology



LSU Burden Botanical Gardens, Baton Rouge LA



Collecting insects at Baton Roots Community Farm



Mounting and identifying insects in the lab.



# Research projects during class



Collecting data in the lab



Experiments using field cages



Measuring plant growth in the field



Analyze data in class



# Visit Entomology Department at LSU



Dr. Lord showing the insect collection



Dr. Davis showing the electrical penetration technique

# Invited guest speakers – hear from the experts!

---

- Dr. Schowalter, LSU: Forest insect pests
- Dr. Diaz, LSU: Invasive species and biological control
- Dr. Davis, LSU: Insects as vector of plant diseases
- Tad Hardy, Director USDA-APHIS-PPQ LA: Plant biosecurity

ACADEMIC EXCELLENCE

COMMUNITY ENGAGEMENT

- Recruitment activities
- Internships for students
- Community engagement



# Recruitment activities – Summer Program

**BAYOU Program:** 30 high-school students spent 3 weeks at the Southern University AgCenter

- Research project conducted by students in summer 2018: sampling insects in different raised beds



Bare soil



Eggplant



Okra



Flowers

\*Sticky traps and pitfall traps



Student: Zamira Andrews  
'What's bugging you? Looking for the good guys'



# Recruitment activities - Reaching out



STEAM Night at McKinley Middle Magnet School  
Graduate student Charity Schaffer



Honor's day at the Capitol Museum, Baton Rouge  
Graduate student Dora Sevor and Dr. Manrique





# Internships for undergraduate students

**USDA-Forest Service:** Readiness program funding internships



Hands-on experiences in the entomology lab and in the field



Field experiences in Baton Roots Community Farm





- Undergraduate students from 1890s Institutions
  - Southern University, LA
  - Alcorn State University, MS
- Collected data and prepared poster March 2019
- Presented at the ARD Meeting in Jacksonville, FL
- Funded from USDA Forest Service



# Characterization of the Phytobiome of Rural and Urban Loblolly Pines in Mississippi and Louisiana



Taylor Dapremont, Chyanna Mcgee, Asija Rice, Yadong Qi, Veronica Manrique, Vanessa Ferchaud

Southern University Department of Urban Forestry and Natural Resources, Baton Rouge, LA

D.J Collins, L. Ross, D. Owens, T. Peoples, K. Robinson, L. Anderson -Hodges, C. Zhang, T. Rashid, A. Muhammad, F. Mrema

Alcorn State University Department of Agriculture, Lorman, MS

## Introduction

Phytobiome consist of plants, their environment, and associated community of organisms. Interactions within the phytobiome has profound effects on plants and the entire ecosystem health. Loblolly pines are the most important cultivated timber species in southern USA. But southern pine declined have been reported affecting these forests.



Students and faculty from Southern University and Alcorn State University

## Objectives

- Establish collaboration between Southern University and Alcorn State University
- Characterize soil organisms of loblolly pines in Louisiana and Mississippi in February and March 2019



Fig. 1: Loblolly pines at Alcorn State University Fig. 2: Soil samples

## Materials and Methods

### Study Sites

1. Urban loblolly pines at Southern University, LA
2. Rural loblolly pines at Alcorn State University, MS (Fig. 1)

### Tree Health

Diameter at breast height, tree height, canopy cover, and radial growth rates were measured at three subplots per site (Fig. 3). Soil samples collected for nutrient analyses (Fig. 2).



Fig. 3: Measurements of tree health

## Materials and Methods

### Soil Organisms

Pitfall traps were used to collect soil organisms (12 traps per site) (Fig. 4). Root samples were collected and taken to the laboratory at Alcorn State University for microbe characterization (Fig. 5).



Fig. 4: Pitfall traps during a 4-day period in Feb and March 2019

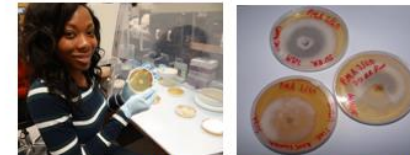


Fig. 5: Characterization of microbes collected from root samples

## Results

### Tree Health

Trees used in this study were approximately 20 years old. Tree diameter ranged from 30 to 45 cm in both sites (Fig. 6). Higher canopy cover were recorded at Southern University compared to Alcorn University (Fig. 6)

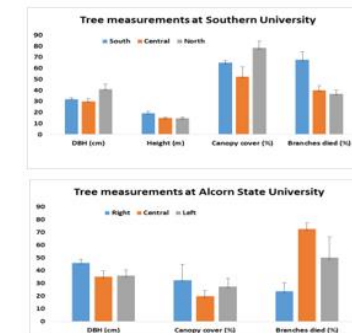


Fig. 6: Tree measurements at Southern and Alcorn sites

## Results

### Soil Organisms

A total of 822 organisms were collected during three trapping events in February and March at Southern site (Fig. 7). The low numbers of organisms at Alcorn site was due to flooding of traps, freezing temperatures, and animal disturbance. Overall, decomposers comprised 50 to 90% of all organisms in early Feb and March, while herbivores represented 20 to 50% in late Feb at Southern site.

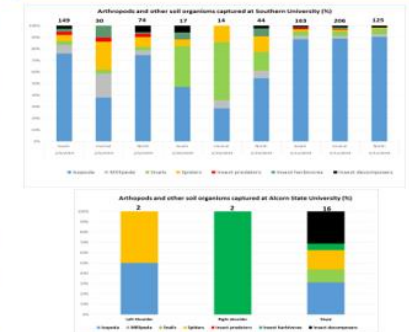


Fig. 7: Soil organisms collected in pitfall traps in Feb and March at Southern and Alcorn sites



Students working together at Southern University (left) and Alcorn State University (right)

## Conclusions

Collaborative research between Universities provide unique opportunities for students to work together, increase interactions among peers, and develop leadership skills. Characterization of loblolly pines will provide information about the microbes, animals and the environment that can lead to improvement of forest health and management. Studies will be continued for complete characterization of phytobiome at Southern University and Alcorn State University.



# Volunteer opportunities for high school students



The Coleopterists Society, an international organization of professionals and hobbyists interested in the study of beetles, has established a program to recognize young people studying beetles. The Society has pledged to provide up to \$300 each year for the Youth Incentive Award Program. Each of the two awards (Junior and Senior) is a monetary grant of \$150, award recipients also will receive up to \$200 (Junior Award) and \$400 (Senior Award) of equipment credit from the [BioQuip Products](#) catalog. In addition to monetary and BioQuip grants, award recipients will receive a one year subscription to the society journal, *The Coleopterists Bulletin*.  
**This is for children of grades 7-12 only.**

- **Tyler Wallace:** High-school student
- Volunteer in the lab during Summer and Fall 2019

- Submitted application to 'Youth Incentive Award'
- Developed a research project for his school

# Engaging our younger generations



Events at Southern University: Elementary schools



Young visitors in the entomology lab



Insect demonstration at pre-kindergarten



ACADEMIC EXCELLENCE

COMMUNITY ENGAGEMENT

Research

Innovate research provides  
the pillars for success

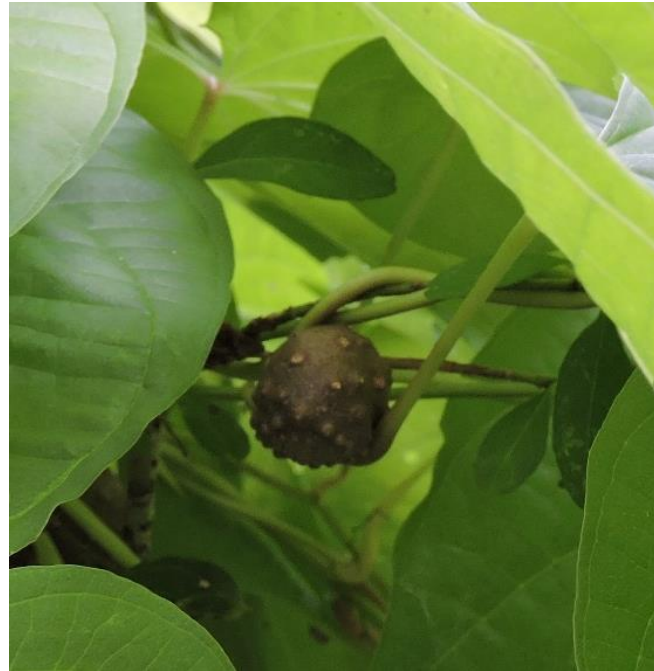
Research

# Invasive species - Air potato vine

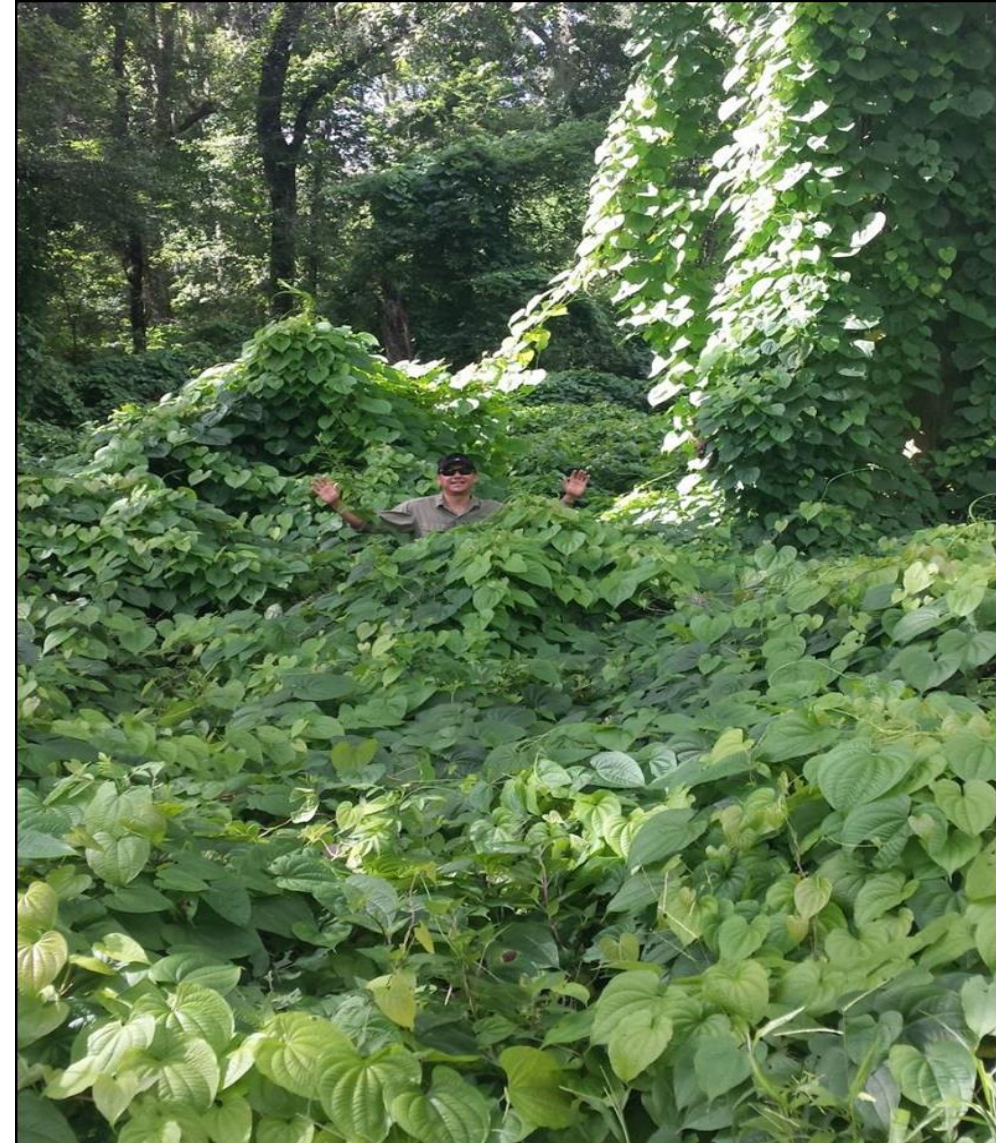
- *Dioscorea bulbifera* L. (Family: Dioscoreaceae)
- Native to Asia and Africa
- Perennial vine characterized by rapid growth



**Heart shaped leaves**



**Aerial tubers or bulbils**





# Specialist insect managing Air potato



***Lilioceris cheni* (Chrysomelidae)**  
**(specialist herbivore on air potato)**



- Released in Florida in 2011
- Released in Louisiana in 2016



Larval damage



Adult damage



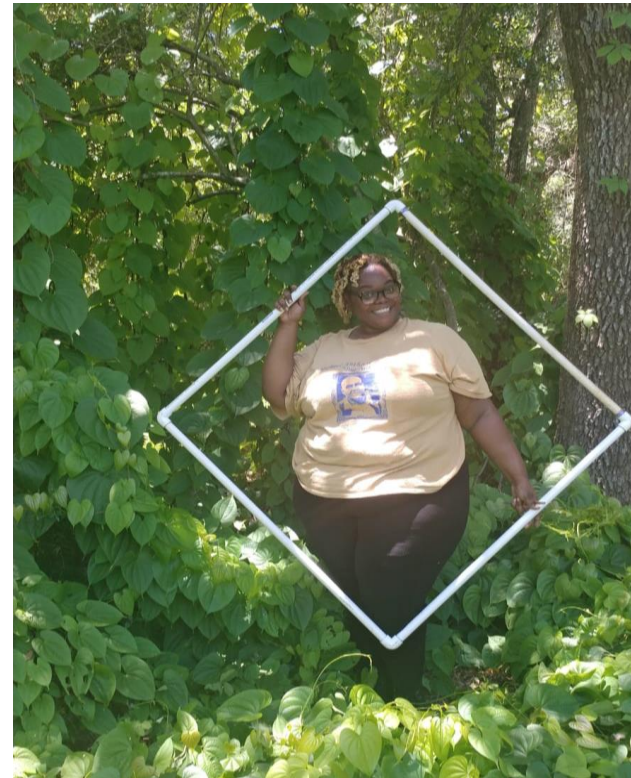
# Research on air potato beetle

## Objectives:

1. Increase release efforts of air potato beetle in Louisiana
2. Long-term studies to determine establishment and impact
3. Examine thermal limits and overwintering survival of air potato beetle



PhD student: Felicia Amenyio



PhD student: Charity Schaffer



# Establishing beetle colony at Southern University

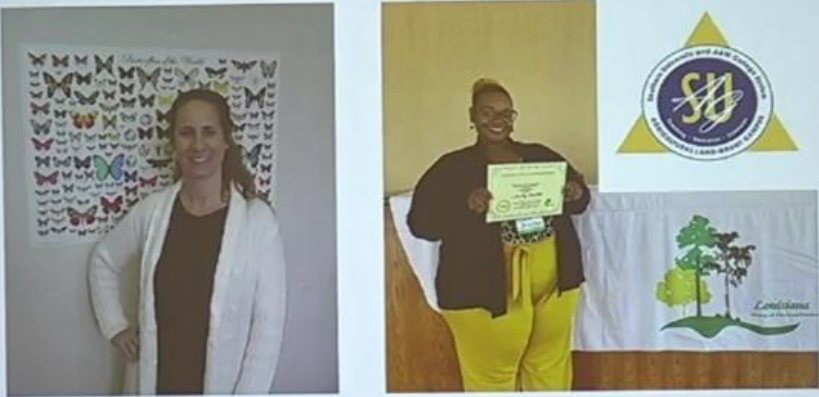


Growing air potato in greenhouse



Rearing air potato beetles in lab and outdoor cages

# Research selected for SU Foundation Donors Day

Sustainable management of invasive weeds: Using Biological Control as a tool for research and teaching



Veronica Manrique and Charity M. Schaffer  
Department of Urban Forestry and Natural Resources,  
Southern University and A&M College, Baton Rouge, LA



2019 MILLION DOLLAR MARCH

VOLUNTEER CAPTAIN TRAINING



# Website and materials available (LSU)



## Air Potato Leaf Beetle

Scientific name: *Lilioceris cheni* Gressitt and Kimoto (Coleoptera: Chrysomelidae)

### Introduction

Air potato, *Dioscorea bulbifera* L. (Dioscoreales: Dioscoreaceae), is a fast-growing perennial vine native to Asia and Africa. It has been introduced into the southeastern United States on multiple occasions and has become established in Hawaii, Florida, Georgia, Alabama, Mississippi, Louisiana and Texas. Currently air potato is registered as a noxious weed in Florida and Alabama (USDA 2015). In Louisiana, populations of *D. bulbifera* have been recorded in 13 parishes (Figure 1). The air potato vine quickly grows to cover large areas and outcompetes native vegetation. It proliferates freely from vegetative bulbils formed in the leaf axils and is difficult to remove, requiring repeated mechanical and herbicidal treatments.

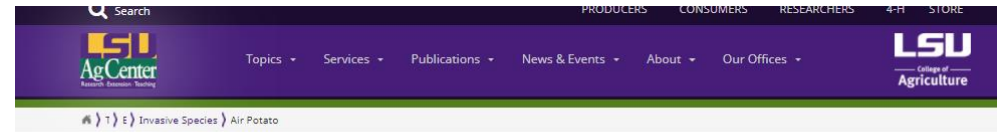
A successful biological control program against *D. bulbifera* was initiated in Florida in 2011 using the air potato leaf beetle, *Lilioceris cheni* (Rayamajhi et al., 2014). Extensive laboratory and open field studies showed *L. cheni* to be extremely host-specific, feeding and developing only on *D. bulbifera* and not on related species of *Dioscorea* found in Florida including *D. floridana*, *D. villosa*, and *D. sansibarensis* (Lake et al., 2015). Rearing and release of *L. cheni* on public and private lands is currently conducted by the United States Department of Agriculture (USDA), the Florida Department of Agriculture and Consumer Services (FDACS) and the University of Florida. Establishment of the beetle has been confirmed across Florida. Based on its success in Florida, there is reason to believe that *L. cheni* will be an effective biocontrol agent against *D. bulbifera* in Louisiana.



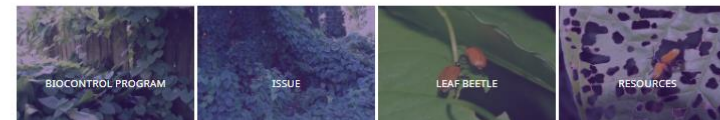
Figure 1. Distribution of air potato (*Dioscorea bulbifera*) in the United States. Source: EDDMapS.org



Factsheet about the beetle



Air potato (*Dioscorea bulbifera*) is a perennial vine native to Asia and Africa that is a member of the yam family (Dioscoreaceae). Air potato is an invasive species in parts of the southeastern U.S. The vines climb up vertical surfaces and compete with other vegetation for light and nutrients. Air potato is commonly found in disturbed habitats such as along roadsides.



### Topics



Website about AP issue, BC program, beetle, and resources



# We developed new brochure for the public

## HOW TO RECOGNIZE AIR POTATO?

**Air potato** (*Dioscorea bulbifera* L.) is a perennial vine in the family Dioscoreaceae. It is recognized by heart-shaped leaves and aerial tubers or bulbils that fall to the ground to produce new plants (Fig. 1). **Active growth** occurs from May to November, and plants senesce and dieback during the winter.



Figure 1: Leaves and aerial tubers of air potato

## WHY IS AIR POTATO INVASIVE?

**Air potato** is native to Asia and Africa, and was introduced into the US in the 1770s. This vine grows fast covering large areas, smothering native species, reducing biodiversity and altering local communities (Fig. 2). Air potato is a threatening urban and natural ecosystems in Louisiana and Southeastern US.



Figure 2: Air potato infestation in South Louisiana

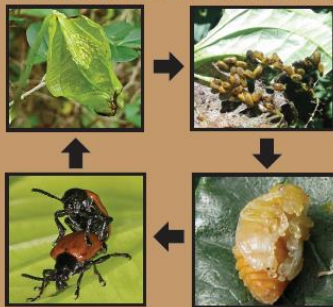
## HOW CAN WE MANAGE AIR POTATO?

Manual removal of vines and bulbils is recommended for small infestations. Chemical control should be used with caution. However, a more ecologically-friendly approach is available. Biological control is the use of specialist insects to manage invasive species. This approach is safe, sustainable and cost-effective.

## BIOLOGICAL CONTROL USING L. CHENI

*Lilioceris cheni* (Coleoptera: Chrysomelidae) known as air potato beetle, was discovered in Nepal and China by USDA-ARS. After years of study, scientists proved that this beetle feeds exclusively on air potato. Beetle adults and larvae feed on the leaves reducing plant

### LIFE STAGES OF THE AIR POTATO BEETLE



Beetle females (1/3 inch long) lay egg masses on underside of the leaves, and make cup-like leaf shape. Larvae hatch in 4-5 days and start feeding in groups on new leaves. Older larvae will stop feeding and pupate in the soil. Two weeks after pupation, new adults emerge and the cycle starts again.

## HOW CAN I GET BEETLES?

If you have air potato on your property, you can obtain beetles at no charge. Contact Dr. Veronica Manrique or Charity Schaffer (Southern University):

veronica\_manrique@subr.edu  
charity\_schaffer\_00@subr.edu  
phone: 225-771-6224



Release of air potato beetles

## WHAT TO EXPECT AFTER RELEASE?

The adult beetles will start feeding on leaves of air potato vines at the release site (Fig. 3). Larval feeding will be evident few weeks later. Beetles will stop feeding and remain dormant (diapause state) during the winter. Adults will be active again by next May or June. As beetle populations increase, adults will start dispersing to close-by sites. Air potato vine will remain at the site, but at lower densities.



Figure 3: Adult and larval feeding damage

## BEETLES IN ACTION



Lumen Christi Retreat Center, Schriever, LA (2016)

## SCIENTISTS AT WORK



## FOR MORE INFORMATION



The LSU website provides further information on the biological control program of air potato in Louisiana:

[www.lsuagcenter.com/airpotato](http://www.lsuagcenter.com/airpotato)

Dr. Veronica Manrique, Department of Urban Forestry, Southern University:  
veronica\_manrique@subr.edu

Dr. Rodrigo Diaz, Department of Entomology, Louisiana State University:  
RDiaz@agcenter.lsu.edu

Pictures were taken by V. Manrique, R. Diaz, C. Schaffer, S. Spinner, L. Moshman, J. Hartgerink and FDACS, Division of Plant Industry

## BIOLOGICAL CONTROL of **AIR POTATO** IN LOUISIANA



TrueBLUE  
EDUCATION, RESEARCH, COMMUNITY.

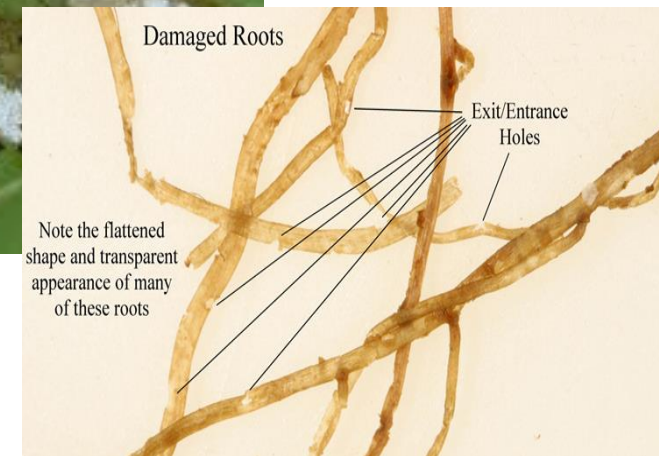


Southern University joined forces with Louisiana State University to combat invasive species in Louisiana



# Invasive tree - Chinese tallow

- Chinese tallow, *Triadica sebifera* (L.) Small (Euphorbiaceae)
- Native to S. China, Taiwan and N. Vietnam
- Now present in southeastern US, including LA
- USDA-ARS Ft. Lauderdale, FL
- *Bikasha collaris* (Baly) (Chrysomelidae)
- Waiting for release permit to be completed



Figures from G. Wheeler

# Research on Chinese tallow - Demography

Objective 1: Determine age-composition, seed rain, seedling recruitment, and tree survival in LA

## Site 1: Pineville, central LA

- Private property
- Cattle and horse ranch
- Low soil nutrients



## Site 2: New Orleans, south LA

- Parc des familles
- Recreation, disc golf course
- High soil nutrients



Dora Sevor, MS student  
(Graduated Fall 2019)





# Research on Chinese tallow – Field performance

- **Site 1:** LSU Burden Gardens, Baton rouge, LA
  - 80 Chinese tallow (1-year old) in June 2018
  - Treatment: insecticide, water (control)
- **Site 2:** Southern University, Baton rouge, LA
  - 64 Chinese tallow (1-year old) in June 2018
  - Treatments: Fertilizer x Artificial herbivory



**Charles Omoyele, MS student (graduated Fall 2018)**



# Improving urban farming in our community

- Partnership with Baton Roots Community Farm, Baton Rouge LA
- Research: Evaluating push-pull strategies to reduce pests and increase natural enemies



MS student Shivonne Marshall  
(Summer 2019)



\*Shivonne was hired as Outreach Coordinator at the farm in September 2019 (The Walls Project: Serve Louisiana)



# Professional development and growth



Students participate in extension activities



Students presenting research at Meetings



PhD student, Charity Schaffer, winning award at Society of American Foresters Meeting, Feb 2019, Pineville LA



# Join the Department of Urban Forestry

## JAGS: Journey to Achieve Greater Success

- Faculty committed to support students succeed
- Academic excellence provides strong foundation
- Early career development opportunities for growth
- Our graduates enter the workforce:
  - Government agencies (e.g. USDA-Forest Service)
  - Academic Institutions
  - Power companies and warehouses
  - Landscaping companies and park managers
  - Non-profit organizations
  - Urban agriculture

