DIVISION
of
PLANT INDUSTRY

BIENNIAL REPORT 2022-2024

Table of Contents

Report of the Division Director

Mandate of the Division of Plant Industry

The Division of Plant Industry (DPI, or the division) is one of 13 divisions within the Florida Department of Agriculture and Consumer Services (FDACS, or the department). DPI is the regulatory agency responsible for protecting Florida's native and commercially grown plants from harmful pests and diseases. The division is also responsible for protecting Florida's apiary industry. The statutory authority for the division is contained in Florida State Statutes Chapters 570, 581, 586 and 593.

Summary of Activities

IN MEMORIUM

John Capinera – October 2023

Dr. John L. Capinera (University of Florida Professor and Department Chair 1987-2015) died in October 2023. John's professional career started as an Assistant Professor in the Department of Zoology and Entomology at Colorado State University, Ft. Collins. In addition to teaching several entomology courses, his research focused on grasshoppers, integrated pest management, and biological control. He published his first book, *Grasshoppers of Colorado* (Capinera and Sechrist, 1982) during this time. In 1987, he was hired by the University of Florida as a Professor and Department Chair in the Department of Entomology and Nematology. He remained in that position until his retirement in 2015. John was a prolific writer who authored over 200 scientific articles and book chapters, as well as several full-length books. His most well-known works were Handbook of Vegetable Pests (Capinera, 2001) and his four-volume *Encyclopedia of Entomology* (Capinera, 2008). He mentored hundreds of his coworkers and colleagues over the years and chaired student committees for hundreds more. He was a quiet and thoughtful leader but was extraordinarily astute and was known for getting the job done. He was a tireless supporter of innovation in the educational arena and was one of the founders of the Doctor of Plant Medicine program at UF. Through John's leadership, his department became the #1 Entomology program in the nation. John was a good friend to DPI, always promoting collaboration between the two agencies and the utilization of the world-famous Florida State Collection of Arthropods (FSCA). His unique grasshopper collection was brought to the FSCA after his death and fully integrated into the collection for future entomologists to study.

Capinera, J.L. 2001. Handbook of Vegetable Pests. Academic Press, New York. 729 pp.

Capinera, J.L. (editor). 2008. Encyclopedia of Entomology, 2nd Edition. Vols. 1-4. Springer, Dordrecht, The Netherlands. 4346 pp

Capinera, J. L. and T. S. Sechrist. 1982. Grasshoppers (Acrididae) of Colorado: Identification, Biology and Management. Colo. Agric. Expt. Sta. Bull. 584S. 161 pp.

AWARDS AND SPECIAL RECOGNITION

Career Achievement
Walter Golden (December 2022)
Selina Estrada (December 2023)
Jeffrey Lotz (2024)

Edward Berger Award
No award in this biennial period

Employee of the Year
Kaleigh Walker (December 2022)
Robert Pitts (December 2023)
Nicole Benda (2024)

F.M. O'Byrne Award
Dyrana Russell (December 2022)
Randall Dean (December 2023)
Lisa Tyler (2024)

Outstanding Service (2023)
Gloria Lotz
No award in 2024

Sustained Excellence (2023)
Cheryl Roberts
Steve Hildebrandt
Jesse Krok
Sam Hart
Stephen Jenner
James Snyder
Alexander Tasi
Sherry Steele
Mary Graham
Kyle Schnepp
Richard Tordi
Selina Estrada

Sustained Excellence (2024)
Mark Laurint
Abby Bartlett
Bobbe Rose
Ray Jarrett
Alex de la Paz
Gary Webb

Superior Teamwork Award (2023)
ASSIST Team
Robert Shim
Carlos Cambana
Carlos Aguilera
Reinaldo Casanas
Edgardo Luiggi
Edgardo Alvarado
David Ortiz
Sherry Steele
Carolina Reece

2022 Pinellas Fruit Fly Emergency Program
Patrick Armao
Carlos Averhoff
Abby Bartlett
Lisa Blakey
Rick Blaney
Matt Brodie
David Brown
Sean Brown
Jacob Bryan
Sammy Campbell
Bill Churchill
Logan Cutts
Charles Davis
Becky Dineen
Kristin Doeblin
Kelly Douglas
Carolyn Duever
Kenny Ellis
Tyson Emery
Renan Espino-Martinez
Sarah Gentile
Fabian Gomez Lostalo
Gloria Gonzalez
Tavia Gordon
Mary Graham
Dante Gulla
Justin Haley
Cathy Harrity
Sam Hart
Austin Hawes
Kelsey Helseth
Tracy Howard
Angie Hutcherson
Holly Jarboe
Ray Jarrett
Stephen Jenner
Philayrack Khousakoun
Jeff Laster
Thomas Lastrapes
Nora Marquez
Diane McColl
Shaelyn McGiveron
Linda McRay
Matt Miller
Shanelle Mulrooney
Sarah Neglia
Noemi Negron
Stepanka Newman
Clarence Parkes
Ashley Pickett
Caleb Poock
Anthony Puppelo
John Quigley
Marilyn Quigley
Mary Reed
Sara Restrepo
Steve Rish
Bobbe Rose
Ona Saengphaxay
Emily Safran
William Salway
John Serra
Calvin Snyder
Katherine Steinkamp
Colton Striker
Alec Tasi
Rich Tordi
Alex Tuz
Alicia Velazquez
Mo Violett
Howard Wallace
Richard White
John Wiggins
Christine Zamora
John Zito
Elizabeth Zuniga
Doug Batson
Alex Davila
Geovani Esquivel
Kevin Golden
Jeremy Gilbert
Virginia Hommel
Rusty Noah
Randall Dean
Jimmy Hernandez
Donald Taylor
Kate Fairbanks
Craig Welch
Darci Hames
Georgeanne Paris
Alicia Lawrence
Kate Love
Holly Hughes
Paula Dwyer
Christina Chitty

Trenton Budwood Facility
Taylor Lewellyn
Gilford Mclean
Carlos Pica-Perez
Robert Pitts

Superior Teamwork Award (2024)
Charlotte County FFD Traps
Jenny Henry
Kinsley Vlot
Pamela Violett

FFD Traps
Noemi Negron
Victoria Benjamin
Chase Groninger
Caroline Pride
Jeanie Frechette
Samuel Smith
Teresa Ortelli

NECE Permitting
Eddie Cayia
Nick Dorman
James Durrell
Mileydis Vargas
Zachary Zorn
Rachel Ben-Avraham
Daphne Glasgow
Ritu Shah
Jon Wolfe
Janet Gilbert

Nematode Certification
Juan Menendez
Ciro Milian
Sean Brown
Maria Gonzalez Leyva
Suhayla Carrasquilla
Reinaldo Casanas

Palm Harbor OFF Emergency Program
James Zapko
Onanong Saengphaxay
Bobbe Rose
Wayne Ernst
Calvin Snyder
Luck Khousakoun
Jennifer McKeever
William Salway
Robert Denoux
Bethany O'Donnell
Shanelle Mulrooney
Colton Striker
Kristin Doeblin
Christina Huetcher
Charles Davis
Jacob Bryan
Jenny Henry
Jarrod Davila
Kacie Gmitter
Eddie Anderson
Vaden Edmondson
Justin Haley
Robert Castilleja
Wentworth Lawrence
Cindy Blattenberger
Donald Bracey
Caleb Poock
Grayson Grume
Anthony Puppelo

Sarasota County FFD Traps
Karla Thompson
Jenny Henry

Tampa GFF Emergency Program
Sara Restrepo
Shaelyn McGiveron
Cindy Blattenberger
Kacie Gmitter
Andres Cabrera
Colton Striker
Robert Denoux
Christina Huetcher
Bobbe Rose
Caleb Poock
Vaden Edmondson
Jacob Bryan
Eddie Anderson
Jennifer McKeever
Grayson Grume
Wentworth Lawrence
Justin Haley

Winter Park OFF Delimit Program
Alberto Rentas
Anthony Puppelo
Katy Steinkamp
Jennifer McKeever
Tim Stumpp
Lance Brown
Harry Morrison
Andres Cabrera
Nora Marquez
Jesse Cassarino
David Brown
Diane McColl
Ashley Pickett
Brittny Breier
Les Crocker
Justin Haley
Wentworth Lawrence
Robert Castilleja

Citation of Special Recognition (2023)
Tyler Shaw
Rosemary Murray
Lynn Combee
Robert Brady
Alexander de la Paz
Kevin Burnette
Emily Safran
Laura Perez

Citation of Special Recognition (2024)
Nora Marquez
Julietta Brambila
Zion Needham
Victoria Bemjamin
Elizabeth Johnson
Ethan Beesley
Karla Thompson
Ryan Ong
Kevin Burnette

First Finds (2023)
James Hayden
Sam Hart
Kelly Douglas
John McVay
Nicole Benda
Phellicia Perez
Suhayla Carrasquilla
Mark Zenoble
Keith Zugar

First Finds (2024)
Abby Bartlett
Ariadna Gonzalez
Yamiley Guia Riquenes
Jennifer McKeever
Robert Denoux
Maria Leyva
Reinaldo Casanas
Sara Restrepo
Susan Halbert
Larry Violett
Ayiana Rivera Robles
James Hayden
Isabelle Atchia
Jonathan Bremer
Kevin Burnette
Ariana Gaskin
Catherine Nance
Erin Powell
Hannah Kiefer
Sam Hart
Mark Zenoble
Scott Krueger
Mary Yong Cong
Paola Ramos Perez
Mary Sellers
Kenneth Ellis
Ray Jarrett
Mary Graham
Robert Shim

Administration

OFFICE OF THE DIVISION DIRECTOR

One of the most significant occurrences of the biennium was the addition of a new program and facility in our Bureau of Citrus Budwood Registration. This new program, the Accelerated Budwood Initiative (ABI), was initiated to rapidly sanitize and mass-produce citrus varieties that show some tolerance to citrus greening under field conditions. This program was designed only for citrus varieties growing in a commercial-type setting and of an age to produce fruit. Experimental varieties grown in greenhouses with unproven tolerances and not fully exposed to Asian psyllid populations and greening are not included in this program. The first entry into this program was dubbed the "Donaldson" tree. This tree was discovered by a newly hired USDA citrus breeder in a neglected portion of an experimental farm in Groveland. This tree was over 40 years old and seemed healthy and productive while all of the varieties around it were collapsing under citrus greening. Extensive testing showed that the Dondalson, so named because it came from a family named Donaldson in Central Florida, was infected with citrus greening but continued producing a large crop of oranges with an excellent Brix count. The division's mandate was to take this single tree and make millions out of it. To achieve this, DPI leased a commercial nursery facility in Trenton, hired a staff to run the facility, and began the accelerated process. Within 18 months, the ABI program produced thousands of the Donaldson trees and other greening tolerant varieties like Parson Brown, Carney, and Roble. These were then transferred to our citrus nursery industry for further mass propagation. This program continues to focus on accelerating the production of promising varieties in the field similar to the Donaldson.

From 2022-2024, California suffered the most extensive and diverse tephritid fruit fly outbreaks in the history of the United States. These programs involved eradication campaigns for five different fruit fly species spanning thousands of square miles and over 50 delimiting programs around the state. Of the most concern to Florida was the tau fruit fly (TFF), *Zeugodacus tau,* found in the Stevenson Ranch area of Los Angeles County. On July 11, 2023, the first-ever TFF quarantine in the United States was established. The tau fruit fly has a broad host range, and important crops in Florida at risk include cucurbits, citrus, tomatoes, and peppers. This species also responds very poorly to cue lure. The division was concerned that this catastrophic situation had the potential to bleed over into Florida. Therefore, USDA-APHIS supplemented DPI's existing cooperative fruit fly cooperative agreement with an extra $1.4 million to shore up the state's defenses during this time. Luckily, Florida made it through this period with a single Oriental fruit fly (OFF), *Bactrocera dorsalis*, eradication program in St. Petersburg, two delimitation programs for OFF in Winter Park and Palm Harbor; one guava fruit (*Bactrocera correcta*) fly delimiting program in Tampa; and on peach fruit fly (*Bactrocera zonata*) delimiting program in Davie.

DPI continued pushing the USDA and California to regulate the cotton seed bug, *Oxycarenus hyalinipennis* (Costa). It is very concerning that no interior quarantines or information concerning distribution and survey efforts have been forthcoming since its original detection. The potential movement of cotton seed bug on plant material from California is likely. Therefore, DPI placed restrictions on the movement of plant material from areas where detections have occurred. In addition to explicitly regulating California nursery stock for this pest, DPI also developed a regional cotton seed bug survey involving five other states on the Southern Plant Board. This survey was submitted for PPA 7721 funding and received funding in 2022. This is an ongoing survey effort and regulatory program to ensure this devastating cotton pest does not move out of California and is detected early if it does.

The election of a new Commissioner of Agriculture brought major changes to FDACS. After taking office, one of the commissioner's biggest concerns was the department's remarkably low salaries and wages. This has been addressed in several ways over the last two years. In fact, DPI received the most significant increase it has seen in over half a century. The minimum salaries throughout the department were increased by almost $10,000, and over $2 million went to adjust wages and salaries within the division for nearly 600 employees. By the end of the biennium, the division had seen a rapidly falling vacancy rate and considerable improvements in personnel retention.

DATA PROCESSING

The Data Processing (Information Technology- IT) section's primary responsibility is to ensure information technology infrastructure and services are established and maintained throughout the division. This section is also responsible for database and application development, GIS mapping requests, procurement, installation, and support of network infrastructure, and computers (PCs, laptops, minis, iPads, and tablets) as well as maintaining computer inventories, determining data processing needs for various program areas, and serves as division liaison with the department, USDA, and other divisions and agencies within state government related to systems and data needs.

Infrastructure Upgrades
As of July 1, 2022, the division infrastructure had about 50 offices throughout the state with various network and communication connections. Much of the network infrastructure had been put into place a decade earlier, with the increased use of online communications and push to keep systems regularly (weekly) updated, Network upgrades were requested for nearly half of the offices to bring the network connectivity speed up to a minimum of 45 MBps. Prior to requesting the upgrades, most offices were running below 8 MBps. Large and/or 'data heavy' campuses were upgraded to a minimum of 100 MBps and included Winter Haven, Coral Gables (Miami-Kendall), and Lacrosse. The main campus in Gainesville was requested to be upgraded to 1.4 GPps and is currently at 300 MBps.

Hardware Refresh
As of the end of 2024, the Data Processing section was responsible for procuring, installing, and supporting over 1,077 devices and just over 500 users throughout the state. Of the 1,077 devices, a little over 500 were Windows-based computers, and the rest were iOS and iPad devices.

In 2024, the Division began upgrading all the inspector iPads from the older mini model to the cellular-enabled 5G capable model. Along with enrolling iPhone and iPad users in a Web Priority Service (WPS), an agreement with T-Mobile was initiated which included heavily discounted 10th Generation iPads with reduced monthly cellular costs at nearly half the current monthly cellular cost of Verizon. Utilizing the larger iPad (coupled with a monitor, keyboard, and pen) in lieu of assigning a laptop and a mini iPad per inspector is expected to result in significant cost savings both from an operational and support cost standpoint. Staff that have been upgraded to the newer hardware and cellular service have remarked that throughput speed and connectivity are much improved.

Software Development Changes
Technology Transformation: The Office of Agricultural Technology Services embarked on a multi-year Technology Transformation project and in 2023, DPI submitted a list of approximately 40 'credentials' that included Nursery /Stock Dealer Registration licenses, Hemp Cultivation Licenses, Native Endangered and Commercially Exploited (NECE) permits and others. These items would be downloadable from a Florida Department of Agriculture and Consumer Services (FDACS) website wherein the public user, after authenticating, could find all the licenses, permits, and FDACS-generated 'products' pertinent to them and no longer have to go through multiple Division websites applicable to them. Additionally, a move to replace legacy Oracle applications with more modernized systems was begun. Within DPI, the AgEagle Hemp Cultivation system and PITR systems are top priorities to be replaced. The Botany List system will also be migrated to the MS Dynamics Platform. Data has already been migrated to the FDACS Data Lake and OATS is coordinating with outside consultants for application development.

New Division SQL Development Projects
Development projects within DPI include the DPI-Citrus Indexing, Tracking, and Registration System (CITRS). Design efforts were initiated in late 2022 with the Bureau of Citrus Budwood to move their antiquated MS Access databases into a web-based multiuser environment. Meetings to map out each location's (Winter Haven, Lacrosse, and Chiefland) workflow processes were held, and in early 2024, CITRS was moved into the TEST environment. It is expected that in spring 2025, CITRS will move to production and eventually include all location's processes.

Refinement of other DPI-developed systems continues. These include DPI-Laboratory Identification Sample Tracking (DPI-LIST) and DPI-Communication Tracking System (DPI-CTS), as well as an API interface between DPI-LIST and Plant Inspection's ESRI Mobile Apps. This interface development is expected to be applied to CHRP and GALS ESRI projects soon.

Division GIS Projects
The last two years have seen significant changes in field staff utilization of Microsoft Teams and ESRI GIS applications. Along with moving most of the inspection-related functionality of the Plant Inspection Trust Revenue (PITR) Oracle system to ESRI GIS Plant & Apiary Applications, the GIS Section of Data Processing continued to produce maps for and refine the analytics related to:

- Multiple emergency programs including:
  - Fruit Fly finds (St. Petersburg 5/2022, 4/2023 Hallandale Peach Fly, 07/2023 Winter Park Oriental Fruit Fly, 08/2023 Tampa Guava Fruit Fly, 05/2024 Palm Harbor Oriental Fruit Fly)
  - Giant African Land Snail finds:
    - (June 2022) Pasco, (December 2022) Lee Counties survey mapping, color alert, and decommission workflows.
    - Pasco, Lee, (June 2023) Broward, survey, treatment, color alert and decommission workflows
- Citrus Health Response Program (CHRP)
  - Citrus Black Spot (CBS) spread analysis, quarantine, and quarantine release changes.
  - CRAFT program workflow creating and data needs.
  - New CHRP workflows: Special and Limited Permits for citrus waste disposal, leaves and stems, regulatory and survey field notes.
  - New CHRP Data views for other divisions.
  - Hurricane impact maps.
  - Migrated CHRP's web services to a new web server.
- Brazilian pepper tree thrip release monitoring surveys and follow-up workflows.
- Research maps for Entomology and Nematology finds.
- Plant Inspection and Protocol wall map updates.
- Research publication and public data request maps.
- Division campus maps for facility changes.

Faster hardware, improved connectivity speeds, and ready access to maps and mobile data technology have continued to allow Division staff to work more effectively and efficiently throughout all Bureaus and in the field.

The IT office continues to explore and implement newer technologies to automate field inspection activities. Data Processing continues to move toward having systems cross-communicate and collaborate, which allows for better Division data management for research, decision-making, and litigation support. Data Processing maintains a staff of nine FTEs.

TRAINING

New Inspector Training
The Bureau of Plant & Apiary Inspection worked to train 26 new inspectors.

CLASS #95
- Grayson Grume, 251
- Kacie Gmitter, 224
- Alex Arbelaez, 250
- Bobby Floyd, 252
- Alex Tuz, 302
- Sarah Bachar, 306
- Seth Spiegel, 332
- Sean Brown, 330
- Holly Jarboe, R3A7

CLASS #96
- Paola Ramos Perez, 107
- Vincent Barrios, 116
- Shaelyn McGiveron, 204
- Caleb Poock, 210
- Alberto Rentas Muller, 217
- Noemi Negron, 222
- John Zito, 303
- Mark Zenoble, 310
- Chantelle Villoria, 315
- Norberto Sosa, 320

CLASS #97
- Ayiana Rivera Robles, 110
- Robert Denoux, 211
- Jennifer McKeever, 250
- Ariadna Gonzalez, 312
- Yamiley Guia Riquenes, 318
- Reinaldo Casanas, 325
- Maria Gonzalez Leyva, 330

New Employee Orientation / ROOTS Training
From July 1, 2022 – June 30, 2024, 72 employees attended live New Employee Orientation where they were given the opportunity to travel to Tallahassee to learn about the Department. In the same date range, 42 employees attended Virtual New Employee Orientation and 31 new supervisors attended Constructing Leaders in Tallahassee.

On November 30th, 2022, DPI held the first of a new type of division specific employee orientation called ROOTS Training, which stands for Readying Our Organization To Succeed. ROOTS Training is DPI's version of New Employee Orientation and is located in Gainesville at DPI headquarters. Employees learn about DPI history, the division's organizational structure, have the opportunity to speak with the Directors and are given a tour of the Gainesville facility. The goal is to equip employees with new connections and an understanding of the Division of Plant Industry's continued history of excellence and its role in protecting Florida industries.

Specific Learning Goals for ROOTS Training, and what is done to address them:

- Participants are more familiar with the Gainesville facilities than before.
  - Lead on a tour encompassing nine sections over two hours.
- Participants are given the opportunity to meet the Directors.
  - Meet and greet time is built into the schedule.
  - The directors intentionally devote time outside of agenda activities to have conversations and get to know people.
- Participants meet most of their session's ROOTS Training participants and grow their network of coworkers.
  - A simple networking activity, intentional seating charts and informally emphasizing the importance of communication helps bring people together.
- Participants interact with DPI scientists and staff throughout the tour.
  - The tour of DPI is only guided by the training host. Scientists and staff give real stories and first hand knowledge of the work being done in our facilities as they welcome participants into their workspaces.
- Participants have a better understanding of the division's organizational structure and what each bureau's activities are.
  - Dr. Greg Hodges and Bryan Benson give a presentation explaining each bureau and each administrative section within the division.
- The History of DPI presentation helps employees feel like part of the purpose and mission of DPI.
  - Dr. Trevor Smith delivers an engaging presentation weaving together compelling statistics, a rich historical timeline, and meaningful stories that all culminate in a powerful connection to our division's mission.

ROOTS Training was also given its name with the following relevant themes in mind: the metaphor of plant roots representing foundational learning, the beginning of one's DPI career and their relevance to our division's work and name.

From the first ROOTS Training to June 30, 2024, 119 DPI employees participated in ROOTS Training. By early to mid-2024, all employees needing ROOTS Training started working with the division in 2024, indicating that the backlog of new employees in need of training had been addressed.

LinkedIn Learning
The division continued its use of the online training platform LinkedIn Learning. In the timeframe of this publication, DPI employees viewed 1,007 hours, 25 minutes and 55 seconds of training material found on the site with a total of 15,921 video completions. LinkedIn Learning trainings are continuously updated to meet industry standards. Employees are encouraged to learn business skills related to their work at DPI but also have the benefit of being able to learn extracurricular material on their own time. For example, a plant inspector might work on a time management course at work and get better at their hobby of drawing and illustration while off duty.

MAINTENANCE
The Maintenance section manages and directs the building maintenance programs for all Division of Plant Industry facilities statewide from its headquarters in Gainesville using personnel or contracted services. Maintenance directs routine and preventative maintenance, exceptional maintenance and construction projects. This section is also responsible for landscaping and custodial services in Gainesville.

Major projects conducted during this biennial period on the Doyle Conner Campus include the following:

FDACS Project #1094 – Doyle Conner Parking Lot Paving (Gainesville)
The Doyle Conner campus was built in 1967. The paved areas have expanded over the years and were replaced at some point in the distant past. However, over the past 20 years, it has only received patchwork and sealings. The pavement condition is to the point where the sealings are not good enough anymore. When the property's fence was replaced in the last few years, the entryway was reconfigured and repaved, but this was just a tiny portion.
Description of Project: Removed existing asphalt from the area, regraded any lime rock problems, paved with 2" of 12.5 Hot Mix Asphalt, and restriped to the original configuration.

Project LED Lighting and Replacing Ceiling Tiles for Doyle Conner Building at Doyle Conner Campus (Gainesville)
Plant Industry has addressed this issue for 6-7 years. We have addressed the front of the building – interior lighting in the hallways, replacing the "small tiles" with LED lighting and whole ceiling tiles, and painting the walls. We will continue with the same throughout the facility. The current process has been tackling small spaces when other projects are happening in the same area. Most phases of this project have been isolated to individual offices/ rooms. Some areas haven't been improved in 30 years.
Description of Project: Removed existing fluorescent lights and the old ceiling grid that is no longer in production. Installed new acoustical ceiling with tiles and new LED lay-in fixtures in any areas needing updating.

FDACS Project– Doyle Conner Network Emergency Generator (Gainesville)
Description of Project: Installed a new emergency standby generator, feeder, power, control circuits, panelboards, ATS switch, emergency power distribution and gas piping.

Justification of Need: This will power the Plant Industry Network for the entire state of Florida's Plant Industry locations. The generator now provides emergency power to the building.

Dundee Facility Repairs:
On Thursday, July 25th, 2024, the Maintenance Mechanics of the Maintenance & Construction Division made repairs at our Dundee Facility.

Description of Project: Removed the middle screen to expand the area where plants are pruned and cleaned. New doorknobs and doors were repaired and replaced in greenhouses, and screen doors were adjusted to close correctly—repairs to wind-damaged screens and replacement of outside spigots and hose bibs. We also replaced the brackets on the swamp cooler system with new stainless steel brackets once they had been custom-made by Boone Welding.

PUBLIC INFORMATION AND OUTREACH
In the 2022-2024 reporting period, DPI's Public Information & Outreach section supported many events and programs for the division. The mission of the PIO section is to provide excellent resources and customer service to industry, stakeholders and division employees. In this reporting period, 144 events were attended by the division and all of these events were supported by PIO in the form of personnel, outreach items and/or publications.

Between July 2022 and June 2024, 40 external publications were created or edited. A full list of those publications can be found in appendix D.

In this timeframe, multiple programs, daily business and the increase in permitting resulted in 46,945 phone calls along with an increase in email communications. If a call could not be resolved by a helpline operator or the supervisor, a CTS (Communication Tracking System) ticket was routed to the appropriate personnel. During this time, only 2,912 tickets were created which means that 93.8% of outside calls made to the division were resolved by the helpline. At the end of this reporting period, the helpline began ticketing every call for better reporting and data collection.

Don't Pack a Pest
Don't Pack a Pest (DPAP) is a cooperative agreement funded by USDA-APHIS-PPQ using AQI funding. In this funding period, the agreement was funding in the amount of $470,357.98.

During this time, DPAP continued to focus on outreach and advertising in ports of entry.

Advertising campaigns in airports, on aircraft along with network TV and digital click ads on travel websites were purchased. The reach and data from those campaigns are listed below.

- American Airlines: 6.2 million passengers on 26,357 flights
- Jet Blue: 3.4 million passengers on 24,961 flights
- Alaska Airlines: 7.63 million passengers, 47,492 flights
- Network TV: About 200 airings on a variety of networks (i.e. Travel, Outdoor, RFD, SEC networks) with the audience reach of over 50 million viewers
- Digital Ads: 452,619 impressions spread throughout multiple campaigns

Throughout this contract period, we continued working with USDA/APHIS, prepare/implement enhancements to PR Toolkit, a "how to" guide on promoting the DPAP program. Kit includes press release templates, launch event checklists and ways to engage local communities.

In addition to established campaigns and signage in florida ports of entry, an international study abroad focused campaign was developed and initiated with the University of Central Florida and multiple other Florida universities were approached to implement this campaign including the University of Florida, Florida State University, University of South Florida, and Florida A&M University. There are plans to expand this program overtime.

PERSONNEL

The Personnel Office coordinates recruitment and selection, orientation, benefits, classification, compensation, attendance and leave, performance management, employee relations, and separations/retirement for the Division. Putting the Division's needs first, the Personnel office made the strategic decision to give Apiary a vacant Career Service administrative support position. In place, the Personnel office now has an OPS Human Resources Assistant position.

Staffing

As of April 19, 2024, DPI had an allocation of 397 Full-Time Equivalent (FTE) salaried positions. Of the 397 FTE salaried positions, of which 36 were vacant on this date. The Division also had approximately 164 Other Personal Services (OPS) positions. Primarily, the reduction in OPS positions from the previous biennial to the present, was due to a Division-internal audit of underutilized OPS positions and their subsequent abolishment. The average salary for FTEs is $46,328. The average hourly rate for OPS is $15.50.

FISCAL

The Fiscal Office oversees matters relating to the division budget, purchasing, leasing and other fiscal activities.

- Regina Fairbanks, Division Finance Officer-SES
- Ron Ridgway, Accountant Supervisor II - SES
- Kareema Huggins, Grants Specialist II Supervisor-SES
- Li Wen, Professional Accountant
- Rayya Johnson, Professional Accountant
- Bob Vivian, Professional Accountant
- Scott Grinder, Accountant II
- Sarangeli Oppenheimer-Ortiz, Accountant I

DPI Expenditures FY 22-23 to FY 22-23		
	FY22-23	FY23-24
Directors office (DO, Data processing, Fiscal, Personnel)	5,125,154.73	3,512,401.69
Maintenance	853,357.61	827,640.81
PIO	426,923.83	468,332.96
Training	205,662.05	208,709.78
Total Administrative Services	**6,611,098.22**	**5,017,085.24**

Special Category Appropriations		
	FY22-23	FY23-24
Apiary Indemnities 100140 360001	36,000.00	36,000.00
Apiary Research 100777 360001	80,993.12	105,000.00
Boll Weevil 100134	152,556.31	217,230.31
Endangered Plant Species 100207	269,988.35	216,000.00
IFAS Invasive Exotics 103810	540,000.00	540,000.00

Division Funds		
	FY22-23	FY23-24
General Revenue	15,531,056.85	17,726,879.68
Citrus Inspection Trust Fund	245,987.35	173,838.16
Federal Grants Trust Fund	12,971,207.80	15,196,587.23
Agricultural Emergency Eradication Trust Fund	9,206,925.13	9,225,295.15
Plant Industry Trust fund	6,659,238.04	3,816,137.69

Plant Industry Programs		
	FY22-23	FY23-24
ABI	2,000,000.00	2,000,000.00
Agri Emergency Medfly Program	1,408,473.00	1,464,177.00
Apiary	748,417.87	915,363.59
Auto Dissemination of Beauveria	31,249.85	31,291.53
Bagrada Bug	42,069.45	-
Bio Rearing Facility	637,056.90	692,312.30
Biocontrol of Air Potato	181,087.07	218,379.00
Black Bean Bug Survey	72,596.06	-
Botany	178,670.49	218,422.56
Brazilian Pepper	68,343.95	83,333.00
Cactus Moth	78,360.37	64,144.32
CAPS Infrastructure	143,934.82	150,069.58
CAPS Combined Survey	246,510.32	249,070.76
CHRP Federal	7,792,993.42	7,754,633.74
CHRP State	2,000,000.00	2,000,000.00
Citrus Budwood	309,427.32	749,013.00
Cotton Seed Bug Survey	-	51,823.59
High Risk and Detector Dog	1,301,440.73	1,395,330.86
Don't Pack a Pest	270,671.25	288,498.18
Diagnostics	143,209.84	325,737.06
Entomology	1,947,730.42	2,485,592.92
Florida Citrus Germplasm	308,926.00	545,732.11
Fruit Fly Detection	1,000,000.00	1,183,952.63
Fruit Fly Methods	53,103.59	55,810.02
Giant African Land Snails Federal	566,899.05	1,436,338.02
Giant African Lands Snails State Side	218,333.84	87,526.13
Grapefruit Rootstock	353,512.97	-
State Industrial Hemp	903,951.07	961,917.22
Honey Bee Survey	20,700.00	20,700.00
Horntail Snail	331,549.25	-
Imported Fire Ant Regulatory	134,152.14	137,467.96
Invasive Species Control	500,000.00	500,000.00
Methods	664,959.29	796,368.04
Nematology	650,989.62	594,931.95
O.C.E.A.N Surfing	-	67,502.07
Old World Bollworm Tomato Commodity	145,000.00	151,511.90
Oriental Fruit Fly	373,725.15	-
Peach Root-Knot Nematode	-	59,524.37
Plant Inspection	9,272,717.24	10,170,557.65
Plant Pathology	408,831.10	348,685.36
Pest Eradication and Control	1,037,621.48	740,816.77
Potato Wart	59,006.26	-
Total	36,606,221.18	38,996,535.19

Bureau of Plant and Apiary Inspection

The Bureau of Plant and Apiary Inspection is responsible for protecting Florida's agricultural industry and the public from the introduction and spread of serious plant and honey bee pests. The bureau enforces Florida statutes and departmental rules pertaining to the movement of honey bee colonies, plants and plant products, and conducts routine surveys for the early detection of pests.

NURSERIES

July 1, 2022 – June 30, 2023
Environmental Specialists conducted 19,986 inspections of 10,125 nursery locations during the 2022-23 season. One hundred eighty Hold Order and Quarantine notices were issued to prevent the sale of infected or prohibited plants. These plants were either treated, destroyed or released once official verification of mitigation was received.

During this period, 1,026 new nurseries were registered equaling 1,205 locations. There were also 849 nurseries equaling 1,079 nursery locations placed out-of-business.

July 1, 2023 – June 30, 2024
Environmental Specialists conducted 18,743 inspections of 10,438 nursery locations during the 2023-24 season. One hundred eighty Hold Order and Quarantine notices were issued to prevent the sale of infected or prohibited plants. These plants were either treated, destroyed or released once official verification was received.

During this period, 1,121 new nurseries were registered equaling 1,300 locations. There were also 931 nurseries equaling 1,161 nursery locations placed out-of-business.

A Certificate of Registration issued by the Division of Plant Industry is required by any person selling nursery stock in Florida. Nursery stock is defined as "all plants, trees, shrubs, vines, buds, vegetable and field crop plants, flowering annual plants, aquatic plants, corms, tubers, bulbs, liners, cuttings, grafts and scions thereof, grown or kept for propagation, sale or distribution." Seeds, lawn or pasture grasses, cut flowers, cut ferns and cut foliage (greens) are specifically exempt from nursery stock classification.

STOCK DEALERS

July 1, 2022 – June 30, 2023
Environmental Specialists made 5,126 inspections of 9,124 stock dealer locations during the 2022-23 season. Three hundred fifty-one Hold Order and Quarantine notices were issued to prevent the sale of infected or prohibited plants. These plants were either treated, destroyed or released after being tested in a lab.

During this period, 242 new stock dealers were registered equaling 342 locations. There were also 358 stock dealers equaling 427 stock dealer locations placed out-of-business.

July 1, 2023 – June 30, 2024
Environmental Specialists made 4,895 inspections on 8,986 stock dealer locations during the 2023-24 season. Two hundred sixty-nine Hold Order and Quarantine notices were issued to prevent the sale of infected or prohibited plants. These plants were either treated, destroyed or released after being tested in a lab.

During this period, 255 new stock dealers were registered equaling 364 locations. There were also 305 stock dealers equaling 767 stock dealer locations placed out-of-business.

PLANTS AND NURSERIES UNDER INSPECTION BY COUNTY
July 1, 2022 – June 30, 2023

COUNTY	TOTAL NURSERY LOCATIONS	TOTAL ACRES	TOTAL PLANTS
Alachua	219	979.84	4,324,083
Baker	26	84.38	74,400
Bay	21	1,298.52	13,962
Bradford	21	7.62	30,284
Brevard	303	2,143.42	469,759
Broward	515	385.48	2,603,892
Calhoun	9	811.89	3,404,624
Charlotte	81	168.49	354,092
Citrus	98	351.02	302,829
Clay	39	89.31	575,038
Collier	206	181.77	109,588,918
Columbia	50	347.76	1,570,985
Desoto	38	613.25	2,485,303
Dixie	19	62.15	16,717
Duval	130	542.32	194,788
Escambia	62	38.29	1,666,426
Flagler	32	845.54	1,372,160
Franklin	3	0.37	4,245
Gadsden	27	463.65	13,321,604
Gilchrist	34	141.02	110,427
Glades	27	354.02	394,550
Gulf	10	5.82	6,284
Hamilton	12	77.65	75,580
Hardee	47	1,128.41	5,710,644
Hendry	58	175.72	1,403,286
Hernando	102	745.75	490,526
Highlands	127	1,630.06	4,833,043
Hillsborough	496	1,923.79	18,710,768
Holmes	11	7.57	4,745
Indian river	99	1,036.94	327,779
Jackson	40	11.06	37,607
Jefferson	36	256.68	14,843,882
Lafayette	11	274.12	6,594,586
Lake	336	3,704.05	59,630,891
Lee	406	953.61	5,360,563
Leon	64	43.08	130,890
Levy	81	908.01	10,113,960
Liberty	2	0.02	2
Madison	19	124.12	28,207,084
Manatee	154	485.06	304,660,983
Marion	230	881.91	889,650
Martin	171	663.57	17,003,397
Miami-Dade	2,461	9,787.69	139,653,390

COUNTY	TOTAL NURSERY LOCATIONS	TOTAL ACRES	TOTAL PLANTS
Monroe	41	28.63	49,344
Nassau	21	134.90	11,593
Okaloosa	39	166.10	12,297
Okeechobee	54	3,404.58	299,268
Orange	439	1,663.05	40,598,476
Osceola	87	242.34	3,707,098
Palm beach	598	1,689.52	21,087,786
Pasco	195	69.66	731,465
Pinellas	250	54.61	241,531
Polk	316	651.22	8,044,394
Putnam	55	177.22	232,409
Santa rosa	73	447.13	6,188,318
Sarasota	106	129.76	4,120,338
Seminole	208	1,151.54	1,389,130
St. Johns	69	212.11	153,412
St. Lucie	91	707.68	843,003
Sumter	86	1,012.74	50,104,163
Suwannee	59	957.66	16,098,878
Taylor	13	61.35	132,460
Union	7	6.31	4,005
Volusia	322	2,876.45	3,489,689
Wakulla	15	14.15	3,994,175
Walton	19	5.70	30,142
Washington	15	10.67	120,837
Totals	**10,111**	**50,509.87**	**923,252,837**

July 1, 2023 – June 30, 2024

COUNTY	TOTAL NURSERY LOCATIONS	TOTAL ACRES	TOTAL PLANTS
Alachua	235	923.57	4,343,018
Baker	24	78.41	75,393
Bay	34	1,324.23	23,238
Bradford	22	6.02	25,276
Brevard	316	1,317.01	479,585
Broward	537	1,103.24	2,683,341
Calhoun	11	813.99	3,405,412
Charlotte	85	528.86	90,474
Citrus	109	1,301.47	207,056
Clay	40	102.92	573,855
Collier	218	687.00	113,102,019
Columbia	47	353.27	740,285
Desoto	42	381.71	2,240,423
Dixie	21	516.01	20,944
Duval	138	444.05	207,279
Escambia	60	33.61	1,668,871
Flagler	34	859.21	1,385,634
Franklin	5	2.22	4,279
Gadsden	32	143.45	15,420,812
Gilchrist	33	165.53	115,136
Glades	25	438.00	455,556
Gulf	13	10.86	6,994
Hamilton	10	75.32	90,344
Hardee	48	1,435.65	5,430,346
Hendry	59	113.32	1,467,146
Hernando	101	808.72	373,910
Highlands	120	1,057.05	5,806,151
Hillsborough	463	1,977.16	18,570,719
Holmes	13	2.39	83,248
Indian river	108	1,396.63	319,591
Jackson	39	21.36	34,286
Jefferson	40	680.88	15,121,433
Lafayette	10	209.35	3,046,005
Lake	342	3,887.18	39,268,470
Lee	420	1,691.91	5,446,502
Leon	60	68.73	162,180
Levy	90	1,418.04	9,970,470
Liberty	3	0.03	102
Madison	20	116.32	32,115,269
Manatee	161	923.35	304,458,152
Marion	205	891.14	999,016
Martin	175	3,721.59	12,946,671
Miami-Dade	2,598	13,512.61	147,543,990

COUNTY	TOTAL NURSERY LOCATIONS	TOTAL ACRES	TOTAL PLANTS
Monroe	31	29.74	29,362
Nassau	25	205.57	9,903
Okaloosa	42	163.29	15,869
Okeechobee	56	2,536.32	336,822
Orange	440	1,792.76	42,224,949
Osceola	95	252.00	1,102,194
Palm beach	602	3,294.26	20,690,388
Pasco	193	71.61	810,180
Pinellas	215	42.26	200,047
Polk	330	943.90	6,721,220
Putnam	63	305.42	263,387
Santa rosa	64	449.02	6,190,397
Sarasota	119	155.24	4,094,027
Seminole	243	1,123.42	1,436,759
St. Johns	79	732.50	267,623
St. Lucie	100	1,045.16	1,210,095
Sumter	89	1,068.63	49,431,001
Suwannee	65	1,501.24	16,491,401
Taylor	22	1,403.81	65,405
Union	8	6.14	2,806
Volusia	338	3,299.93	3,698,725
Wakulla	16	18.08	4,220,551
Walton	17	13.29	25,326
Washington	20	13.98	110,140
Totals	**10,438**	**66,010.93**	**910,177,458**

IMPORTED FIRE ANT

Since the introduction of the imported fire ant (IFA) in Florida between 1933 and 1945, it has spread to all counties. There are two species of IFA found in Florida. The most common is *Solenopsis invicta* Buren, the red imported fire ant (RIFA) and the less common *Solenopsis* geminata (Fabricius); a native fire ant.

July 1, 2022– June 30, 2023

As of June 30, 2023, there were 1,105 nursery and stock dealer locations under a compliance agreement with 3,210 regulatory inspections conducted for Imported Fire Ant certification.

July 1, 2023 – June 30, 2024

As of June 30, 2024, there were 1,443 nursery and stock dealer locations under a compliance agreement with 3,672 regulatory inspections conducted for Imported Fire Ant Certification.

CARIBBEAN FRUIT FLY PROTOCOL PROGRAM CITRUS

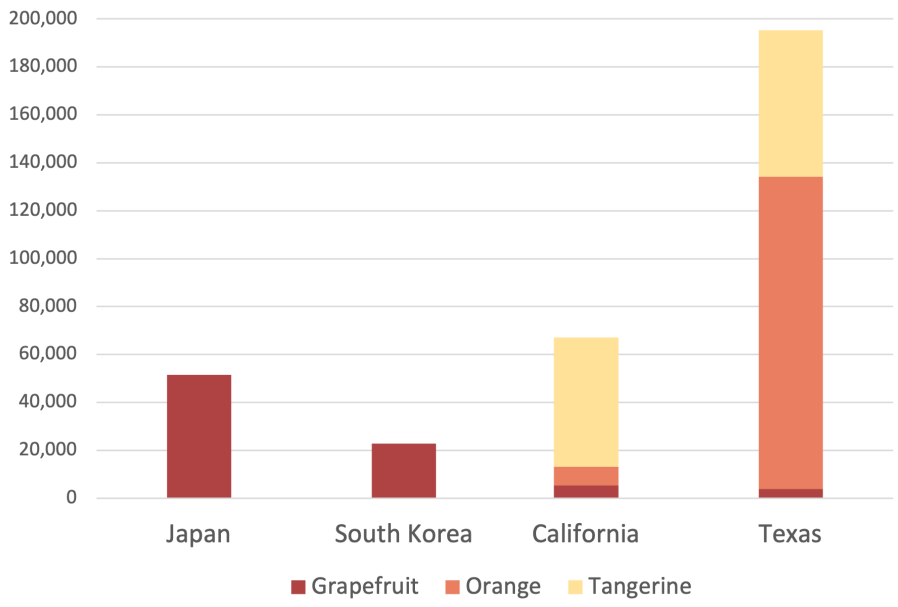
July 1, 2022 – June 30, 2023

During the 2022-2023 season, there were two major hurricanes which significantly impacted both the citrus and carambola harvest. The result was a reduction in cartons of both fruit types. There were 11,585 acres certified under the Caribbean Fruit Fly Protocol Program (CFFPP) which produced 336,711 certified cartons shipped under the program. A total of 74,378 cartons were exported to Japan and South Korea while 262,333 cartons were shipped domestically to California and Texas.

During the 2022-23 fiscal year, CFFPP personnel conducted the following inspections:

- Fruit fly trap services: 6,684
- Harvesting inspections: 1,705
- Packing house inspections: 420
- Acreage surveyed for preferred hosts: 203,014

TOTAL PROTOCOL CITRUS SHIPPED 2022-2023				
	Japan	**South Korea**	**California**	**Texas**
Grapefruit	51,575	22,806	5,369	3,831
Orange	0	0	7,774	130,379
Tangerine	0	0	83,901	61,079
Totals	81,572	22,806	97,044	195,289

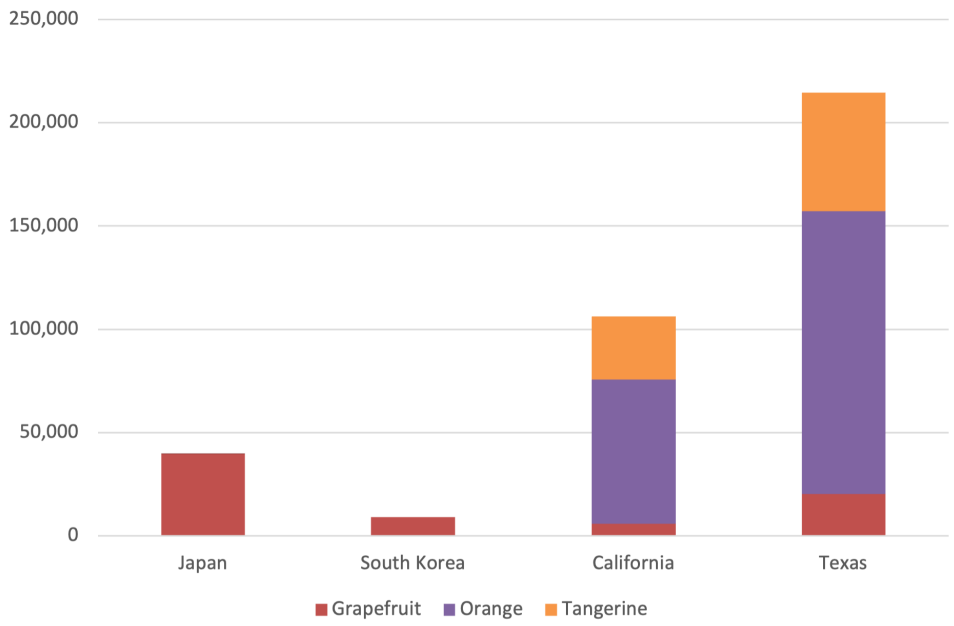


July 1, 2023 – June 30, 2024
During the 2023-24 season, 32,560 acres were certified under CFFPP. A total of 369,739 certified cartons were shipped under the program. A total of 48,854 cartons were exported to Japan and South Korea, while 320,885 were shipped domestically to California and Texas.

During the 2023-24 fiscal year, CFFPP personnel conducted the following inspections:

- Fruit fly trap services: 7,197
- Harvesting inspections: 2,615
- Packing house inspections: 634
- Acreage surveyed for preferred hosts: 220,973

TOTAL PROTOCOL CITRUS SHIPPED 2022-2023				
	Japan	**South Korea**	**California**	**Texas**
Grapefruit	39,656	9,198	5,887	20,207
Orange	0	0	69,694	136,896
Tangerine	0	0	30,619	57,582
Totals	39,656	9,198	106,200	214,685



CARAMBOLA

July 1, 2022 – June 30, 2023
During the 2022-23 season, 160 acres were certified for export to Texas and California. There were 173 cartons shipped to Texas and 32,067 shipped to California for a total of 32,240 cartons.

During the 2022-23 fiscal year, CFFPP personnel conducted the following inspections:

- Fruit fly trap services: 400
- Packing house inspections: 15
- Harvesting inspections: 27
- Acreage surveyed for preferred hosts: 340

July 1, 2023 – June 30, 2024
During the 2023-24 season, 120 acres were certified for export to Texas and California. There were 2,165 cartons shipped to Texas and 69,237 shipped to California for a total of 71,402 cartons.

During the 2023-24 fiscal year, CFFPP personnel conducted the following inspections:

- Fruit fly trap services: 468
- Packing house inspections: 36
- Harvesting inspections: 111
- Acreage surveyed for preferred hosts: 120

PEACH

July 1, 2022 – June 30, 2023
No growers requested peach certification during this fiscal year.

July 1, 2023 – June 30, 2024
No growers requested peach certification during this fiscal year.

IMPORT INSPECTIONS
Distribution centers, nurseries importing foreign plant material and post-entry quarantine locations are potential high-risk sites for bringing in exotic insect pests and plant pathogens due to the large volume of plant and plant products imported to these sites. Import inspection activities were conducted at high-risk locations throughout the state. These import inspections are instrumental in preventing the introduction of exotic insect pests and plant pathogens into the US through Florida.

July 1, 2022 – June 30, 2023
During the 2022-23 fiscal year, the following inspections were completed:

- 3,295 import inspections
- 19 post-entry quarantines
- 35 firewood inspections
- 138 cut foliage, ferns and flowers
- 91 distribution centers
- 961 domestic foreign plant material
- 455 produce
- 154 craft store inspections

July 1, 2023 – June 30, 2024
During the 2023-24 fiscal year, the following inspections were completed:

- 3,667 total import inspections
- 8 post-entry quarantines
- 64 firewood inspections
- 215 cut foliage, ferns and flower inspections
- 86 distribution center inspections
- 1,217 domestic and foreign plant material inspections
- 598 produce inspections
- 224 craft store inspection

NON-PROHIBITED AQUATIC PLANT HARVESTING PERMITS
The Division of Plant Industry regulates the importation, transportation, cultivation, collection, sale or possession of any aquatic plant. Non-prohibited aquatic plant harvesters are required to be registered as a nursery and sign a compliance agreement/ permit to harvest non-prohibited aquatics.

July 1, 2022 – June 30, 2023
For the 2022-23 fiscal year, the division issued one aquatic harvesting permit. The Division had 42 active nurseries under compliance.

July 1, 2023 – June 30, 2024
For the 2023-24 fiscal year, the Division issued one aquatic harvesting permit. The Division had 19 active nurseries under compliance.

TEMPORARY CERTIFICATES
Temporary certificates are issued to persons or businesses needing to demonstrate their plant material meets plant pest freedom requirements. The persons or businesses often do not meet the conditions needed to be fully registered under our division rules. These include sod grass inspection, homeowners moving out of Florida, or one-time plant sales.

July 1, 2022 – June 30, 2023
During the 2022-23 fiscal year, 663 temporary certificates were issued.

July 1, 2023 – June 30, 2024
During the 2023-24 fiscal year, 575 temporary certificates were issued.

BOLL WEEVIL ERADICTION PROGRAM

The Bureau of Plant and Apiary Inspection is responsible for the collection of assessment fees for commercial cotton producers in the state. The assessment fees are set each year per acre and are due by December 31. Those that are delinquent are charged an additional $4.00 per acre. The Bureau is also responsible for issuing cotton liens when payment is not received.

2022-2023 Season

At the close of the 2022 cotton-growing season, there were 326 commercial cotton producers in the state that planted 103,765 acres of cotton in 16 counties. Total assessment collected was $256.422.74 and 35 growers were issued liens for non-payment.

2023-2024 Season

At the close of the 2023 cotton-growing season, there were 291 commercial cotton producers in the state that planted 87,057 acres of cotton in 16 counties. Total assessment collected was $193,631.90 and 32 growers were issued liens for non-payment.

PEST DETECTION RECORDS
July 1, 2022 – June 30, 2023

NEW HOST RECORD	50
NEW COUNTY RECORDS	291
NEW STATE RECORDS	10
NEW U.S. CONTINENTAL RECORDS	7
NEW HEMISPHERE RECORDS	1
NEW TAXONOMIC DISCOVERY	1

PEST DETECTION RECORDS
July 1, 2023 – June 30, 2024

NEW HOST RECORD	33
NEW COUNTY RECORDS	353
NEW STATE RECORDS	9
NEW U.S. CONTINENTAL RECORDS	3
NEW HEMISPHERE RECORDS	1

HEMP PROGRAM

In 2020, the department completed rules and regulations to allow for the commercial cultivation of hemp. Hemp cultivation and licensing is regulated under rule 5B-57.014, State Hemp Program. The division is responsible for regulations involving licensing and growing hemp in the state.

July 1, 2022 – June 30, 2023

During the 2022-23 fiscal year, 516 hemp licenses were issued with 615 locations covering over 15,554 acres. A total of 512 hemp inspections were conducted during this reporting period.

July 1, 2023 – June 30, 2024

During the 2023-24 fiscal year, 450 hemp licenses were issued with 547 locations covering over 11,938 acres. A total of 475 hemp inspections were conducted during this reporting period.

VEGETABLE, CUT FERN AND CUT FLOWER CERTIFICATIONS

Vegetable, cut fern and cut flower businesses generally need to meet specific regulatory requirements for export. These include specialized inspections of the plant material where a certificate attesting to the inspection is issued.

July 1, 2022 – June 30, 2023

During the 2022-23 fiscal year, 240 vegetable, cut fern and cut flower certificates were issued.

July 1, 2023 – June 30, 2024

During the 2023-24 fiscal year, 198 vegetable, cut fern and cut flower certificates were issued.

NEMATODE CERTIFICATION

Florida nursery stock is regulated for certain nematodes when shipped to California, Arizona, Texas, Louisiana, European Union (EU) and other countries. The Division of Plant Industry has plant inspectors across the state responsible for conducting nematode sampling to meet certification requirements.

July 1, 2022 – June 30, 2023

During the 2022-23 fiscal year, nematode certification personnel evaluated 1,316 ornamental nursery locations. A total of 3,730 samples were collected and processed from nurseries for nematode certification.

July 1, 2023 – June 30, 2024

During the 2023-24 fiscal year, nematode certification personnel evaluated 1,263 ornamental nursery locations. A total of 4,158 samples were collected in the field and processed from nurseries for nematode certification.

EXPORT CERTIFICATION

Export certification allows for nurseries and stock dealers to export plants and plant products out of the state and/or country.

Canadian Greenhouse Certification allows for nurseries to export greenhouse grown plants to Canada based on quarterly inspections using authorized stickers in place of a phytosanitary certificate.

Canadian Blueberry Certification allows for blueberry fruit shipments to enter Canada based on negative trapping surveys for the blueberry maggot using authorized stickers in place of a phytosanitary certificate.

Arizona Origin Inspection Agreement – This agreement allows Florida nurseries to ship to Arizona without a phytosanitary certificate. It is based on a plant cleanliness program ensuring freedom from plant pests.

Corn Borer Certification is a trapping and pre-harvest treatment agreement designed to mitigate the European corn borer. When employed, this certification authorizes firms to ship untreated corn, beans and bell peppers into California, Texas, Idaho, Oregon and Washington. The only Florida counties considered infested are Calhoun, Escambia, Gadsden, Hamilton, Holmes, Jackson, Jefferson, Madison, Okaloosa and Santa Rosa.

July 1, 2022 – June 30, 2023
Plant Inspection personnel issued 8,115 state phytosanitary certificates and 10,155 federal phytosanitary certificates for plants and plant products destined to other states and countries.

There were 39 nursery locations under compliance for the Canadian Greenhouse Plant Certification Program (GCP).

There were 50 locations consisting of 3,627 acres in Florida certified for Canadian Blueberry Certification.

A total of 42 nurseries were under compliance for Arizona Origin Inspection Agreement.

A total of 56 European corn borer traps were monitored during this fiscal year.

July 1, 2023 – June 30, 2024
Plant Inspection personnel issued 7,930 state phytosanitary certificates and 10,505 federal phytosanitary certificates for plants and plant products destined to other states and countries.

During the 2023-24 fiscal year, the U.S. Canada Greenhouse Plant Certification Program (GCP) was in full swing. One nursery failed certification and one nursery rescinded from the program leaving a total of 38 nurseries under compliance.

There were 33 locations consisting of 3,197 acres in Florida certified for fresh fruit shipment to Canada and California.

A total of 72 nurseries were under compliance for Arizona Origin Inspection Agreement.

A total of 155 European corn borer traps were monitored during this fiscal year.

PHYTOPHAGOUS SNAIL PROGRAM
This program focuses on targeted surveys of high-risk pathways to address the issues of invasive snails and slugs. The end goal is to locate incursions of pests before they become too widespread. By doing so, the Department can quickly mitigate and eradicate, preventing the establishment of unwanted mollusks pests. The program team targets areas identified as high risk, where invasive mollusks are likely to be introduced and have the potential to spread. Areas identified include, but are not limited to; marinas, stone distribution sites, pallet recycling centers, botanicas and other places with a history of domestic and international trade movement. Survey sites are risk assessed and inspected at specific intervals, based on that assessment.

July 1, 2022 – June 30, 2023
There were 539 establishments targeted for inspection with 2,561 inspections completed, 230 canine inspections completed and 109 samples collected by program personnel and canines.

July 1, 2023 – June 30, 2024
There were 577 establishments targeted for inspection with 2,787 inspections completed and 409 samples collected by program personnel. Canine was not active during this period.

DETECTOR DOG PROGRAM
A primary objective of this program is to continue safeguarding our nation's food and environmental security through early detection of exotic pests and pathogens that threaten agricultural production and ecological systems. This program provides the opportunity for early identification and mitigation of plant pests by using detector dog technology directed at high-risk pathways.

Trained canines have been deployed at mail/parcel hubs and distribution centers targeting high-risk host material.

Five canine teams inspect parcel facilities. They are tasked with the inspection of packages for high-risk plants and plant products. Two teams are in Central Florida (Orlando & Tampa) and three teams are stationed in Miami. These teams also travel throughout Florida conducting searches in areas where there are no permanent canines stationed. This allows for teams to train together and provide a wider range of coverage for the state. Information collected during this type of travel will aid in the placement of future detector dog teams. One canine team is assigned to the exotic snail program. The exotic snail teams respond to potential snail finds, helpline calls and eradication programs.

Teams conduct daily inspections at private mail sort facilities targeting plant pests and diseases that may negatively impact Florida agriculture and our food supply. Routine inspections using detector dog technology include detections of fruit, vegetables, plants and plant products mailed from within and into the state of Florida. High-risk target fruit identified through canine alerts include citrus, guava, mango, papaya and stone fruits including peaches, nectarines, cherries, plums and apricots. The program strives to identify unmarked shipments of agriculture material and educate those who are not complying with Florida's import requirements.

In addition to the six canine/handler teams, the division has a program manager to supervise the handlers and oversee the detector dog program. The program manager is responsible for conducting annual canine certification, program development and problem solving in all canine inspection areas.

July 1, 2022 – June 30, 2023
One canine team is assigned to the GALS eradication program in Miami. The focus is to assist with early detections of live GALS on high-risk properties. For properties previously positive, the canine teams serve as an additional negative inspection and confirmation that a positive property is free of the snails. For helpline calls or new detections, the canines can supplement a thorough survey and help quickly delimit infestations.

Parcel facility overview:
- 10,820 total alerts
- 10,944 targets placed
- 99% detection accuracy

Giant African Land Snail activities:
- 230 properties inspected
- 646 targets placed
- 93% detection accuracy

July 1, 2023 – June 30, 2024
One canine team works on invasive environmental mollusks in Miami. The focus is to assist with early detection of live invasive mollusks on high-risk properties and shipping pathways. For properties that have been previously positive for GALS, the canine team serve as an additional negative inspection and confirmation that a positive property is free of snails. For helpline calls or new detections, the canine can supplement a thorough survey and help quickly delimit infestations. The environmental canine has been instrumental in transitioning from the old GALS program to the new phytophagous snail program. The canine team has conducted surveys in marinas, tile warehouses and other high-risk entities for invasive mollusks. Under this program they continue to search previously positive GALS properties and respond to discoveries of new GALS properties throughout Florida.

Parcel facility overview:
- 10,518 accurate parcel alerts
- 10,589 total parcel alerts
- 94% detection accuracy
- 14 unmarked parcel finds

Environmental overview:
- 246 properties inspected
- 21 GALS surveys on Pasco County program
- 1,577 targets found
- 1,598 targets placed
- 98% detection accuracy

INTERDICTION STATIONS
The Bureau of Plant and Apiary Inspection has a supervisor and five inspectors who survey and inspect in and around high-risk Agriculture Interdiction Stations on interstates and other roads in North Florida. These stations have the highest potential for exotic pest introduction. The four main interdiction stations entering Florida are located on I-95 in Yulee, I-75 in White Springs, I-10 in Pensacola, and I-10 in Live Oak. The inspectors also travel to the other 19 side stations for survey and inspection activities.

Their focus is to inspect plant material and agricultural products brought into Florida via tractor trailers and leased U-Haul- type trucks for foreign plant pests and pathogens or those with a very limited distribution in the United States and Florida. During the inspections they examine, collect and submit soil, plants and plant materials from all parts of the trailer and/or container. Inspectors also verify compliance with federal and state regulations for these products.

Carriers are subject to targeted and random detailed inspections, which are conducted in pull-over areas. Visual surveys of the immediate environs at these locations are also conducted.

July 1, 2022 – June 30, 2023
Overview:
- 3,305 vehicles inspected
- 465 samples collected
- 1,328 sample identifications
- 69 regulatory significant pests
- 50 trucks were refused entry
- 19 confiscations

July 1, 2023 – June 30, 2024
Overview:
- 5,161 vehicles inspected
- 1,236 samples collected
- 237 regulatory significant samples collected
- 107 trucks were refused
- 41 confiscations

APIARY INSPECTION
A Certificate of Beekeeping Registration issued by the Division of Plant Industry is required by any person having honey bee colonies within Florida. Beekeepers are separated into three categories based on the number of colonies they manage: Backyard (1-40 colonies), Sideline (41-100 colonies) and Commercial (101 or more colonies).

The apiary inspection team services 114 bait hives at the ports of entry around the state to capture any unwanted bees or bee pests that may be imported into the state. These are conducted by apiary inspectors with assigned ports every 21-30 days. Additionally, the division collaborates with the USDA-APHIS National Honey Bee Survey to assess honey bee colony health across the nation. Twenty-four sampling kits are issued to Florida and they are all completed by the apiary inspection team.

Although there are numerous challenges within this sector of agriculture, from pest and disease issues to forage loss to pesticide exposures, the Florida beekeeping industry continues to grow.

July 1, 2022 – June 30, 2023
There were 752 new beekeeper registrations processed during the 2022-23 season. This brought Florida's industry to 5,273 registered beekeepers. Apiary Inspection was operating at full staff during most of this season. Even still, due to the beekeeper to inspector ratios, we are unable to visit each beekeeper for an annual inspection. Approximately 27% of the registered beekeepers underwent a routine inspection during this season.

Apiary inspectors conducted 1,416 routine apiary inspections during the 2022-23 season. There were 983 permits issued to ship loads of honeybees out of the state, consisting of 408,986 colonies total. There were 196 inspections completed to certify hives destined for California for almond pollination as "ant-free".

In addition to providing these services to the beekeeping industry, the apiary inspection team performed follow-up visits for more than 65 calls from the general public regarding nuisance honey bees during the 2022-23 season.

July 1, 2023 – June 30, 2024

There were 874 new beekeeper registrations processed during the 2023-24 season. This brought Florida's industry to 5,168 registered beekeepers. The Apiary Inspection section was operating at full staff during most of this season. Even still, due to the beekeeper to inspector ratios, we are unable to visit each beekeeper for an annual inspection. Approximately 42% of the registered beekeepers underwent a routine inspection during this season.

Apiary inspectors conducted 2,200 routine apiary inspections and 41,600 hives inspected during the 2023-24 season. There were 985 permits issued to ship loads of honey bees out of the state, consisting of 817,972 colonies total. There were 196 inspections completed to certify hives destined for California for almond pollination as "ant-free".

Apiary inspectors completed 462 checks on 114 bait hives at the ports of entry around the state of Florida to capture any unwanted bees or bee pests that may be imported into the state.

In addition to providing these services to the beekeeping industry, the apiary inspection team performed follow-up visits for 52 calls from the public regarding nuisance honey bees during the 2023-24 season.

APIARYS UNDER INSPECTION BY COUNTY
July 1, 2022 – June 30, 2023

COUNTY	TOTAL APIARIES	TOTAL COLONIES
Alachua	146	23,184
Baker	24	5,706
Bay	84	1,219
Bradford	19	2,073
Brevard	151	35,519
Broward	198	6,487
Calhoun	19	1,223
Charlotte	49	2,927
Citrus	62	5,707
Clay	103	657
Collier	65	7,944
Columbia	43	3,002
Desoto	13	9,725
Dixie	9	2,122
Duval	221	3,499
Escambia	132	1,820
Flagler	27	212
Franklin	11	170
Gadsden	25	393
Gilchrist	30	591
Glades	7	2,417
Gulf	22	4,290
Hamilton	12	248
Hardee	14	7,030
Hendry	21	7,884
Hernando	64	2,213
Highlands	51	6,312
Hillsborough	271	9,433
Holmes	21	3,722
Indian river	55	8,742
Jackson	48	2,221
Jefferson	28	484
Lafayette	7	211
Lake	131	31,636
Lee	176	20,304

COUNTY	TOTAL APIARIES	TOTAL COLONIES
Leon	113	2,689
Levy	33	3,661
Liberty	31	16,156
Madison	21	198
Manatee	85	31,203
Marion	105	5,096
Martin	51	11,506
Miami-Dade	244	18,504
Monroe	24	485
Nassau	55	626
Okaloosa	111	3,479
Okeechobee	9	3,980
Orange	134	2,021
Osceola	40	852
Out of state	201	206,535
Palm beach	211	41,714
Pasco	131	6,170
Pinellas	326	2,210
Polk	155	31,799
Putnam	50	1,891
Santa rosa	91	527
Sarasota	92	4,009
Seminole	98	831
St. Johns	111	1,265
St. Lucie	60	13,810
Sumter	21	4,281
Suwannee	37	2,410
Taylor	15	427
Union	11	356
Volusia	119	6,587
Wakulla	54	8,772
Walton	49	1,425
Washington	27	2,012
Totals	**5,273**	**658,814**

APIARYS UNDER INSPECTION BY COUNTY
July 1, 2023 – June 30, 2024

COUNTY	TOTAL APIARIES	TOTAL COLONIES
Alachua	133	22,048
Baker	22	4,031
Bay	87	2,108
Bradford	18	2,571
Brevard	153	67,212
Broward	194	11,522
Calhoun	19	1,219
Charlotte	52	2,685
Citrus	55	5,725
Clay	98	660
Collier	60	7,469
Columbia	38	3,343
Desoto	18	13,268
Dixie	11	2,191
Duval	225	3,489
Escambia	130	1,759
Flagler	21	459
Franklin	10	227
Gadsden	27	318
Gilchrist	26	574
Glades	9	2,465
Gulf	24	5,311
Hamilton	9	396
Hardee	12	8,710
Hendry	22	9,603
Hernando	60	1,799
Highlands	44	6,467
Hillsborough	246	10,252
Holmes	14	1,624
Indian river	60	17,250
Jackson	50	2,767
Jefferson	28	612
Lafayette	6	291
Lake	135	36,429
Lee	180	19,247
Leon	112	4,478
Levy	42	3,863
Liberty	30	15,093
Madison	21	206
Manatee	81	31,938
Marion	110	5,268
Martin	57	13,041
Miami-dade	238	19,544
Monroe	23	467
Nassau	57	1,352
Okaloosa	119	3,670

COUNTY	TOTAL APIARIES	TOTAL COLONIES
Okeechobee	12	4,041
Orange	143	1,806
Osceola	41	948
Out of state	180	206,309
Palm beach	222	47,351
Pasco	120	6,176
Pinellas	284	2,038
Polk	160	30,892
Putnam	56	2,376
Santa rosa	87	629
Sarasota	98	5,368
Seminole	87	862
St. Johns	103	1,241
St. Lucie	67	17,073
Sumter	23	4,620
Suwannee	38	1,437
Taylor	16	291
Union	10	337
Volusia	105	10,628
Wakulla	58	10,236
Walton	47	1,366
Washington	25	2,378
Totals	**5,168**	**733,424**

Bureau of Entomology, Nematology and Plant Pathology

ENTOMOLOGY

The Entomology section identifies arthropod and mollusk samples submitted from DPI's plant inspectors, USDA inspectors, pest detection surveys, emergency eradication programs, businesses, universities, other governmental entities, and the public. This section also curates the Florida State Collection of Arthropods (FSCA), which contains over 12.5 million specimens. The museum's mission is to build the best possible worldwide collection of terrestrial and aquatic arthropods in support of research, education, and the regulatory functions of FDACS. In addition, the staff maintains resources and relationships with other experts related to insect taxonomy and publishes research results in multiple media.

Grant Awards

- **APHIS Farm Bill 2023, Biological Control of Bagrada Bug,** *Bagrada hilaris* (Pentatomidae), $50,000
- **Collaborative Research: Digitization TCN:** Extending *Anthophila* research through image and trait digitization (Big-Bee), 2021–2025, $154,730.

Sample Totals
Number of Samples Submissions and Lots Identified

	2022-2023 Fiscal Year				2023-2024 Fiscal Year				Biennial Total
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
# Samples Received	1248	1161	1582	1788	1575	1447	1497	1970	**12,268**
# Lots Identified	1774	1698	2240	2915	2319	2528	2406	3436	**19,316**

NEMATOLOGY

Nematology analyzes soil and plant samples for nematodes, conducts pest detection surveys and provides diagnoses of plant problems, as well as completing identification of plant parasitic nematodes involved in regulatory and certification programs. State of Florida statutes and rules mandate the predominant regulatory activities of the section. Analyses of plant and soil samples include those from in-state programs, plant shipments originating in Florida destined for other states and countries, as well as samples intercepted in Florida from outside the United States.

The Nematologists and supporting staff processed and analyzed:

FY 2022-2023	10,920
FY 2023-2024	11,752
Total	22,672

Analyses for certification and regulatory programs relative to citrus, ornamental plants and other Florida crops represent 94.9 percent of the identification work provided by the section. The remaining 5.1 percent included analyses for surveys of nematodes in cultivated and natural lands, and for identification of nematode species involved in plant problems. No less than 114,396 specimens were examined, and 29,222 morphological identifications were provided. The number of molecular and isozyme analyses conducted by the section were 1,840 and 1,279, respectively. These analyses, which involved mainly root-knot nematode species, were in addition to the morphological analyses listed above.

Research

Characterization of Florida pin nematodes
Renato Inserra, Research Scientist
Jason Stanley, Bureau Chief of Methods Development and Biological Control
Silvia Vau, Biological Administrator II

Pin nematodes (*Paratylenchus* spp.) are root parasites found worldwide. They have different life cycles and feeding habits and can damage a wide range of plants. A study on the diversity of pin nematodes in Florida, and other localities was conducted in cooperation with nematologists of the University Rey Juan Carlos, Madrid Spain and the Department of Food and Agriculture, Sacramento, California. A remarkable diversity of pin nematode species was found in soil samples from Florida and other states of the USA, Canada, and Spain. Using integrative taxonomy, two

new species: *Paratylenchus hawaiiensis* sp. n. and *P. roboris* sp. n., six valid species: *Paratylenchulus acti*, *P. aquaticus*, *P. goldeni*, *P. paralatescens*, *P. minutus* (= *P. shenzhenensis* syn. n.), *P. straeleni* and two undescribed species were identified from Florida; *P. goldeni*, *P. hamatus*, *P. hamicaudatus*, *P. holdemani*, and *P. pedrami* were found in California, *P. minutus* in Hawaii, *P. goldeni* in Oregon and Washington, and one new species, *Paratylenchus borealis* sp. n. in Alaska. Phylogenetic relationships of *Paratylenchus* were reconstructed using the D2-D3 of 28S rRNA, ITS rRNA and *COI* gene sequences. Congruence of molecular and morphological evolution and species identification problems were discussed. Obese females were found in two major clades of *Paratylenchus*. The problem of reference materials was emphasized, and it was proposed to make more efforts to collect topotype materials of known *Paratylenchus* species for molecular study.

The results of this research were presented at ONTA 53rd Annual Meeting held in Cairo, Egypt in September 2023.

Identification, distribution, and hosts of root-knot nematodes (*Meloidogyne* spp.) in Florida, USA with focus on *Meloidogyne enterolobii*

Janete A. Brito, Research Scientist

A Cooperative study with a nematologist and a MSc student from the University of Florida aiming on the identification, distribution and host of root-knot nematodes in Florida, with focus on *Meloidogyne enterolobii* was conducted. Results obtained using DNA analysis showed root-knot nematodes (RKN) were detected in 247 of 304 root samples collected in South and Central Florida from September 2019 to January 2023. Five RKN species (*M. arenaria*, *M. enterolobii*, *M. hapla*, *M. incognita* and *M. javanica*) were identified. *M. incognita* and *M. enterolobii* were the most prevalent species, each present in 76 (25%) of the samples. *M. javanica* was identified in 50 (16.44%) samples, followed by *M. arenaria* in 25 (8.22%) samples and *M. hapla* in 16 (5.27%) samples. Phylogenetic analysis showed low genetic variability among populations of *M. enterolobii* found in Florida, the US and other countries. New host records found in this study include: a worldwide host record, *Solanum capsicoides* (*M. enterolobii*); new US continental host records, *Vigna unguiculata* (*M. enterolobii*), *Opuntia cochenillifera* (mixed species – *M. enterolobii* and *M. incognita*). Additionally, new state host records found were, *Cannabis sativa*, *Colocasia esculenta and Lilium sp. (M. arenaria), Phaseolus vulgaris (M. enterolobii), Cucumis melo (M. hapla), and Lavandula angustifolia and Helianthus annuus (M. incognita).*

The student successfully defended her thesis, and a manuscript was prepared and accepted for publication in the Journal of Nematology in July 2024.

Morphological and molecular characterization of *Meloidogyne spartinae* from Florida, USA, and assessment of bacterial assemblages in infected roots of smooth cordgrass (*Spartina alterniflora*)

Janete A. Brito, Research Scientist
Silvia Vau, Biological Administrator II
Jason Stanley, Bureau Chief of Methods Development and Biological Control
Ruimin Xue, Laboratory Technician IV
Lucas Dombeck, Laboratory Technician I

This study was conducted in collaboration with the Plant Pathology Department, University of Florida, and California Department of Food and Agriculture focusing on the morphological and molecular characterization of three populations of *Meloidogyne spartinae* from Florida, and assessment of bacterial assemblages in smooth cordgrass (*Spartina alterniflora*) root galling, induced by *M. spartinae*.

A manuscript was prepared and submitted for publicaiton in PLANTA, a peer reviewed Journal.

Improving diagnostic of the guava root-knot nematode, *Meloidogyne enterolobii*: A Novel TaqMan Assay for *M. enterolobii*

Wishal Negi, Research Scientist
Janete A. Brito, Research Scientist
Matthew Moore, Biological Scientist IV
Lynn Combee, OPS Laboratory Technitian IV
Ruimin Xue, Laboratory Technitian IV
Cheryl Roberts, Biological Scientist I

A novel TaqMan real-time PCR assay was developed for the precise detection *of Meloidogyne enterolobii*, a quarantine root-knot nematode, in soil samples. The assay targets the cytochrome c oxidase I (coxI) gene, leveraging its genetic divergence from other *Meloidogyne* spp. Species-specific primers and a probe were designed and validated for specificity, ensuring no cross-reactivity with non-target nematodes. The phylogenetic analysis confirmed the distinct clustering of *M. enterolobii* within Clade 2, along with *M. incognita*, *M. javanica* and *M. arenaria*. This assay offers a reliable tool for certification samples and for monitoring and managing *M. enterolobii* in ornamental nurseries and other agricultural settings. A manuscript focusing on these findings will be prepared and submitted to a peer reviewed journal.

Foliar nematodes associated with strawberry in Florida.

Renato Inserra, Research Scientist
Silvia Vau, Biological Administrator II

A longstanding cooperative project between FDACS-DPI nematologists and those at Gulf Coast Research and Education Center, University of Florida, Wimauma, Florida, has been conducted since 2016 with the aim to characterize the foliar nematodes associated with strawberry (*Fragaria* x *ananassa*) in central Florida. Several species of foliar nematodes (*Aphelenchoides* spp.) were detected during surveys conducted in Florida strawberry fields including the plant parasitic nematode,

Aphelenchoides besseyi, detected only in 2016 and 2017 on photosynthetic strawberry leaves/buds. However, other not well characterized populations of *Aphelenchoides* sp. were found on declining/desiccated leaves. Morphological analyses indicated these populations of *Aphelenchoides* sp. contained specimens of *A. bicaudatus*, a species reported in the United States (Illinois and Maryland) but detected in Florida for the first time. *Aphelenchoides bicaudatus* differs from *A. besseyi* in the shape of their tail terminus is bifurcate in *A. bicaudatus* and stellate in *A. besseyi*. One population of *A. bicaudatus* was used for morphological and molecular analyses after being reared on the fungus *Monilinia fructicola*. Body and tail length differences were observed among Florida *A. bicaudatus* and other populations from the Far East and South Africa. Phylogenetic analyses of the rRNA gene sequences showed Florida *A. bicaudatus* grouped with those of species from South Korea, Taiwan and the Netherlands and several other populations listed as *Aphelenchoides* sp. from Brazil, Costa Rica and Japan, which were considered as representatives of *A. bicaudatus* in these studies. Photosynthetic strawberry leaf samples were free from *A. bicaudatus*, indicating this species does not damage strawberry. *Aphelenchoides bicaudatus* was associated with desiccated leaves and/or propagative stolons, usually infected by fungi, confirming it is mycetophagous under field conditions in these studies. Results of soybean leaf inoculation on moist filter paper containing *A. bicaudatus* specimens showed this species could become phytophagous under artificial conditions. Nematodes penetrated the leaf epidermis and migrated into the mesophyll causing leaf tissue discoloration/necrosis, which remained localized within the infested area. Soybean leaf damage was almost negligible, and no nematode reproduction was observed in the inoculated soybean leaf areas.

Plant Pathology

The Plant Pathology section diagnoses plant problems exhibiting symptoms of pathogenic infection or environmentally borne (abiotic) syndromes on plant material samples primarily collected and submitted by DPI plant inspectors. Diagnostic services are also offered to homeowners. The section also supports export certification through testing of asymptomatic plant material for pathogens to satisfy phytosanitary requirements of importing states and countries.

In addition to these duties, section scientists and staff conduct basic and applied research pertaining to plant pathology, participate in New Inspector training, permit application, reviews scientific research for publication in peer reviewed literature and serve on multiple internal, external and multi-agency committees, panels and societies, all with fulfilling the focus of DPI's mission.

By the Numbers

Sample Type	Number
Citrus Black Spot	406
Citrus Canker	891
Citrus Greening	346
Phytoplasma Palm lethal decline	25
Sudden Oak Death	4
Aroid rust	64
Citrus Nursery Certification	16,331
Interdiction Station	349
Detector Dog	53
Invasive Phytophagous Snail and Slug Survey	58
Other	4,533
Total	**23,060**

Major Projects

Watermelon Crinkle Leaf-Associated Viruses Detected in Seeds

Kishore Dey

In early spring 2023, watermelon plants in commercial fields in Hardee County, Florida, displayed symptoms such as yellow mottling, chlorosis, wrinkling, thickening and upward curling of leaves. Initial testing by the University of Florida's Southwest Florida Research and Education Center (UF-SWREC) confirmed the presence of Watermelon crinkle leaf-associated viruses 1 and 2 (WCLaV-1 and WCLaV-2) in the leaves. The grower then sent unopened seed packets from two commercial suppliers, Enza Zaden and Seedway, to the FDACS-DPI Plant Pathology section for examination of possible seed-borne infections. Molecular testing revealed the Enza Zaden seeds were infected with both WCLaV-1 and WCLaV-2, while Seedway seeds were positive for WCLaV-1 only.

Seeds from both suppliers were germinated, and 30-day-old seedlings showed mild mosaic patterns and leaf deformation. Testing confirmed the Seedway seedlings were infected with WCLaV-1, while Enza Zaden seedlings were infected with both WCLaV-1 and WCLaV-2. Preliminary findings suggest the viruses are present within the seed itself, rather than being confined to the seed coat. Further testing on grower-supplied seeds from two additional varieties, Cracker Jack and Estrela (both treated and untreated), also confirmed the presence of WCLaV-1 and WCLaV-2. To examine the spread of these viruses in other commercial seeds, watermelon seeds from the Ferry Morse brand, representing seven varieties purchased at retail stores (Lowes, Gainesville) were tested. The varieties included Sugar Baby (heirloom), Jubilee (organic), Garden Leader Monster, Crimson Sweet, Black Diamond (heirloom) and Allsweet (organic). All tested samples were positive for WCLaV-1, with a 100% infection rate.

Context and Implications
WCLaV-1 and WCLaV-2 were first identified in China during the 2015–2016 watermelon growing seasons (Xin et al., 2017). The first report outside China occurred in the U.S. in Texas watermelons (Hernandez et al., 2021), followed by detections in Florida (Hendricks et al., 2022), Georgia (Adeleke et al., 2022) and Oklahoma (Gilford & Ali, 2022). Recently, these viruses were also found in squash (*Cucurbita pepo* var. recticollis) (Jailani et al., 2023) and zucchini (*Cucurbita pepo*) (Iriarte et al., 2023) in Florida.

Currently, no specific entry pathway or insect vector has been identified. However, the detection of WCLaV-1 and WCLaV-2 in seeds strongly suggests seed transmission is a primary route for the virus's introduction and spread in Florida and other parts of the United States. Since Florida ranks top in watermelon production and accounts for nearly 30% of US production of watermelon, this highlights the urgent need for further research into seed-borne transmission and the development of diagnostic protocols to prevent the spread of these viruses in watermelon and related crops.

First Report of Cucumber Green Mottle Mosaic Virus (CGMMV) and Watermelon Green Mottle Mosaic Virus (WGMMV) in Florida
In July 2022, samples of bottle gourd (*Lagenaria siceraria*) and luffa (*Luffa* sp.) showing virus-like symptoms were collected from a commercial cucurbit field in northeast Florida and submitted to FDACS by the USDA Agricultural Research Services (USDA ARS) for diagnostic testing. The symptoms observed in bottle gourd included chlorosis, mottling, deformation of young leaves and mottling on fruits, while luffa exhibited chlorosis and mosaic patterns on older leaves. Following this initial finding, regulatory officials from both FDACS and USDA ARS collected 32 additional bottle gourd vines from the same field, all showing similar chlorosis and mottling symptoms. Immunoassay testing identified tobacco mosaic virus (TMV), and subsequent molecular analyses revealed co-infections with cucumber green mottle mosaic virus (CGMMV) and watermelon green mottle mosaic virus (WGMMV).

Archived RNA from samples collected in May and June 2022 from the same field was also tested using specific primers for CGMMV and WGMMV. These tests confirmed the presence of CGMMV in one additional bottle gourd sample and WGMMV in another bottle gourd and two luffa samples. This represents the first documented detection of CGMMV and WGMMV in Florida.

Significance of the Findings
The discovery of CGMMV and WGMMV is significant because both viruses pose serious threats to cucurbit crops, causing extensive damage to plants and fruits and resulting in considerable yield losses. CGMMV is especially concerning as it is seed-borne, easily transmitted through sap, and can remain viable in infected crop debris for long periods. This virus has caused widespread damage to cucurbit crops across Europe and Asia and was first detected in melon fields in California in 2013. The recent detection of these viruses in Florida, alongside other seed-borne pathogens like WCLaV-1 and WCLaV-2 highlights the critical need for effective monitoring and management strategies to protect Florida's cucurbit crops and agricultural industry.

Proposed Measures
In response, FDACS-DPI submitted a proposal to the 2024 Farm Bill titled:

"Robust and Sensitive Detection Methods for Economically Important Seed-Borne Viruses in Watermelon and Other Cucurbits." This proposal emphasizes:

- Developing molecular and serological methods to detect WCLaV-1, WCLaV-2, CGMMV, and WGMMV in seeds.
- Testing growers' seed lots for these viruses with proper sampling methods, requiring at least 10% of the total seed lot for statistically significant results.

The proposal also highlights regulatory challenges in the international seed trade, where seeds often transit multiple countries, increasing the risk of exotic pests entering Florida's crops. Addressing these gaps is critical to safeguard cucurbit seed and fresh market industries against these emerging threats.

Citrus Black Spot
Hector Urbina, Callie Jones, Matthew Meise, Taylor Smith

Following its initial detection in Southwest Florida in 2010, FDACS-DPI has continued to monitor the presence and movement of Citrus Black Spot (CBS), caused by the ascomycete fungus *Phyllosticta* (=Guignardia) *citricarpa* in commercial citrus groves. To this end, in collaboration with the Bureau of Pest Eradication and Control, the mycology unit (H. Urbina, M Meise, T. Smith, C. Jones) has confirmed presence of CBS in field samples, using quantitative PCR assays. Additionally, the unit has tested for presence, and mating type, of conidial spores on asymptomatic tissues from citrus trees adjacent to symptomatic ones, using assays designed and validated at FDACS-DPI.

In 2023, FDACS-DPI adjusted the conditions of the quarantine based on the assessment of the Citrus Black Spot Science Panel, making a more targeted quarantine area following field detection, and giving commercial growers an opportunity to exit quarantine following several growing seasons of surveys in which no CBS is found.

BOTANY

This section identifies plants for the Division of Plant Industry, as well as for other governmental agencies and private individuals. The Botany Section maintains a reference herbarium with over 18,000 dried plant specimens and 1,400 vials of seeds. Responsibilities include training Plant Inspection staff and reviewing permit applications for regulated plant species in addition to daily plant sample identification.

Identifications of botanical samples	2,714
Identifications of plants for other ENPP sections	11,020
Total samples identified	13,734
Herbarium Specimens added	1,937

Herbarium activity	
Number of specimens accessioned	1,937
Number of digitized herbarium specimens on-line	18,803 (1,834 added 2022-2024)
Specimen Collections made by Alex de la Paz	557

Projects

Collaboration with outside entities

The Botany section regularly reviews Florida Department of Transportation proposals for construction to determine impacts on regulated plant species. During 2022-2024, there were five such proposals, and in February 2024, Dr. Patti Anderson was rated as the very best interagency communicator from FDOT's perspective.

The Botany section represented FDACS-DPI at meetings of several organizations important to the plant industry:

- FISC (Florida Invasive Species Council) Partnership
- UF/IFAS Cultivar Release Committee quarterly meetings
- UF/IFAS Interdepartmental Invasive Plants Working Group

As part of a collaborative Faculty Search for University of Florida Department of Environmental Horticulture Committee from April - September 2023, FDACS-DPI Botany staff reviewed the job description, candidate applications and interview questions, and participated in interviews, attended candidate seminars and evaluated candidate performance.

Botany staff also engaged in training FAMU students from the NextGen Program, designed to help build a more equitable and diverse workforce in food, agriculture, natural resources and human sciences. Students learned about regulatory botany procedures, plant collection and identification and tools for plant identification.

COOPERATIVE AGRICULTURAL PEST SURVEY (CAPS)

CAPS Core Surveys

As part of the cooperative agreement, the CAPS team conducted four core surveys: Corn Commodity, Cotton Commodity, Exotic Wood Borer and Bark Beetle Survey, and Nursery Survey. These surveys included 32 insect, mollusk and plant disease pests of state and federal concern. Target pests include, but are not limited to, Giant African Land Snail, Cotton Seed Bug, Old World Bollworm, Spotted Lanternfly and Asian Long Horned Beetle. The CAPS program deployed 1,090 traps and had 2,027 visual survey sites during the reporting period.

Corn Commodity Survey

This program includes trapping and visual survey for 10 insect pests and plant diseases of concern. The pest list included *Autographa gamma* (Silver Y moth), *Diabrotica speciosa* (Cucurbit beetle), *Helicoverpa armigera* (Old world bollworm), *Laodelphax striatellus* (Small brown planthopper), *Magnaporthiopsis maydis* (Late wilt of corn), *Monographella maydis* (Corn tar spot complex), *Peronosclerospora philippinensis* (Philippine downy mildew), *Phyllachora maydis* (Corn tar spot complex), *Sipha maydis* (Hedgehog grain aphid) and *Thaumatotibia leucotreta* (False codling moth).

A total of 295 traps were deployed and 212 visual surveys were conducted. These survey efforts resulted in the collection of 541 samples equaling 24,102 specimens for laboratory screening and identification. The targets were not found. The corn commodity survey resulted in three new first in county records.

Cotton Commodity Survey

This program includes trapping and visual survey for five insect pests and plant diseases of concern. The pest list included *Helicoverpa armigera* (Old world bollworm), *Lissachatina fulica* (Giant African land snail), *Oxycarenus hyalinipennis* (Cotton seed bug), *Spodoptera litura* (Cotton cutworm) and *Thaumatotibia leucotreta* (False codling moth).

A total of 56 traps were deployed and 199 visual surveys were conducted. These survey efforts resulted in the collection of 79 samples equaling 19,723 specimens for laboratory screening and identification. The targets were not found. The cotton commodity survey did not result in any new first in records.

Exotic Wood Borer/Bark Beetle Survey

This program includes trapping and visual survey for nine insect pests of concern. The pest list included *Anoplophora chinensis* (Citrus long horned beetle), *Anoplophora glabripennis* (Asian long horned beetle), *Hylobius abietis* (Large one weevil), *Ips sexdentatus* (Six toothed bark beetle), *Ips typographus* (European spruce bark beetle), *Lycorma delicatula* (Spotted lanternfly), *Platypus quercivorous* (Oak ambrosia beetle), *Thaumetopoea processionea* (Oak processionary moth) and *Tomicus destruens* (Pine shoot beetle). In addition to the nine pests, there were two pest family groups targeted with general lures. The family Cerambycidae and Scolytinae were surveyed for using cross vane panel intercept and Lindgren funnel traps and general lure attractants.

A total of 242 traps were deployed and 645 visual surveys were conducted. These survey efforts resulted in the collection of 2,631 samples equaling 110,146 specimens for laboratory screening and identification. A single specimen of one target, *Ips typographus* (European spruce bark beetle) was found in a trap near Port Canaveral in February 2023. A delimitation survey occurred within a 5-mile radius around the positive trap location. The delimitation included visual survey for host trees and an increase in trap intensity within the delimiting area. A total of nine traps were monitored within the area for approximately 13 months. No other target specimens were collected so the trap numbers were reduced to four in the area. None of the other targets were found. The exotic wood boring/bark beetle survey resulted in 41 new first in county records and one new US Continental record (*Platyscelio pulchricornis*).

Nursery and Retail Plant Survey

This program includes trapping and visual survey for 13 insect pests and plant diseases of concern. The pest list included *Bagrada*

hilaris (Bagrada bug), *Candidatus* Phytoplasma australiense 16SrXII-B (European grapevine yellows), *Conogethes punctiferalis* (Yellow peach moth), *Crocidosema aporema* (Bud borer), *Cydalima perspectalis* (Box tree moth), *Gymnandrosoma aurantianum* (Citrus fruit borer), *Helicoverpa armigera* (Old world bollworm), *Lissachatina fulica* (Giant African land snail), *Lycorma delicatula* (Spotted lanternfly), *Lymantria dispar asiatica* (Asian gypsy moth), *Oxycarenus hyalinipennis* (Cotton Seed Bug), *Spodoptera litura* (Cotton cutworm), *Stenoma catenifer* (Avocado seed moth) and *Thaumatotibia leucotreta* (False codling moth).

A total of 497 traps were deployed and 971 visual surveys were conducted. These survey efforts resulted in the collection of 1,010 samples equaling 20,293 specimens for laboratory screening and identification. The targets were not found. The nursery survey resulted in four new first in county records.

The CAPS program continues to collaborate/participate in outreach events associated with the University of Florida's "Florida First Detector" program, a series of workshops focused on disseminating plant pest information to master gardener and other stakeholder groups.

CAPS Managed Plant Protection Act 7721 Surveys

Tomato Commodity Survey

The CAPS program managed a Plant Protection Act 7721 (PPA 7721) funded program focusing on pests of tomato and other solanaceous crops. Trapping and visual surveys include, but are not limited to, tomato fruit borer, Old World bollworm, potato psyllid and tomato leafminer.

The tomato commodity survey includes trapping and visual survey for eight insect pests of concern. The pest list included *Autographa gamma* (Silver Y moth), *Bactericera cockerelli* (Potato psyllid), *Chrysodeixis chalcites* (Golden twin spot moth), *Helicoverpa armigera* (Old world bollworm), *Neoleucinodes elegantalis* (Tomato fruit borer), *Phthorimea absoluta* (Tomato leafminer), *Spodoptera litura* (Cotton cutworm) and *Thaumatotibia leucotreta* (False codling moth).

A total of 489 traps were deployed. These survey efforts resulted in the collection of 469 samples equaling 19,490 specimens for laboratory screening and identification. The targets were not found. The tomato commodity survey resulted in 29 new first in county records.

Cotton Seed Bug Multi-State Survey

This program is a multi-state effort spearheaded by FDACS-DPI. Initially proposed through the Plant Protection Act 7721 suggestion period, this program is funded through the Cotton Pest line on the federal pest detection budget. Survey dates vary by the participating states, which in the first year included Florida, Georgia, Louisiana, Oklahoma, South Carolina and Virginia. All states entered their own agreement with the USDA with Florida taking on the responsibility of identification services for all participating states.

Florida hired an OPS Environmental Specialist to conduct visual surveys for cotton seed bug (*Oxycarenus hyalinipennis*) in commercial cotton fields throughout the panhandle region of the state. A total of 31 visual survey sites were established and monitored throughout the cotton growing season across Alachua, Citrus, Gadsden, Okaloosa, Orange, Santa Rosa, Sarasota and Walton counties. Eight total samples, all negative for the target, were submitted and identified. FDACS-DPIBureau of Entomology, Nematology and Plant Pathology also received and identified eight additional samples from the other participating states. The target has not been found.

The multi-state effort is continuing for a second year. The Plant Protection Act 7721 suggestion period was used to submit the proposal to include the original six states, and added two more, Alabama and Texas. However, not all states were awarded funding for the second year. The participating states are now Alabama, Florida, Oklahoma and Texas. Data for the second year falls outside the period for this report.

EDRR Survey

The Early Detection Rapid response (EDRR) program is a supplement to the Exotic Wood Boring/Bark Beetle Survey. It is funded through the United States Forest Service and the Florida Budget is managed through the Florida Forest Service. However, the CAPS program facilitates all the field work associated with this program through a network of CAPS personnel and cooperators through the Bureau of Plant and Apiary Inspection. Trapping surveys are designed to target non-native bark and ambrosia beetles in the family Scolytidae. Traps are deployed in the spring to coincide with the leaf flush of host trees. Lindgren funnel traps are baited with general and targeted lures to survey for *Hylurgops palliates*, *Hylurgus ligniperda*, *Orthotomicus erosus*, *Ips sexdentatus*, *Ips typographus*, *Tomicus minor*, *Tomicus piniperda*, *Trypodendron domesticum*, *Xyleborus* and *Xylosandrus* spp. Traps are serviced and their contents collected every two weeks for a total of six collections equal to three months of survey. Historically, all samples were sent to Michigan State University for screening and identification. However, with the Entomologist at MSU being overburdened with samples from around the country, the University of Florida and FDACS-DPI worked together to utilize resources here in Florida to ease the EDRR sample load on the MSU taxonomist. During the 2024 season, FDACS-DPI hired a part time Entomologist, associated part time with the University of Florida, to screen and identify the Florida samples. In the future, this resource may be used to accept EDRR samples from other states with funding through the EDRR program.

For the reporting period, Florida deployed and serviced 63 Lindgren funnel traps resulting in 378 samples. The targets were not found.

MOLECULAR DIAGNOSTICS LABORATORY (MDL)

The Molecular Diagnostics Laboratory (MDL) provides nucleic acid-based identifications for FDACS-DPI. These identifications are conducted using rapid assays, such as probe-based quantitative polymerase chain reactions (qPCRs) and DNA sequence analysis. MDL serves the needs of multiple FDACS-DPI bureaus, including ENPP, Plant and Apiary Inspection, Methods Development and Biological Control, and Citrus Budwood Registration. MDL is in a prime position to study many questions related to plant pest and disease diagnosis in Florida, their pathways into the state and their mitigation (e.g., accurate identification of biological control agents being deployed). MDL wields excellent human and material resources, allowing for this work to commence quickly and effectively.

Samples processed by Molecular Diagnostics Laboratory for the biennial period.

Biennial Quarter	2022 Q1	2022 Q2	2022 Q3	2022 Q4	2023 Q1	2023 Q2	2023 Q3	2023 Q4	Biennial Total
Regulatory Samples	395	376	616	496	359	377	350	297	2,495
Additional Samples (Methods Development, Validation, Calibration)	247	508	234	207	28	193	1,733	250	2,645
TOTALS	**642**	**884**	**850**	**703**	**387**	**570**	**2,083**	**547**	**5,140**

Grant Awards

MDL contributed to one grant funded project during this biennial period.

Grant	Dates	Award Amount
Improving Detection and Diagnostic Capacity for the Peach Root-Knot Nematode, Meloidogyne floridensis, in Florida	September 30, 2023 to September 29, 2024	$93,376.00

HONEY BEE DIAGNOSTICS LABORATORY (HBDL)

The Honey Bee Diagnostics Laboratory (HBDL) is the FDACS Division of Plant Industry's most recent addition to its diagnostic infrastructure. HBDL employs traditional and molecular diagnostic tools to identify bacterial, viral and fungal pathogens as well as arthropod pests. The impetus for the lab was driven by industry demand for state diagnostics capabilities to address the dynamic and ever-developing pest and disease challenges affecting Florida apiculture. Since February 2023, the lab has developed a conceptual framework, triage and logistics system to diagnose samples submitted by a variety of stakeholders including state regulatory officials, commercial beekeepers, inspectors and academicians. Our lab diagnoses regulatory pests such as *Apis mellifera scutellata* (Africanized honey bee), *Apis cerana*, *Tropilaelaps* spp., *Vespa velutina* and pathogens like *Paenibacillus larvae* (American foulbrood). We also offer comprehensive pathology testing of other significant agents affecting honey bee health. Beginning in 2024, we have started accepting direct sample submission from beekeepers in Florida and other states. Due to these developments, our efforts were recognized by the Apiary Inspectors of America (https://apiaryinspectors.org/page-18060) and USDA (National Honey Report Volume XLIV, Number 6). Our efforts have also been requested as contributing members of the AIA Lab Committee and the Prevention of honey bee COlony LOSSes (COLOSS) organization's World Honey Bee Health Task Force. In addition to an expansion in the types of testing services available at the lab, we expanded our testing to include pathology of bumble bees (*Bombus* spp.). Beyond routine testing of submitted samples, the lab engages in cutting-edge research in collaboration with researchers at several leading universities and extends the lab's impact throughout the state through outreach events at state and national conferences and events.

2024					
	Q1	Q2	Q3	Q4	Total
Total Samples Received	269	390	322	71	1,052
Pathology	95	304	203	20	622
Africanized honey bee	174	86	119	51	430

Grant	Funding Agency	Amount Requested	Status
Enhancing Detection and Identification of Regulatory Species Through the Application of Novel eDNA and eRNA Technologies	Animal and Plant Health Inspection Service	$66,890	Awarded
The One Bee Initiative: Developing an integrated, nationwide platform for predicting honey bee health and productivity outcomes	USDA National Institute of Food and Agriculture	$455,000	Revised submission welcomed
Development of a Loop-mediated isothermal AMPlification (LAMP) assay for field testing of deformed wing virus in Bombus impatiens (Eastern Bumble Bee)	USDA National Institute of Food and Agriculture	$300,000	Different agency suggested
Developing a trap and lure system as a tool for detection and control of the yellow-legged hornet, Vespa velutina	Project Apis mellifera	$165,304.00	Revised submission welcomed

Project and Program Narratives

Vespa velutina

In August 2023, a yellow-legged hornet (YLH; *Vespa velutina*) was positively identified by Georgia Department of Agriculture (GDA) from an apiary close to Savannah, Georgia. Shortly afterwards, the first nest was discovered, and 44 nests have since been located and destroyed. This is the first incidence of this species reproducing and building nests in the United States. The impact of this incursion can not be understated and significant harm to the nation's apiary industry will result from an established population. In response, the GDA is coordinating with the United States Department of Agriculture Animal and Plant Health Inspection Service (USDA APHIS) to delineate the extent of *V. velutina*'s invasion and attempt eradication. Given our geographical proximity to this area, FDACS-DPI has acted proactively to limit this pest's impact. HBDL traveled twice to the Savannah region to engage with GDA and affected beekeepers, dissected nests for specimen collection, collected eDNA samples for diagnostic method development, participated in the YLH Task Force and Science Panel of the Incident Command Structure, drafted the state's Pest Alert notification, co-authored and submitted research management proposals and spoken at several events on this topic.

Tropilaelaps spp.

Currently, Tropilaelaps mites are found only in Southeast Asia (India, China, Philippines, etc.) where it co-evolved with its natural hosts the giant Asian honey bees, *Apis dorsata* and *A. laboriosa*; however, there is significant concern its distribution could expand to areas where it is currently absent. This concern has been justified as *T. clareae* and *T. mercedesae* has since been introduced to new areas. The continued significance and likelihood of this mite's spread to other honey bee production areas and the risk such an introduction would pose to the industry has resulted in its inclusion on the notifiable diseases list of the World Organization for Animal Health, Europe's regulatory list of animal disease, and active surveillance in the United States. The American apiary industry has been fortunate this mite has not yet emerged as a management problem which is largely explained by possessing mouthparts that can only penetrate the cuticles of brood and not adult bees. This limitation requires that continually accessible brood populations are available for Tropilaelaps populations to persist. However, mites can survive for up to three days while attached to adults and provides an opportunity for their transportation through global trade to vulnerable populations. Unfortunately, Florida's unique climate allows for year-round brood rearing, has the fourth largest number of productive colonies in the country, and the state is a vibrant hub for international trade including to regions where Tropilaelaps is found. Due to these factors, Florida is vulnerable to the introduction of Tropilaelaps. Consequently, continual surveillance and extensive sampling throughout the state is merited. To facilitate early and accurate detection and identification of this pest, HBDL participated in a hands-on workshop concerning the biology and management of Tropilaelaps from November 4-8, 2024 at Auburn University. Additionally, the HBDL has implemented random testing of apiaries throughout the year to look for this mite. During inspection, inspectors will remove a frame containing brood and perform a "brood bump" wherein the contents of cells on these brood frames are deposited into a collection vessel. These vessels are then sent to the lab for diagnostics.

Africanized honey bee detection in Alabama, Florida and Jamaica

Brittaney Allen, Plant Pest Survey Coordinator for the Alabama Department of Agriculture and Industries, reached out to us in July 2023 to request testing support of suspect samples. As a result, Alabama (https://agi.alabama.gov/plantprotection/2024/06/africanized-honeybees-detected-in-alabama/) reported for the first time Africanized honey bees in the state based on our testing. After testing these samples and confirming A-lineage admixture, we assisted Dr. Mohammadreza Ehsan, Veterinary Diagnostic Specialist at the Thompson Bishop Sparks State Diagnostic Lab, with incorporating our testing methodology into their lab's standard operating procedures.

We continue to coordinate with the Jamaican Ministry of Agriculture and Fisheries (JMAF) in response to their request for

assistance in identifying Africanized bees. We have tentatively scheduled a Study Workshop for February wherein JMAF scientists will learn how we implement genetics testing, brainstorm incorporating our methodologies in their institution, and conducting a national survey.

Varroacide resistance testing
Since the early 1990s, Varroa destructor has emerged as the superseding issue impacting honey bee (*Apis mellifera*) health. Lacking a co-evolutionary history, honey bees are particularly vulnerable to *V. destructor* predation. Various management strategies have been developed for this pest; however, the application of miticides including amitraz has emerged as one of the most effective. Unfortunately, miticide resistance has become more common throughout apiaries worldwide. Amitraz has been regarded as the most convenient and effective varroacide treatment for many years and its use has become the management strategy employed by most sideline and commercial beekeepers. Amitraz resistance was first reported in 1998 and has become more common alongside its widespread use. The HBDL has begun offering amitraz and fluvalinate resistance testing to support beekeeper management diseases.

State of the State: Statewide Honey Bee Pathology Baseline Survey
We have continued our baseline Florida survey of honey bee pathogens across the state by samples submitted by members of the public and our apiary inspectors. This comprehensive assessment will describe the current condition of our apicultural industry and assist in gathering essential data on various health parameters, including disease prevalence, pest infestations and colony strength. Molecular, microscopy and conventional diagnostic testing methods are employed to detect amoebic, bacterial, fungal and viral pathogens. We then share testing results with the beekeeper who submitted the sample. In addition to testing for known pathogens, we routinely identify new organisms that may affect honey bee health.

Bumble Bee (*Bombus impatiens* and *Bombus huntii*)
Bumble bees (*Bombus* spp.) are an important agricultural resource, contributing to pollination of blueberries, tomatoes, squash and a variety of other crops due to physiological traits that make them effective pollinators such as high flower visitation rates, long proboscises and buzz pollination. The crops *Bombus* spp. pollinate frequently overlap temporally and geospatially with other important native pollinator species. This overlap creates opportunities for pathogen spillover between managed and wild populations of bumble bees. High pathogen spillover has been documented in diseases such as *Nosema bombi*, *Crithidia bombi* and *Apicystis bombi*. These pathogen introductions cause declines in populations, foraging and reproduction. Given their economic and ecological importance to Florida, the HBDL has begun pathogen testing for submitted bumble bee samples.

Enhancing Detection and Identification of Regulatory Species Through the Application of Novel eDNA and eRNA Technologies
The primary purpose of this agreement is to enhance current diagnostic capabilities for invasive pests and pathogens of regulatory significance by validating an emerging sampling and sequencing technology, evaluating its application as a routine component of standard diagnostic procedures and employing the methodology to identify traces of microbes and other biota associated with baited swarm traps located at high-risk maritime ports. The potential impacts of introduced exotic pests and pathogens such as *Vespa velutina*, *Tropilaelaps* spp., *Apis cerana*, *Apis mellifera* subsp. capensis and Slow Bee Paralysis virus on the United States apiary industry includes honey bee health issues mediated by enhanced disease transmission leading to colony losses and reduced colony viability. These could result in trade restrictions, competition with native bees and other pollinators, and ecosystem perturbation. The risk of introduction can be moderated by active surveillance if followed by rapid and targeted eradication efforts. The approach investigated during this project should outperform conventional methodologies and allow us to update our view on the current community of pests and diseases actively entering Florida.

Although sampling was nearly completed by July 31st, 2024, due to Hurricane Debby, power to the Division of Plant Industry was lost for several days. Upon return, the freezers were discovered at room temperature, jeopardizing sample integrity. As a result, a no-cost extension was requested and approved. The project will recommence in Spring 2025.

Permitting and Containment
The ENPP Permit Section is comprised of biological scientists and administrative staff who collaborate with other Division personnel from the remaining Bureaus to form a larger Permit Review Team. The Permit Review Team's members engage in routine meetings to discuss current issues surrounding the introduction or movement of regulated articles (organisms and soil) into and within Florida. The Permit Section relies on the taxonomic expertise and regulatory experience of these Division personnel to accurately review both State and Federal permit applications.

The Permit Section operates under Statutory authority to achieve the mission of the Division: "to detect, intercept and control plant and honeybee pests that threaten Florida's native and commercially grown plants and agricultural resources." This authority is broadly referenced in Florida Statute 581.083 and Florida Administrative Code 5B-57.004. Permits issued by the Division can prevent the spread of plant pests and disease, limit the introduction of invasive arthropods, protect critical natural resources, safeguard consumers from unjust business practices, maintain the integrity of research and industry standards and more. At times other State or Federal agency permits or approval may be required to perform a particular activity or move/possess a regulated article. Applicants are encouraged to remain up to date with all pertinent regulations that may impact their interests/needs.

The Permit Section spearheads containment facility inspections throughout the state to verify permit holder compliance and assess risk at locations where FDACS permits are maintained. The Permit Section also works with federal counterparts with the USDA-APHIS-PPQ to not only weigh in on federal permit applications but also perform joint inspections at federally permitted containment facilities. FDACS-DPI maintains oversight for three USDA-approved containment facilities in the State. Permit Section Containment Officers ensure researchers comply with State and Federal guidelines at each of these locations:

- Invertebrate Research and Containment Laboratory (IRCL) – Gainesville
- Plant Pathology Containment Laboratory (PPCL) – Gainesville
- Norman C. Hayslip Biological Control Research and Containment Laboratory (BCRCL) – Fort Pierce

The Permit Section is also periodically tasked with providing comment on Qualitative Pathway-Initiated Pest Risk Assessments (PRAs) for the importation of agricultural commodities into the United States. The Permit Section Chairperson(s) will consult with the Permit Review Team and other Division staff to analyze the implications of proposed pathways and produce a timely response to USDA-APHIS and other relevant plant health stakeholders.

Permit Review Team Members (as of June 2024) and Function

Leroy Whilby, D.P.M, ENPP Bureau Chief
- Paul Skelley, Ph.D., Entomology Section Administrator
  - James Hayden, Ph.D., Arthropod Permit Analyst
  - Vacant, Nematology Section Administrator, Soil Permit Analyst[1]
  - Silvia Vau, Ph.D., Nematology and Soil Permit Analyst
- Patti Anderson, Ph.D., Botany Permit Lead Analyst
  - Alexander de la Paz, Botany Permit Analyst
- Nicole Casuso, D.P.M., Permit Database and Review Workflow Facilitator
  - Rachel Ben-Avraham, Permit Records Management[2]
  - Zachary Zorn, Voucher Records Management[2]
  - Edward Cayia, Arthropod Permit Liaison / Native Plant Harvesting Permit Analyst
  - James Durrell, Native Plant Harvesting Permit Analyst
  - Nicholas Dorman, Commercial Hemp / Native Plant Harvesting Permit Analyst
  - Mileydis Vargas, Commercial Hemp / Native Plant Harvesting Permit Analyst
- John McVay, Ph.D., Plant Pathology Section Administrator
  - Jodi Hansen, Plant Pathology Permit Analyst
- Taylor Smith, Citrus Budwood Permit Analyst
  - Brianna Benitez, Citrus Budwood Permit Analyst

Cheryl Jones, Plant and Apiary Inspection Assistant Bureau Chief, Post-Entry Quarantine & Import Specialist

Permit Section Personnel (as of June 2024) and Primary Section Responsibilities

Nicole Casuso, D.P.M., Biological Scientist IV-SES
- Permit Chair
- Containment Officer Supervisor
- Statewide Permitted Facility Inspector and Risk Analyst
- Permit Database and Review Workflow Facilitator

Edward Cayia, Biological Scientist II
- Containment Officer, IRCL & PPCL
- Permitted Facility Inspector and Risk Analyst – North Florida

James Durrell, Biological Scientist IV
- Containment Officer, BCRCL
- Permitted Facility Inspector and Risk Analyst – East Florida
- Permit Outreach Coordinator

Nicholas Dorman, Biological Scientist III-SES
- Permitted Facility Inspector and Risk Analyst – North Florida
- Hemp Cultivation and Native Plant Harvesting Permit Analyst Supervisor

VACANT, Biological Scientist II[1]
- Permitted Facility Inspector and Risk Analyst – West Florida
- Hemp Cultivation Permit Analyst

Mileydis Vargas, Biological Scientist II
- Permitted Facility Inspector and Risk Analyst – South Florida
- Native Plant Harvesting Permit Analyst

Rachel Ben-Avraham, Administrative Assistant I[3]

Zachary Zorn, Senior Clerk[3]

[1] Position became vacant in March 2024.
[2] These personnel assumed their role in 2023.
[3] Position became vacant in February 2024.

Permit applications processed by the Permit Section for the biennial period July 2022 through June 2024.

Type of Permit	2022 July 1 – Dec 31	2023 Jan 1 – June 30	2023 July 1 – Dec 31	2024 Jan 1 – June 30	TOTAL
FDACS-08208	54	68	80	109	**311**
FDACS-08025	2,407	680	2,250	809	**6,146**
FDACS-08112	223	310	172	268	**973**
FDACS-08450	8	5	8	5	**26**
FDACS-08274	7	5	2	3	**17**
FDACS-08084	2	1	12	0	**15**
PPQ 526	77	103	116	136	**432**
PPQ 588	11	22	9	18	**60**
PPQ 525	8	9	11	8	**36**
PPQ 546	1	3	0	0	**4**
TOTAL	**2,798**	**1,206**	**2,660**	**1,356**	**8,020**

Note: Not all applications result in an active issued permit, some applications may be denied or withdrawn during processing.

Facility inspections performed by Permit Section scientists for the biennial period July 2022 through June 2024.

	2022 July 1 – Dec 31	2023 Jan 1 – June 30	2023 July 1 – Dec 31	2024 Jan 1 – June 30	TOTAL
Facility Inspections	122	120	189	118	**549**

FDACS Permits Issued

FDACS-08208 – Application and Permit to Move Organisms Regulated by the State of Florida

Florida Statute 581.083 requires a special permit and security for any organisms deemed as a potential threat to plant life in this state. The Division is the sole issuing agency for this type of permit. Per Rule Section (1) of Chapter 5B-57.004 F.A.C., "It is unlawful to introduce, multiply, possess, move, or release any arthropod, plant pest, biological control agent, noxious weed, or invasive plant regulated by the Department or the USDA except under permit issued by the Department unless a federal permit, PPQ 526, has been issued by the USDA with concurrence by the Department." In certain instances, the Division may request an FDACS-08208 in addition to the PPQ 526 permit. This may be for species that are of particular concern to Florida and no longer regulated with the USDA or may be requested of entities with intended uses that pose a higher risk to local agriculture, natural areas or consumers. Only individuals may apply for a permit to possess, research, release, commercially produce/resale or display certain regulated organisms for educational purposes. An individual may obtain a permit on behalf of an agency, institution or other larger entity. However, the individual listed as the signatory on the first page of the application is the primary responsible party. Any changes to the permit holder or other listed personnel must be filed with the Division's Permit Section promptly. The FDACS-08208 review process is summarized below:

1. Permit Section intakes and reviews applications for completion and relevance.
2. Taxonomic specialists from the other ENPP Sections are consulted and asked to write a memo supporting approval or denial of the request. Additional permit conditions can be required such as employing specific security measures, devitalization methods, production/cultivation techniques, etc.1
3. Memos are reviewed by the Director's Office and the permit is approved/denied. The Director's Office will indicate the expiration date of the permit. Typically, permits are valid for one to three years depending on numerous risk factors.
4. Final action is taken by the Permit Section to notify the applicant of the decision.
5. Once a permit is issued, Permit Section biological scientists will schedule and perform at least an annual inspection (frequency dependent on risk level) for each FDACS-08208 recipient occurring within their designated area of the state.

[1]At times, taxonomists may indicate if voucher specimens should be requested to confirm the identity of the regulated organism. If vouchers are required by the entomologists, Permit Section administrative staff will send a **Permit Voucher Specimen Request and Identification Invoice** (FDACS-08526) with the final approved permit, any conditions and official letter to the applicant. Fees may be assessed and collected for applicable services

rendered, such as diagnostic fees and special inspections, per Rule 5B-2.010. Curated voucher specimens are stored within the Florida State Collection of Arthropods.

FDACS-08025 – Request for Permit to Harvest Endangered or Commercially Exploited Plant(s) or Plant Part(s)
This permit is referenced in Rule Chapter 5B-40 F.A.C. Preservation of Native Flora of Florida. Any individual seeking to collect plants/plant parts listed as endangered or commercially exploited in the Regulated Plant Index (5B-40.0055 F.A.C.) must obtain written permission from the property owner or legal representative and an annual harvesting permit through the Division. The name and relevant contact information, such as a phone or email address, must be provided to confirm permission has been granted for the proposed harvest activities. Individuals seeking to harvest plants/parts from property they own or manage themselves must still obtain a permit. Permits are issued for the following purposes: commercial sale, propagation, rescue or research. Those applying to harvest plants for propagation much be an active registered nursery in good standing with the Division. The nursery's firm number and status would be confirmed during the application review process. Those applying to perform a rescue or research operation must also include a written plan summarizing how plants will be handled to ensure their survival. Botanical gardens and parks typically apply for these types of harvesting permits. These written plans would be reviewed by the Botany Section.

In 2018, the Division was tasked with reviewing applications for the harvest of Saw Palmetto (*Serenoa repens*) berries. This species was added to the Regulated Plant Index as a commercially exploited when concerns from the public were received and its status voted upon by the Florida Endangered Plant Advisory Committee. The seasonal nature of the crop and the volume of applications that resulted for the subsequent years prompted the need for reform and development of a more efficient intake, review, and permit issuance process. In 2022, an online application process was launched through AgEagle Aerial Systems Inc. to expedite the review process and provide support during the seasonal surge of applications for permits to harvest Native Endangered or Commercially Exploited (NECE) plants. This was an expansion of the existing online system created to manage commercial hemp cultivation licenses (*see next section on FDACS-08112*). The shift to an online system significantly improved the multi-level review process for not only saw palmetto berry applications, but also allowed for the transition of the remaining permits for harvesting other NECE species (issued for research and rescue) to be handled by the Permit Section. Formerly, all permits issued to botanical gardens and research institutions were tracked/managed by the Bureau of Plant and Apiary Inspection. The current review process can be summarized as follows:

1. Permit Section receives application (online or via paper) and performs initial review for completion and appropriateness. Follow-up and clarification obtained as needed.
2. Botany Section reviews species information and any submitted workplans (Serenoa repens-only applications, are reviewed by Permit Section Botany designees).
3. Plant Inspection confirms nursery firm status if needed.
4. Permit Section performs final review and notifies applicant of approval/denial.

FDACS-08112 – Application for License to Cultivate Hemp
After the 2018 Farm Bill separated hemp from the definition of marijuana in the Controlled Substances Act, Senate Bill 1020 marked the beginning of the State Hemp Program within FDACS by paving the way for the Industrial Hemp Pilot Project (Rule Chapter 5B-57.013 F.A.C.) Programs facilitated by the land-grant universities. This bill allowed for the licensed cultivation of specific hemp seeds and cultivars to be processed for retail sale in the form of cannabinoids, personal care products, food intended for animal or human consumption, fiber, etc. The FDACS State Hemp Production Program was approved by the USDA in April 2020. DPI was identified as one of the divisions that would play a key role in overseeing the Florida Hemp Program along with the Division of Agricultural Environmental Services (AES) and Division of Food Safety.

An online platform through AgEagle Aerial Systems Inc. was developed to streamline the application process. This allowed the Division of Licensing to process the required background checks and the Permit Section to review the remaining application sections. The cultivation license application review process includes verification of the designated cultivation site as meeting the appropriate zoning criteria outlined in Rule Chapter 5B-57.014 F.A.C. Permit Section staff regularly field consumer calls regarding the state hemp program and tracking cultivation license harvest activity. The team communicates with not only Division Plant Inspectors who perform the annual audits for licensed hemp operations and nurseries, but also other Department agents who regulate the additional facets of the hemp industry.

FDACS-08450 – Application for Permit to Collect Non-Prohibited Aquatic Plants
Non-prohibited aquatic plants are regulated under Rule Chapter 5B-64 F.A.C. Aquatic Plant Importation, Transportation, Non-Nursery Cultivation, Possession and Collection. This Rule currently separates aquatic plants into non-prohibited and prohibited (Class I and Class II) species. The Class I prohibited aquatic plants were added to the Noxious Weed List (5B-57.007 F.A.C.) in 2020 and may be permitted collection and cultivation for certain purposes under Rule Chapter 5B-57 F.A.C. Class II species may only be grown by registered plant nurseries and sold out of state. The three species, *Hygrophila polysperma* (hygro), *Limnophila sessiliflora* (ambulia) and *Pistia stratiotes* (waterlettuce) were also added to Rule 5B-57 in 2020. However, they remain classified as "Prohibited Aquatic Plants" due to their extremely high invasiveness potential.

To obtain an FDACS-08450 permit, applicants must provide details regarding the species to be collected, quantity of plants being harvested and a written description of the collection site. Per the standards, safeguards and pre-determined conditions presented on page 2 of the application, a written plan is required ensuring the spread of prohibited/noxious aquatic plants will not occur due to the proposed harvest activities. For any non-sovereignty submerged lands, the applicant must also provide evidence of

landowner permission to collect the species and amount listed on the application. For sovereignty submerged lands, a written reasonable assurance that the native aquatic population will be maintained should also be submitted with the permit request. In 2022, records management for this permit was transferred from the Bureau of Plant and Apiary Inspection to the ENPP Permit Section. The review process is multi-level and resembles the FDACS-08025 permit application process.

1. Permit Section receives applications and performs initial review.
2. Botany Section reviews listed taxa, collection site and written plans details.
3. Plant Inspection confirms applicant's nursery status and final permit determination.
4. Permit Section notifies applicant of final decision along with any additional conditions.

FDACS-08274 – Application and Permit to Plant Citrus Pathogen Infected Stock and FDACS-08084 – Application to Introduce Citrus Plants and Citrus Plant Parts

The movement of citrus plants, plant parts and citrus-pathogen infected stock is regulated by the Division's Bureau of Citrus Budwood Registration. The FDACS-08274 and FDACS-08084 are referenced in Rule Chapter 5B-62 F.A.C Citrus Nursery Stock Certification Program along with other citrus production-related required forms. While these two permits are facilitated through another Bureau, the Permit Section tracks and records copies of these requests as they correspond to other federal and state permits. When an individual seeks a PPQ 526 import permit that involves regulated citrus plants, parts, or pathogens, the State has an opportunity to review a proposed draft permit and concur/concur with modifications or deny the request. During this time, an FDACS-08084 would be deemed necessary by the Division's State Plant Regulatory Official (SPRO) representative. Applicants would send their form either directly to the Permit Section or to a Budwood administrator who would forward a copy to the Permit Section for processing. ENPP scientists may be consulted for additional review if the proposed movement of citrus may pose other organismal risks. Once the Budwood administrator approves the request, the Permit Section will route the document to the Director's Office for final approval and any other conditions that may apply.

Federal Permits Reviewed

Under the Federal Plant Protection and Honeybee Acts, the USDA has the regulatory authority to require Plant Protection and Quarantine (PPQ) permits. Each of the following PPQ permits (526, 525, 588 and 546) are reviewed by the Division and records are maintained by the Permit Section. When an application for a PPQ permit is received via their online electronic filing system e-File (formerly e-Permits) and the destination of regulated articles occurs in Florida, the USDA Permit Unit notifies the Division. Upon notification from the USDA, the Division has time to review the submitted application, draft permit and related files, and provide a response to the USDA Permit Unit. The Permit Section facilitates the SPRO review process.

PPQ 526

This permit targets activities related to importation, interstate movement, possession and environmental release of any plant pests, biological control organisms, Federal noxious weeds, parasitic plants and soil (with intent to isolate/culture organisms of concern potentially harbored in the material). The internal review process triggered by the Permit Section is akin to the workflow for the FDACS-08208 permit. The Division has 14 days from the date a notification is received by the e-File system to provide a response to the USDA for this permit type.

1. Permit Section notified by USDA Permit Unit, intakes copy of permit application/files and performs initial review.
2. Permit items routed to respective taxonomic specialist for review and a memo.
3. Memos reviewed by the Director's office and SPRO comments are added to e-File system on behalf of the state.
4. The USDA Permit Unit will issue a formal response to the applicant and the Permit Section will be notified of the final approved/denied permit.

When the movement or proposed activity involving regulated articles warrants the need to use a USDA-approved containment facility, a new containment facility inspection will be arranged by USDA Containment Officers. Permit Section scientists are invited to attend these joint site inspections. Periodic compliance inspections at containment facilities are also scheduled by USDA Containment Officers and may be attended jointly. However, the Division also maintains regulatory authority to perform follow-up inspections at any point during the lifetime of approved permits, which is typically three years.

PPQ 525

Importation of soil from foreign sources and interstate movement of soil can only be done with authorization from APHIS via a PPQ 525 application for permit to receive soil. Permits are often obtained for physical and chemical analyses or remediation. No biological assays or extracts can be performed under a PPQ 525 permit. The review/inspection process is the same as the PPQ 526 workflow. An additional requirement for domestic soil movement within the continental US is a compliance agreement which must be signed by PPQ, FDACS and the permit holder.

PPQ 588

A Controlled Import Permit (CIP) may be obtained by submitting a PPQ 588 application. Certain species of plants may be listed as prohibited/restricted by the USDA. The review/inspection process is the same as the PPQ 526 workflow. CIPs for plants and plant products are usually issued for less than two years and intended for the following purposes as described by the USDA:

- **Experimental:** Scientific testing to collect data and perform analytical processes under controlled conditions.
- **Therapeutic:** Specific scientific processes designed to eliminate, isolate or remove potential plant pests or diseases.

- **Developmental:** Evaluate, monitor or verify plant material for plant health risks and/or the adaptability of plant material for certain uses or environments.

PPQ 546
High risk plants imported from foreign sources and intended for propagation may be subject to certain post entry quarantine requirements. These import procedures and restrictions are listed by plant part and origin in the USDA APHIS Plants for Planting Manual. Unlike the other PPQ permits, this form does not require any containment facility inspection from Permit Section scientists. However, the local District Plant Inspector will be responsible for certifying planting stock is free of pests and diseases. The Permit Section will receive notice of a new PPQ 546 application via the e-File system and trigger the following review process:

1. Permit Section intakes application and notifies Permit Review Team Import Specialist.
2. Import Specialist assigns District Plant Inspector (DPS) for verification of proposed planting site.
3. After initial site inspection, DPS will notify Import Specialist of any recommendations to provide in response to applicant's request for permit.
4. Import Specialist notifies Permit Section of recommendation/modifications.
5. Permit Section includes applicable comments and sends response to USDA in e-File.
6. DPS performs follow-up inspection(s) upon receipt of plant shipment at site up until the end of the quarantine period to allow for safe release of healthy stock.

BRS Permits
Biotechnology Regulatory Services (BRS) is a separate branch of USDA-APHIS that regulates genetically engineered organisms that may pose a risk to plant health. In function, BRS permits are comparable to PPQ permits which regulate the importation, interstate movement and environmental release of select organisms. Applicants must specify the nature of the genetic modifications and provide adequate assurance that work with the listed organism(s) will not jeopardize local agriculture or the environment. Like the PPQ workflows described above, the e-File system will notify Division SPROs within the Director's Office and Permit Section. Oftentimes BRS applications contain confidential-business information (CBI) and have several redacted components inaccessible to Permit Section staff. The reviewing SPRO must reach out to the applicant to clarify any specific details needed to draft an official memo and response to the USDA.

Library
The DPI Library supports the activities of the Division by maintaining a specialized research collection of books, journals, documents and other related materials needed by Division staff to identify and control exotic plant pests. Subjects covered include entomology, nematology, plant pathology, botany, beekeeping, plant quarantine and biological control of pests. The library's collection is organized and maintained by a librarian, who also provides reference services and obtains materials not held in the library via interlibrary loan. The library houses approximately 25,000 bound volumes, including many unique books held in very few, or no other, libraries.

During the biennium, eight new titles were ordered for cataloging, not of all which were formally added to the catalog yet, due to a continuing backlog of items needing to be entered in the University of Florida catalog. A small number of books were also donated to the library.

During this biennial, inter-library Loans (ILLs) remained low as patrons became more comfortable finding materials online, often utilizing digital access to the University of Florida Library but not recording these as loans. Still, some very hard to locate articles and books were found, often thanks to the added ancillary Illead system through the University of Florida. As UF is a world-leading agricultural university, more selective lenders are more likely to take requests from them. Our own ILL system remains essential for fast local loans and to keep our library network connected. We remain a source for universities and scientific agencies all over the world to request copy requests of our unique items.

Throughout these two years, the librarian has been involved in a project to integrate all items from the Plant Pathology library into the main library, which has also required planning on how to shift our library materials to make room for everything. The actual shifting will begin in the next biennial period.

In late 2023, most of our DPI Archive materials were moved from old file cabinets stuck in a closet, to acid-free archival boxes located on easy to access shelves in our back room.

In May 2024, a renovation of the library's furniture and workspaces was undertaken. The librarian's station has been updated from its dated look and has much improved functionality. Two computer search and research stations are now located next to each other instead of just one standing station that made it difficult for some users to access. The back workroom has also been updated and can also be used as a research area for patrons browsing our archive materials, which we prefer to not loan outside of the library.

Bureau of Pest Eradication and Control

The Bureau of Pest Eradication and Control (PE&C) assists in the detection, control and eradication of harmful pests and diseases, particularly citrus. PE&C operates statewide, headquartered in Winter Haven with field stations in Quincy, Avon Park, Immokalee and Vero Beach. The Bureau is tasked with the operation of the Citrus Health Response Program (CHRP), a cooperative effort between industry, USDA and FDACS, implemented to assist growers with the management of citrus diseases and pests to protect Florida agriculture.

The Bureau's mission is carried out through a comprehensive program including statewide multi-pest surveys of all commercial production areas, regulatory inspection and oversight with detailed data recording and mapping of all activities available to inform producers and address their concerns, and to increase public awareness and support the industry. The regulatory component enforces decontamination and quarantine protocols outlined in compliance agreements to ensure compliance with regulation for the protection of Florida's citrus industry.

Emergency programs and special projects are the bureau's responsibilities and upon detection and verification of invasive pests and diseases, they mobilize the necessary equipment, supplies and staff to carry out programs to mitigate damages and control disease spread with the goal of eradication.
Bureau staff averaged 63 employees among all offices of which the largest percentage is commercial grove surveyors and regulatory inspectors. Other components of staff include administration and property personnel.

- Callie Walker, Bureau Chief of Pest Eradication and Control, and Project Manager for Florida's Citrus Health Response Program (CHRP)
- Rusty Noah, Assistant Bureau Chief
- Larry Violett, Assistant Bureau Chief
- Douglas Batson, Jr., Statewide Regulatory Director

ESRI Citrus Information Database (CID)
The Citrus Information Database (CID) is used for all CHRP survey and regulatory activities which enables offices to provide real-time information to the industry as needed. The program has been modified as needed with the creation of new applications that provide current data, maps and other information through dashboards that can be accessed in our offices statewide. For example, when Hurricane Idalia impacted Florida in August of 2023 as a major storm, the bureau's Storm Track allowed for tracking the impact to the state's citrus industry by county, variety, acres, tree counts and number of citrus nurseries. The Division's GIS staff worked to create maps to show the track and wind fields that impacted the citrus industry. The information provided by the applications and the maps created was shared with leadership and field offices. The maps created were provided to growers at various industry meetings.

North Florida Citrus
In 2019, we created a CHRP office in Quincy, Florida, that oversaw approximately 700 acres of planted citrus. As of this reporting, there are approximately 1,012 acres of commercial citrus grove. Over the years, FDACS-DPI administrators and the PE&C Bureau Chief worked with the Georgia Department of Agriculture and the Alabama Department of Agriculture and Industries to create Memorandums of Understanding between the states to facilitate the movement of fresh fruit from the various states to packinghouses, enabling growers to transport their harvest for packing and shipping with conditions to ensure the fruit is disease-free thereby protecting the states.

CITRUS HEALTH RESPONSE PROGRAM
Florida is at high risk for the introduction and establishment of invasive pests and diseases due to its international seaports, cargo and container ports, and the state's subtropical climate conditions. The goal of the Citrus Health Response Program is the protection of the citrus industry, still a strong contributor to the state's economy.

Two of the most challenging and devastating diseases threatening the citrus industry are citrus greening (also known as Huanglongbing or HLB), and citrus black spot (CBS).

Citrus Greening is a very challenging and devastating bacterial disease found in the US in August,2005 in Miami-Dade County. With no cure, it is a major focus of the Citrus Health Response Program. Endemic to Florida, the state is entirely quarantined for it. As yet, no cure has been found for the disease, although intense research continues to try to find answers and develop methods and management recommendations for growers.
Greening management/regulation includes:

- **Compliance Agreements**, registering all citrus growers and surveying groves for the disease thenrecording it in the Citrus Information Database. The database records details of the specific properties, noting infection where found, the

extent and any other observations the inspectors' record. At the end of this reporting period, there were 1,657 grower/ caretaker compliance agreements on file.

- ***Tamarixia* release** at grower request, a bio control for the disease vector, Asian Citrus Psyllid. CHRP offices released 252,983 wasps during this reporting time.
- **Asian citrus psyllid (ACP)surveys** are conducted periodically in areas to count psyllids and advise grove owners of the findings to assist them in grove management and ultimately help to control the spread of the disease. PE&C inspectors scout and map the selected sites, and provide sampling and the tap counts once the sites are planted and underway. Inspectors trained staff from the Division of Fruit and Vegetables to also collect and submit samples as part of our participation in the Citrus Research and Field Trials program. Between 2022 and 2024, 721 surveys were completed in ACP blocks.

Citrus Black Spot (CBS) was first detected in the Immokalee area in March of 2010. CBS is a fungal disease that blemishes fruit, causes early fruit drop that lowers yield and makes the marked fruit unmarketable for fresh distribution. Surveys for CBS are a part of the Multi-pest Survey Program which records all data of finds and observations in the Citrus Information Database. Quarantines are established for CBS and the following seven counties are positive: Collier, Polk, Hendry, Charlotte, Glades, Lee and Polk. Movement of fruit and plant material is regulated and monitored by CHRP inspectors from harvest to transport, and at the processing plants and approved dumpsite facilities for the proper disposal of citrus debris and waste.

The **CBS Technical Working Group**, a membership of officials and representatives of FDACS, USDA-APHIS-PPQ, UF/IFAS and industry met in May 2022, to review and discuss the status of citrus black spot in the state. As a result of the meeting, the DPI CBS Science panel was created and tasked with reviewing survey data and the current research on the pathogen causing CBS for the purpose of revising quarantine criteria and an exit strategy. Division leadership, USDA-APHIS-PPQ national policy leaders and industry leadership had additional meetings on the CBS quarantine reduction and exit strategy developed by the Science Panel to reduce the size of the quarantine and provide economic relief to growers and other industry participants. In May 2023, the CBS quarantine area was reduced by 56.9% thereby releasing 127 groves from quarantine.

Commercial Survey

In a cooperative effort with the USDA, PE&C participates in a multi-pest commercial survey program statewide for the detection and monitoring of citrus greening, Asian citrus psyllids, citrus black spot , citrus canker, citrus variegated chlorosis (CVC), citrus leprosis (CL) and citrus yellow vein clearing virus (CYVCV) with the objective of early detection and to assist in the mitigation of the impact of infection and limit the spread.

During this reporting period, PE&C performed 18,467 citrus surveys on 432,354 acres as follows:

- **Multiple Pest Surveys** to identify and monitor various pests and diseases as described above. During this period, 9,833 surveys were completed on 188,276 acres.

- **Citrus Black Spot Surveys** to detect the disease, collect samples of suspect fruit for testing at the FDACS-DPI lab and advise grove owners of findings. When there is a positive find, quarantines are created. These regulated areas receive special attention by PE&C/CHRP inspectors to closely monitor the harvest and movement of fruit. General area surveys are performed in addition to quarantine and corridor area surveys. During this period, 8,010 surveys were completed on 234,688 acres.

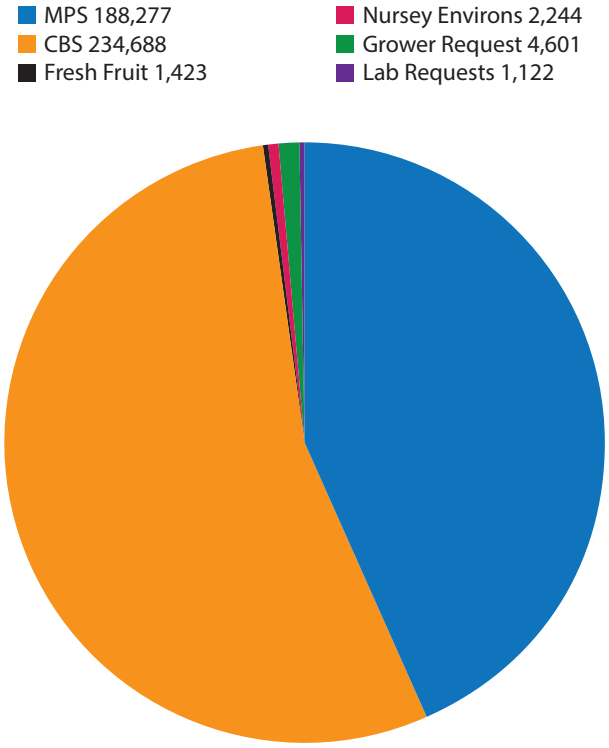
- **Fresh Fruit Surveys** are pre-harvest surveys required by foreign trade partners for the shipment of fresh fruit moving from CBS-quarantined areas and for fruit moving interstate under a Memorandum of Understanding. During this period, 94 surveys were completed on 1,423 acres.

  During the 2022-23 and 2023-24 seasons combined, 24 harvest permits were issued for fresh fruit movement to the European Union, 41 permits were issued for interstate fresh fruit movement under Memoranda of Understanding with the Georgia Department of Agriculture and 33 Leaves and Stems permits were issued for intrastate movement of fresh fruit with leaves and stems attached.

- **Nursery Environs Surveys** are annual inspections of commercial properties within a half mile of commercial citrus nurseries, looking for visible signs of HLB, CBS and citrus canker infection. This reporting period, 302 surveys on2,244 acres were completed.

- **Grower Request Surveys** are performed at the request of growers for the detection of diseases on their properties. Although a pre-harvest survey is not required by EU, growers who desire to send fresh fruit to the EU may request an early survey to be sure their designated fresh fruit blocks are free of infection before they harvest to send to a packinghouse. This reporting period,206 surveys were completed on 4,601 acres.

432,354 SURVEYED ACRES 2022-24 BIENNIAL



ADDITIONAL

Site Verification Surveys are inspections of commercial properties to determine if they remain planted with citrus or have been abandoned or developed. The information is recorded in the Citrus Information Database to keep multiblock statuses up to date. During this reporting period, 13,620 surveys were completed on 304,998 acres.

Pre- and Post-Destruction Surveys are required when growers participate in the Abandoned Grove Initiative to verify the grove trees prior to removal and again after removal in order to issue a compliance agreement they can use to seek a tax assessment reduction through the local property appraisers' offices. During this reporting period, 886 pre-destruction surveys were completed on 10,837 acres and 561 post-destruction surveys were completed on 11,264 acres.

The **Abandoned Grove Initiative**, started in March 2009, offers growers the option to remove abandoned groves which can harbor Asian citrus psyllids and other citrus diseases. By removing their abandoned grove trees, growers can receive an Abandoned Grove Compliance Agreement (AGCA) to present to local property appraisers' offices for a reduction of their property tax assessments. Surveys are performed to ensure regulatory requirements of the initiative are followed and the information in the Citrus Information Database is accurate.

As of the end of this reporting period and since inception of the program, a total of 1,871 AGCAs were issued on properties representing 56,683 acres.

Abandoned Grove Follow Up Surveys are performed annually on properties that were cleared and subsequently issued an Abandoned Grove Compliance Agreement to meet the requirements of the agreement. During this reporting period, 282 surveys were completed representing 4,571 acres.

European Union Quality Assurance (EUQA) Surveys are performed to meet regulatory requirements. Quality assurance surveys for the 2022/23 and 2023/24 harvest seasons were conducted on 10% of acres harvested for export to the European Union. The randomly selected acreage fell primarily within the Vero Beach CHRP area with additional properties in the Immokalee CHRP jurisdiction. Growers were contacted and visited personally to discuss management practices including windbreaks, tree removal and pruning, fungicidal sprays, spray scheduling, decontamination, etc. Total EUQA surveys performed for this report period were 1,572 acres in 56 blocks in St. Lucie and Charlotte counties.

New Plantings and Pushed Acres
New Plantings: Multiblocks created for newly planted properties totaled 889 sites representing 18,421 acres between July 1, 2022 and June 30, 2024.

Pushed Acres: For various reasons including hurricanes and tropical storms, increased disease pressure and economic conditions, 91,791 commercial acres were pushed during this period.

Hurricanes, Storms, and Freezes
The period of time covered in this reporting period was a very difficult one for citrus growers dealing with disease, hurricanes and storms, freezes and economic pressures. Florida took direct hits from Hurricane Ian (a Category 5 storm with 160 MPH winds impacting the southwest coast), followed by Hurricane Nicole in the fall of 2022 that came onshore near Vero Beach then traveled across the center of the state and north through the Big Bend area. In the summer of 2023, Hurricane Idalia made landfall in the Big Bend area as a Category 3 storm and retained hurricane strength as it traveled through North Florida and into Georgia. The winter of 2023 brought freezes devastating to North Florida citrus. Collectively, it all ravaged citrus acreage throughout the state. The estimated loss due to the hurricanes and freeze has been difficult to assess but with the loss of crop and trees it is estimated between $417 million and $675 million.

Public Outreach
Outreach initiatives are a central part of the Division's efforts to keep the public informed and interested in programs involving invasive pests that threaten Florida's agricultural industries and food supply. PE&C contributes to these efforts by participating in grower association meetings both by invitation and by sponsorship of booths, offering presentations and speakers, taking part in statewide industry events, distributing printed materials and videos with the guidance and expertise of the Division's Public Information and Outreach staff.

Bureau of Methods Development and Biological Control

The mission of the bureau of Methods Development and Biological Control is to develop, investigate and implement new ideas, techniques and methods for the prevention, detection, survey, control and eradication of plant pests and diseases threatening Florida's plant and agricultural industries.

METHODS DEVELOPMENT

3D Printing Laboratory

Auto-dissemination of *Beauveria bassiana* for fruit fly population suppression

The purpose of the project, funded through the USDA PPA 7721, was to develop a pest control device that will kill reproductively mature female fruit flies (Tephritidae). Once finalized and approved for use, the device is expected to reduce the quarantine period during eradication efforts, especially for small farms, as it will kill mature female flies to prevent future generations. Current control methods for invasive fruit flies target males using male lures or a protein source to mainly target reproductively immature females. The goal of the project was to develop a passive auto-dissemination device that achieves both male annihilation and horizontal transfer of a microbial insecticide (*Beauveria bassiana*) from males to reproductively mature female fruit flies during courtship. In FY22, we sent several items to our collaborators at the University of Hawaii in Dr. Ikkei Shikano's lab for testing with their fly colonies: 1) plastic sample cards to test fungus survival, 2) plastic tubes with various textures to test which texture would best promote the transfer of the fungus to flies, 3) three different auto-dissemination device prototypes. We also helped field test three different auto-dissemination device prototypes. We updated the auto-dissemination device from what we learned in the field and sent it to Dr. Shikano's lab for testing fly preference. After Dr. Shikano's lab tested the plastic sample cards, it was determined that ABS plastic with epoxy resin promoted the highest germination rates for *Beauveria bassiana*. Our initial plastic tubes we sent to test textures were not functional for testing, and, if needed, surface textures can be added to auto-dissemination devices later. Of the three field-tested auto-dissemination device prototypes, the sphere prototype seemed to attract the highest total number of individual flies. Finally, the updated device based on field observations is cone-shaped to deter flies from congregating on the top of the device where there is no fungus. In FY23, we updated two auto-dissemination device prototypes and sent nine to Hawaii to test fly attraction and entry, weatherproofing, UV protection and servicing. Future research will test the efficacy of this control device on the Caribbean fruit fly under laboratory conditions and develop the device to optimize mass manufacturing capabilities.

Tomato leafminer, *Phtorimeae (Tuta) absoluta*

The tomato leafminer, *Phthorimaea absoluta* (formerly *Tuta absoluta*) (Lepidoptera: Gelechiidae) is a devastating pest of tomato native to and widely distributed throughout South America. *P. absoluta* is currently not present in the US, but the introduction and establishment of this pest poses a serious threat to the US tomato production areas and tomato trade. Larvae feed mainly internally on leaves, stems, shoots and fruit. This pest causes the greatest impact when it feeds on commercial fruit, resulting in reduced growth and decreased fruit yield, and rendering the produced fruit unmarketable. Without adequate control measures, *P. absoluta* has the potential to cause 90-100% production loss. Currently, monitoring for adult *P. absoluta* in the United States is done by using plastic delta traps baited with a male pheromone lure. The trap has a cardboard insert coated with a hot-melt glue that captures the flying moth attracted by the lure. While this widely used trapping method is effective for detection of the moth, removal and identification of trapped specimens can be difficult and labor intensive. The purpose of this project is to develop and test a non-sticky, "dry" trap for monitoring *P. absoluta* as an alternative to the plastic delta trap. This trap design will need to: perform equally or better than the plastic delta trap in retaining collected specimens, be cost effective, be able to function at low pest densities and prevent water from being retained to protect specimens from rot or damage prior to identification. Our goal for the first year is to design and test prototype traps in Florida with tomato pinworm (*Keiferia lycopersicella*) as a surrogate species for the quarantine pest *P. absoluta*. Tomato pinworm is a closely related species endemic in the US, thus testing outside a laboratory with this species is permitted. Prototype traps will also be tested with *P. absoluta* under containment in California. Promising traps will then be tested in field conditions in South Florida targeting tomato pinworm. In 2024, we have established a *K. lycopersicella* lab colony and developed several dry trap prototypes and tested them for waterproofing.

Miscellaneous internal orders

More than 80 traps were produced for the CAPS survey of the tomato psyllid, *Bactericera cockerelli*. Other orders involved customized outreach items, such as air potato beetle garden stakes and insect bookmarks and figures for the 2023 and 2024 Florida State Fair.

Technique Development Laboratory

Black bean bug, *Brachyplatys subaeneus*

The purpose of this project, funded through the USDA PPA 7721, was to assess the spread of the black bean bug (BBB), *Brachyplatys subaeneus* (Westwood), and host range in South Florida, conduct life history studies, evaluate insecticides, assess biological control options, design traps and present findings for outreach. We surveyed the Miami region extensively and found BBB populations present from Haulover Park to Key Biscayne, including a small, isolated instance on the mainland in the Brickell neighborhood. Most populations occur along beach dune habitat, using *Canavalia rosea* (beach bean) and *Galactia volubilis* (Eastern milkpea) as natural, developmental hosts. In dense populations, BBB alter their habitat by feeding on beach bean and making it susceptible to other pests until there is significant beach bean die-back. Of the field plants tested in the laboratory, only beach bean and Eastern milkpea supported the maturity of BBB nymphs. Cultivated legumes, such as green beans, also supported the development of BBB nymphs in the lab. BBB may affect plant diversity or impact agriculture in areas where green beans are grown. Management options for BBB include augmentative biological control and the use of insecticidal sprays, such as pyrethrin (organic) or Malathion (synthetic). Despite the extensive kudzu vine infestations and distribution of beach bean along the Florida coast, established natural enemies would be able to respond to BBB populations in and across natural host plant patches with little human assistance. *Ooencyrtus nezarae* and *Paratelenomus saccharalisis* are promising biological control agents. *Ooencyrtus* sp. has been found in the BBB population and *O. nezarae* has been reported in Miami-Dade County. Both wasps are effective at parasitizing BBB in the laboratory and can easily be collected and propagated from established kudzu bug populations in Florida. In Miami Beach, BBB eggs are often laid away from the host plant, which could allow for the use of biological control in combination with chemical control.

Yellow-legged hornet

The yellow-legged hornet (YLH), *Vespa velutina* (Hymenoptera: Vespidae), is native to Southeast Asia and is a devastating pest to US pollinators and the honey bee, *Apis mellifera*. In August 2023, two live specimens of YLH, were sighted near Savannah, Georgia, approximately 100 miles from the border with Florida. Since this initial sighting, the Georgia Department of Agriculture (GDA) and the South Carolina Department of Agriculture (SCDA) have identified several more in the proximity of Savannah and across the state line into South Carolina. The YLH shows a clear preference for preying on honey bees and demonstrates specialized hunting behaviors, e.g., "hawking," in which foraging hornets hover outside honey bee nests to intercept lone bees leaving or returning to the nest. Where YLH has invaded in Europe, honey yields have decreased by 30% since the hornet's establishment.

Currently, the only method of detection employed in the US entails placing either sugar-based (grape juice and brown sugar mixtures) or protein-based (fish or chicken) traps and triangulating the origin of visiting hornets by tracking their flight pattern. Even when an approximate area can be identified, nests can be difficult to pinpoint as they can occur in treetops, under foliage or in sheltered recesses. Mass-capture traps have been criticized in Europe for catching ecologically important non-target species from multiple taxa. Additionally, mass-capture traps may weaken wasp colonies by targeting and capturing workers, but they do not target the queen or interrupt their production cycle. Targeting queens or interrupting mating will reduce the population not just one colony. We applied to several funding sources in FY23, including Project Aphis m. and USDA PPA 7721, to further the development of a male lure for population suppression, develop new trap designs, search for bio control agents for incorporation into a nest annihilation scheme and travel to European countries with old and new infestations for knowledge transfer. The purpose of these objectives is to observe trapping and other mitigation strategies deployed in places where YLH has invaded, such as France, Spain and Ireland, to develop the best future trapping and mitigation plan if YLH ever spreads to Florida or is reintroduced to the US even if eradication efforts are successful in Georgia and South Carolina. Several potential European collaborators have already been contacted and getting training on current YLH management procedures is highly recommended. If funded, expected accomplishments in one year include selecting the most effective trap, making mass quantities of the trap available in the US, determining trap density and protocols for use and identifying additional monitoring and mitigation plans.

In May of 2024, a collaboration was initiated with Dr. Matthew Siderhurst (USDA-ARS Hilo, Hawaii) to use Harmonic radar technology for tracking individuals back to nests. An improved tracking system is imperative to finding nests, especially when many nests are cryptically located in swampy areas on tree branches hundreds of feet in the air.

Mollusk Research

Horntail Snail Research

Macrochlamys indica (Benson, 1832) (Gastropoda: Ariophantidae) commonly referred to as the horntail snail, is an exotic species of polyphagous snail native to India. It was first found in Florida in June 2020, raising concerns about its pestiferous nature as well as its potential to be a human health risk, as this species has the capacity to carry the deadly, rat lungworm, *Angiostrongylus cantonensis*.

Research on the effects of density was concluded.

Table1: The mean number of eggs per clutch, clutches per snail, and eggs per snail by density with standard deviation and including the N, the total number of snails used over the course of 32 weeks.

Density	N snails	Mean eggs per clutch	Mean clutches per snail	Mean eggs per snail
5	15	18.23±10.06	16.87±9.41	307.6±201.93
10	30	17.40±9.10	11.8±7.89	205.37±133.16
15	45	18.70±9.71	8.36±5.50	156.22±113.09
20	60	21.98±13.07	6.68±3.62	146.92±79.27
25	75	19.66±11.63	5.63±3.66	110.63±70.76
30	90	18.72±12.07	4.30±2.00	80.5±34.52

Data illustrated that over time the mean number of eggs within a clutch did not vary as density increased. The number of clutches laid did decrease as density increased, as did the mean number of eggs laid per snail. Therefore, density does have significant effects on *Macrochlamys indica* fecundity and may play a role in population dynamics. In overcrowded areas, such as nurseries, populations should decrease when a certain threshold density is met.

Research pertaining to the diet of the snail was concluded. Follow up analysis on the oxalate content of the various vegetables used is underway, as methods to determine this vary widely in previous literature. Diets including cabbage, butternut squash and carrot, with the addition of calcium result in the lowest levels of mortality. However, diets including collard greens, kale and spinach, with or without the addition of calcium resulted in mortality within 16 days, despite having the highest level of calcium which is essential for shell growth. Therefore, the level of oxalate may play a critical role in this snail's diet.

Giant African Land Snail Research and Eradication

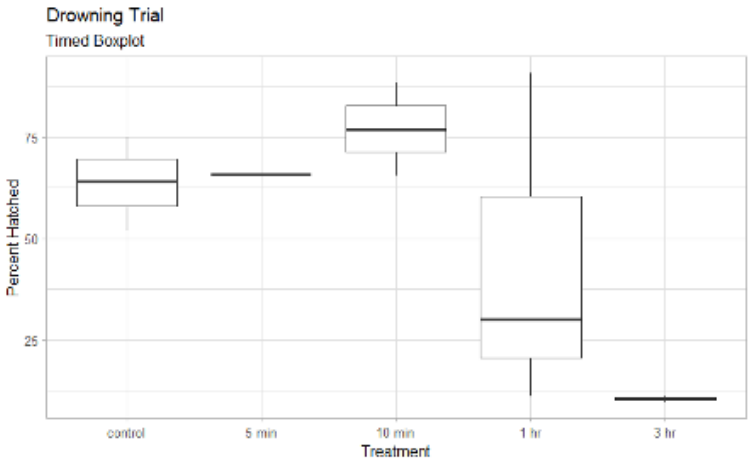
The giant African land snail (GALS), *Lissachatina fulica* (Bowdich, 1822) (Gastropoda: Acatinidae), is one of the most economically damaging snail species in the world and is reported to feed on over 500 species of plants. As such, GALS is a species of high concern for Florida's agriculture. This species has had multiple introductions to Florida. The first of which occurred in 1966, when a child brought specimens from Hawaii, where the snail has become well-established. Since this time, the snail has been eradicated and introduced multiple times. In 2011, GALS was reported in Miami, launching an extensive eradication effort, lasting ten years and costing $1 million. Ultimately, this eradication effort was successful, and the snail was again declared eradicated in 2021. However, since this declaration of eradication, a population of GALS was found in New Port Richey on June 21, 2022, when a master gardener sent photos from a homeowner to a UF-IFAS extension identifier. Unlike their wild-type counterparts previously encountered in Florida residential areas, the snails found in New Port Richey have creamy-white to yellow bodies with some snails also exhibiting lighter-colored shells. This phenotype is the result of breeding practices employed in the trade of this species, indicating that the origin of the New Port Richey population resulted from the pet trade industry. In December of 2022, another population of GALS was reported in Lee County and in July of 2023, in Broward County. All specimens collected from Lee and Broward County match the dark phenotype. Eradication programs continue in all three of these Florida counties.

Preliminary collaboration has begun with a network analyst from the University of Florida Geography Department, to determine if network analysis could be used as a tool to inform surveyors of hotspot areas for invasive pest presence. Using data from interdiction stations and OCEAN, a database for pet trade permitting, it is possible this tool could be put to use towards future GALS invasions especially if there remains a close association between the snail and the pet trade.

The detector dog program is being regularly supplied with shipments of frozen GALS for training purposes. The program visited the GALS facility to train on live specimens, including juveniles and eggs. Preliminary attempts at forming an odor profile of the snail are being provided for the program. The snail is sealed in a large, airtight container for 72 hours to determine if this is a viable method for polymer odor tubes and strips.

In another attempt to assist collaborators studying snail eyestalks, GALS were drowned in a mason jar. After 8 hours the snail survived drowning and was actively moving outside of its shell, likely seeking air pockets. Additionally, it was determined eggs can survive complete submersion for over 3 hours, although the percent hatched is less than 25%.

Figure 1: Eggs were submerged for 5 min, 10 min, 1 hr and 3 hr in comparison to non-submerged eggs as a control. The average percent hatched is represented by the box and whisker plot.



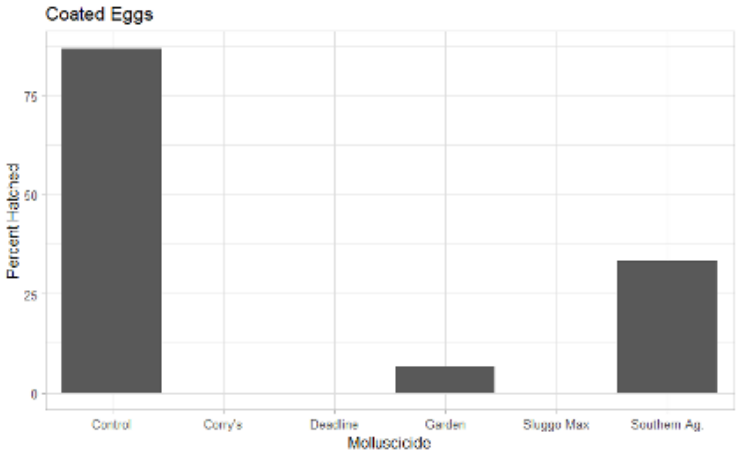
Preliminary studies were undertaken to determine the effects of commonly used molluscicides on GALS eggs.

Table 2: Molluscicide type, the percent of active molluscicide and the calculated label rate for the size of container used in experimentation.

Molluscicide	Molluscicide Content	Amount (g)
Liquid Slug Fest	25% metaldehyde	0.15
Southern Agriculture	3.25% metaldehyde	0.06
Sluggo Maxx	3% iron phosphate	0.09
Deadline	4% metaldehyde	0.11
Corry's	5% sodium ferric	0.11
Garden Safe	1% iron phosphate	0.25

Initially, eggs were coated in the powdered molluscicide (not including Liquid Slug Fest). Only eggs coated in Garden Safe and Southern Agriculture hatched (n=85 per molluscicide).

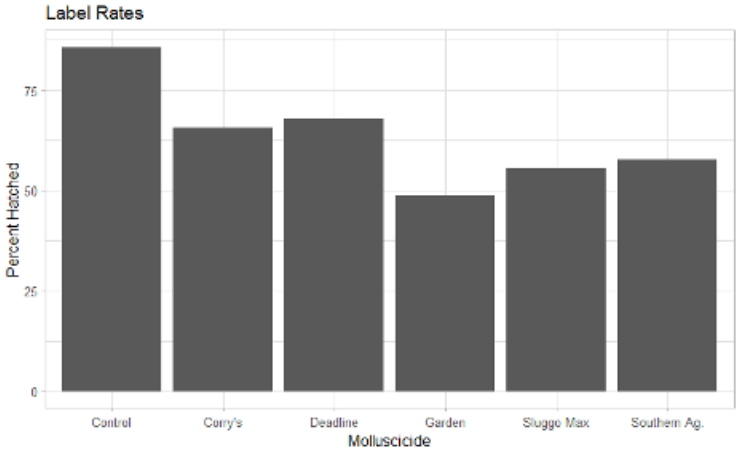
Figure 2. Eggs coated in powdered molluscicide. Molluscicide type on the x-axis and the percent hatched on the y-axis.



This determined the eggshell is permeable, and it is likely the molluscicide would have a negative effect on the egg if directly in contact with the shell. In field conditions only the label rate would be applied to the surface of the soil.

Following, label rates were calculated for the surface area of the experimental container. Eggs were placed 2.5 cm beneath the soil with the molluscicide spread randomly on the surface.

Figure 3. The calculated label rate amount of molluscicide effect on hatchability. The x-axis is the type of molluscicide. The y-axis is the percent of eggs hatched.



Hatch rates from the label rate applications were above 50% in all cases except for Garden Safe (48.8%), which contains 1% iron phosphate, similar to Sluggo Max which contains 3% iron phosphate. Sluggo Max had a hatch rate of 55.5% (n=90 per molluscicide). It was observed that mortality was low despite the molluscicide pellets dissolving into the soil over the time it took the snails to hatch (approximately two weeks). In fact, percent hatch rates were similar, if not higher, when a trial of 1 gram of each molluscicide was used; an amount higher than the label rate. However, twice as much soil was used in trials with 1 gram of soil than the trials with the label rates.

After hatching, the snails were moved to a molluscicide free container and growth rate, survival and time until first oviposition was recorded. This is currently in progress.

A wooden snail hutch was developed that will allow draining and use of less soil. This will aid rearing a larger colony.

A PhD student, Eric Trotman, is performing an island wide survey of GALS on Barbados in August-December 2024, with a focus on the presence of parasitic nematodes and development of traps for the snail. Preliminary traps were tested at DPI on *Bulimulus* spp., using materials such as high contrast tapes, preferred substrates and thermal regulating materials to determine if there would be any change in behavior. This resulted in materials being sent to Mr. Trotman to test in field with high densities of GALS. The preliminary trap is a white trap with high contrast red tape, an aluminum interior and an overall cone-like shape. Within the cone is a bed of newspaper to facilitate burrowing and moisture control. The addition of a fermenting yeast bait will be added to entice the snails.

A different fermenting bait, this one using a rice mold, will also be tested on terrestrial snails as it has proven very effective at attracting aquatic apple snails, *Pomacea canaliculata*. To aid parties interested in managing apple snails, a major pest of rice fields in Louisiana, the bait and its apple snail specific trap will be given to the FWC. The bait and trap were developed by Japanese collaborators, and a manuscript has been submitted for publication.

Biological Control

Brazilian Peppertree

Brazilian peppertree (BP), *Schinus terebinthifolia* Raddi (Anacardiaceae), is one of the worst invasive plants worldwide. Native to Argentina, Brazil, Paraguay and Uruguay, Brazilian peppertree is invasive in the US and is distributed in Florida, Texas, California, Hawaii, Puerto Rico and Virgin Islands. After its introduction to Florida in the 1840s, it has become one of the most aggressive and widespread invasive plants in the state covering over 280,000 hectares. Brazilian peppertree is listed as a noxious weed by the Florida Department of Agriculture and Consumer Services and a category I invasive plant– "species that are altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives" by the Florida Invasive Species Council.

Brazilian peppertree spreads rapidly, tolerates a wide range of environmental conditions and is a prolific seed producer. Seeds have a high germination rate and are fed and dispersed by birds and mammals. Brazilian peppertree also produces allelopathic compounds that can suppress the growth of surrounding vegetation. These characteristics favor BP to outcompete native plants and form monocultural stands. It is a major threat to natural and disturbed areas as well as agricultural and pastural lands.

The conventional methods to control BP such as chemical and mechanical are expensive, labor intensive, non-selective and, in most cases, control is temporary. Moreover, access is difficult in many remote areas infested with BP. Classical biological control provides a low cost, selective and self-sustaining means to reduce BP pressure throughout Florida and other infested regions of the US.

The Brazilian peppertree biological control program involves mass rearing and release of the insect agent *Pseudophilothrips ichini* (Hood) (Thysanoptera: Phlaeothripidae), the Brazillian peppertree feeding thrips, throughout Florida. Field release of this agent was recommended by the Technical Advisory Group for the Biological Control of Weeds (TAG) in August 2016 and approved by USDA-APHIS in May 2019. *Pseudophilothrips ichini* is native to Brazil and is highly specific to Brazilian peppertree. Both adults and larvae of *P. ichini* gregariously feed on flushed leaves and stems of BP, causing death of the apical meristem. The thrips also feed on BP reproductive tissue when few flushing tips are available thereby impacting Brazilian peppertree reproduction. A second insect agent, *Calophya latiforceps* (Burckhardt) (Hemiptera: Calophyidae), the yellow Brazilian pepper tree leaf-galler, was approved for release by USDA-APHIS in May 2019 but its mass rearing has not been achieved yet due to difficulty in colony establishment. The colony under quarantine in the UF-BCRCL collapsed, and new field collections will be required to reestablish the colony. This agent will also be imported into FDACS-DPI Biological Control Rearing Facility in Gainesville, FL for mass rearing when available.

Mass rearing of *P. ichini* and release throughout Florida is being conducted jointly by the Florida Department of Agriculture and Consumer Services–Division of Plant Industry (FDACS-DPI), U.S. Department of Agriculture/Agricultural Research Service–Invasive Plant Research Laboratory (USDA ARS–IPRL), and the University of Florida–Biological Control Research and Containment Lab (BCRCL). The FDACS-DPI Biological Control Rearing Facility reared a total of 1,956,170 *P. ichini* thrips during this reporting period with 877,601 thrips in the FY2022-2023 and 1,078,569 thrips in the FY2023-2024 with expanded and improved rearing operations. A Standard Operating Procedure manual on *P. ichini* mass rearing was developed during this period to assist other states and regions dealing with BP infestation for starting their own *P. ichini* mass rearing program. Of the total thrips reared, 1,172,200 thrips were released throughout Florida and the remainder kept for colony maintenance and research. The initial results suggest the thrips have persisted for at least one generation in 60% of the release sites (Wheeler et al. 2022) with highly variable establishment among the sites.

The establishment of *P. ichini* thrips populations supplemented by the release and establishment of another biocontrol agent, *C. latiforceps* is expected to minimize the spread of BP by reducing its reproductive ability and through seedling herbivory thereby giving the native vegetation opportunities to outcompete the BP. Future program activities, in addition to mass rearing and release of the biological control agents, include examination of the factors affecting agent establishment and efficacy, evaluation of biological control impact on BP populations and examining the possibility and impacts of combining chemical and biological controls to manage BP.

Asian Citrus Psyllid – *Tamarixia radiata*

Background Information

Diaphorina citri Kuwayama (Hemiptera: Liviidae) also known as Asian Citrus Psyllid (ACP), was discovered in Boynton Beach, Florida, in June 1998 by the Florida Department of Agriculture and Consumer Services – Division of Plant Industry (FDACS-DPI). It rapidly spread to all citrus-producing areas in Florida. While ACP feeding causes direct damage to trees, its most harmful role is as a vector of *Candidatus* Liberibacter asiaticus (CLas), the bacterial pathogen responsible for citrus greening disease in Florida.

Tamarixia radiata (Waterston) is a parasitoid that serves as a biological control agent of ACP. The wasp is known to be established in Florida but augmentative releases throughout different locations in Florida, including conventional, low/no spray, organic citrus, abandoned but still flushing citrus and dooryard citrus or *Murraya* sp. are being scheduled on a weekly basis. Releasing parasitoids after a spray provides time for the wasps to attack those psyllid nymphs missed by insecticides or that move into the area in between sprays. If parasitoids maintain low psyllid levels following a spray, the next scheduled spray may be postponed, thereby saving growers money, reducing insecticide resistance, secondary pest outbreaks and environmental damage.

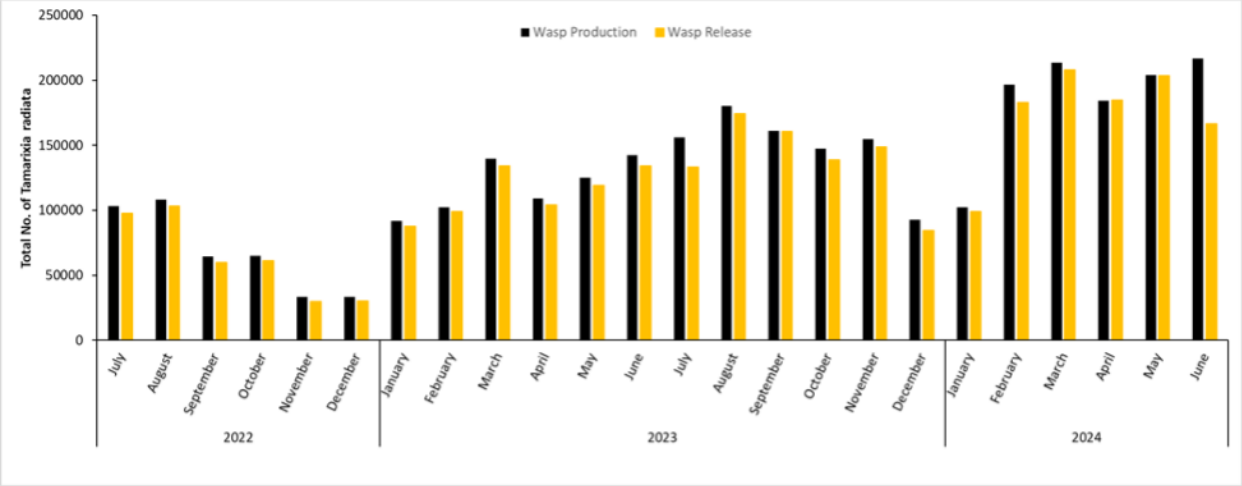
For the past two decades, the Division of Plant Industry has mass produced and released *Tamarixia radiata,* biological control agent of ACP. *Tamarixia radiata* kills psyllid nymphs through parasitism and have significantly reduced the population of *D. citri*. DPI continues rearing *T. radiata* as an effort to control ACP populations in Florida.

The Division of Plant Industry operates two facilities for rearing *T. radiata:* Gainesville and Dundee.

Production Numbers

During this reporting period, we produced a total of 3,127,742 wasps and 2,945,992 (ca. 96%) were released throughout Florida (Figure 4). The remaining wasps were used to maintain the colonies in our mass-rearing.

Figure 4. Mass production and release of Tamarixia radiata, biological control agent of the Asian citrus psyllid.



Considering the ACP mobility between different areas in search of mates and oviposition sites, a dooryard (citrus and citrus related host plants) program has been running. The program's objective is to target those ACP not under any form of insect management, that reproduce freely, acquiring HLB inoculum and disperse into nearby commercial citrus groves. An application for release of parasitoids on a homeowner's dooryard citrus plantings is available on the FDACS website.

Important Notes about the *Tamarixia* program

In late 2021, the USDA determined as of April 1, 2023, the CHRP program would no longer support efforts to mass rear *Tamarixia radiata*. At that point, the biocontrol component of the program began developing plans to address other citrus pests. The Asian citrus psyllid - *Tamarixia radiata* program utilized thousands of orange jasmine (*Murraya paniculata*) in the rearing system because these plants are a good host for the psyllid and are easy to work with; however, other pests of citrus (such as citrus leaf miner) require plants from the genus *Citrus*. We began the process of eliminating the host plants used in the *Tamarixia* program and replacing them with citrus in preparation for the shift on April 1, 2023.

In March 2023, USDA reversed their decision and requested FDACS-DPI continue to produce and release *Tamarixia*. Because the program had made significant and drastic preparations to eliminate the *Tamarixia* project, in June 2023 we initiated a program using the Incident Command System to reestablish the *Tamarixia* rearing program. The aim of this program is to return to rearing and releasing approximately 3,000,000 *Tamarixia* per year.

The Bureau of Methods Development and Biological Control has been steadily increasing its plant stock for rearing Asian citrus psyllids to boost the production of parasitoids. At the start of this reporting period (2022), the program had approximately 4,000 *Murraya* plants suitable for production. To revamp the program, the new team leading the *Tamarixia* program implemented the Incident Command System. As a result, the program now has 12,938 plants, with 54% (~ 7,000) currently utilized in the mass-rearing program (Table 2).

Table 2. Host plant inventory by facility used in the ACP biological control rearing program.

	Common Name	Plant stage	No. of Plants	
			Gainesville	Dundee
Murraya	Orange jasmine	Mother plants	12	0
	Orange jasmine	Seedlings	2,432	3,386
	Orange jasmine	Plant	4,797	1,673
Curry	Curry tree (California)	Seedlings	0	0
	Curry tree (California)	Plant	0	566
Citrus	Valencia	Plant	40	0
	Sour Orange	Plant	0	5
	Meyer lemon	Plant	25	0
	Key lime	Plant	2	0
Grand Total			**7,308**	**5,630**

Air Potato Vine – *Lilioceris egena*

Background Information

Air potato, *Dioscorea bulbifera* L. (Dioscoreaceae), is an invasive, high-climbing vine capable of out-competing native vegetation and displacing other organisms. It forms dense blankets which smother native trees and understory plant species. It is a rapid climber, capable of several inches of daily growth. Air potato is listed as a noxious weed by the Florida Department of Agriculture and a Category I invasive plant by the Florida Invasive Species Council. The vine's primary means of spread is through the production of aerial bulbils, known as "air potatoes".

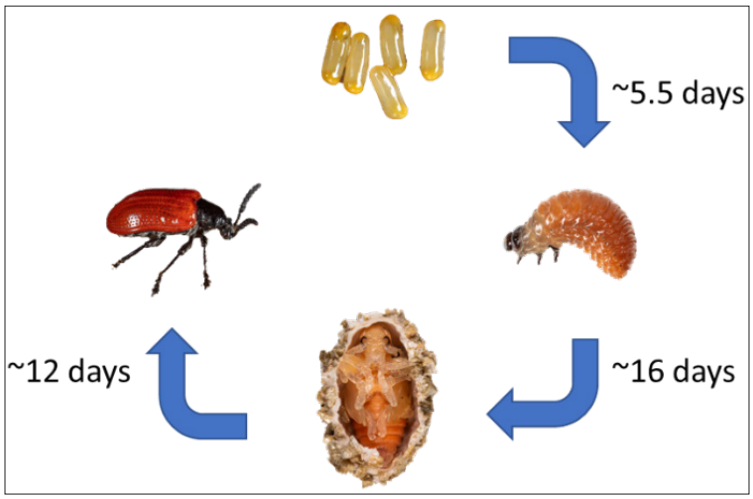
Air potato has a wide native range including much of Asia, tropical Africa and northern Australia. Florida establishment was noted in 1905 once vines began forming thick coverings. Since then, it has spread throughout the southeastern United States. Air potato management has proven to be challenging. Chemical control is costly and requires repeated basal and foliar sprays year after year. It is unclear if chemical control eventually kills the vine as new vines continue to sprout from underground tubers when herbicide treatments cease. Damage or death to non-target plants often occurs during these treatments. Mechanical control of air potato is labor intensive and time consuming. Temporary removal of aboveground tissue is possible when vines and bulbils are hand-collected and destroyed. Eradication, however, requires the removal of underground tubers which can be difficult to access and completely remove.

For over a decade, the air potato biological control program has been a collaborative effort among FDACS-DPI, USDA-ARS, USDA-APHIS and UF/IFAS. During this period, more than one million *Lilioceris cheni* have been released throughout Florida, as well as numerous counties in Alabama, Georgia, Louisiana, Mississippi and Texas. Recently, it was determined that *Lilioceris cheni*, the first air potato biocontrol agent, is officially established in Florida, returning on their own each summer to air potato infestations. Since 2022, FDACS-DPI is focusing on *Lilioceris egena*, a recent federally approved biological control agent that will complement the existing *L. cheni* populations.

Biology of *Lilioceris egena*

Lilioceris egena is approximately 10 mm long and 5 mm wide. The head, thorax, abdomen and legs are black, whereas the wing covers (i.e., elytra) are brownish-orange to bright red. Similar to other Criocerinae species, *L. egena* is elongate, with a rectangular-shaped abdomen, slim thorax and a narrow head with bulging eyes. Eggs are initially whiteish, with an oval shape and approximately 1 mm long with a developmental time of 5.5 ± 0.24 days. As the embryos develop, they become creamy yellow. Larvae have four instars until they reach the pupal stage. Newly hatched larvae are cloudy translucent with black legs, head capsule and thoracic plates. Later instars appear grayish to reddish in color. The larval stage lasts, on average, 16.87 ± 0.23 days. Fully grown larvae exit the bulbil and crawl to the soil where they produce a white oral substance that adheres to soil particles. The oral secretion hardens into a foam-like cocoon called a puparium. The pupa, which are peach-colored and motionless, can be found concealed within the puparium. The pupal stage lasts approximately 12.40 ± 0.19 days. The total developmental time from egg to adult at 25 ± 1 °C is approximately 35.00 ± 0.15 days (Figure 5).

Figure 5. Life cycle and developmental time of Lilioceris egena at 25 ± 1 °C.

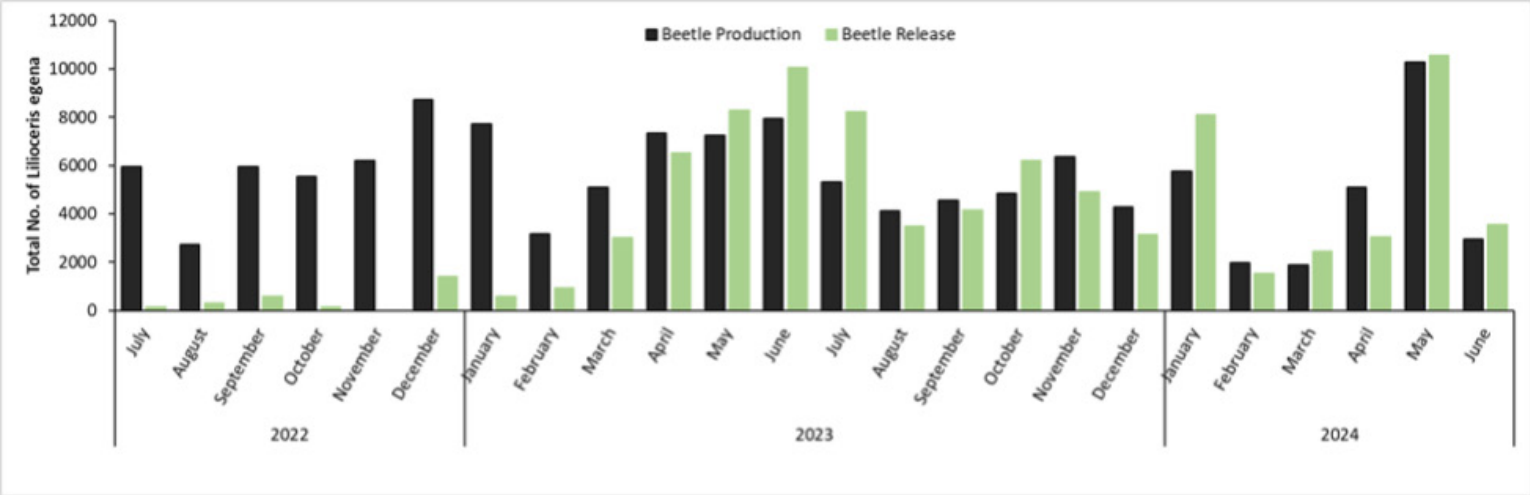


Lilioceris egena females lay eggs on the underside of and within fallen bulbils. Sometimes, although extremely rare, females may oviposit on air potato leaves. Eggs are laid either singly or in clusters of 2 to 14 eggs. A single female can produce an average of 8 eggs/day and more than 900 eggs during her lifespan. Newly hatched larvae are unable to enter the bulbil by themselves, and therefore use tunnels excavated by adults during feeding. Mature larvae (3rd and 4th instars) can exit bulbils and re-enter them by digging extra holes in the bulbils. Several larvae can be found feeding in a single bulbil; the damage can be so severe the interior of the bulbil (i.e., primary meristematic region) appears liquified, which inhibits its ability to sprout. Puparia (singular = puparium) can be found in clusters of 2 to 8 individuals, commonly attached to the underside of the bulbils or loosely in the soil. Adults bore into and mainly feed on bulbils although occasionally they feed on air potato leaves and stems. Females live, on average, 110.7 ± 7.70 days whereas males live slightly longer, 126.2 ± 9.69 days. However, some adults can have a maximum lifespan of 207 days. With water only, recently emerged adults can survive up to 22 days.

Mass Rearing Program

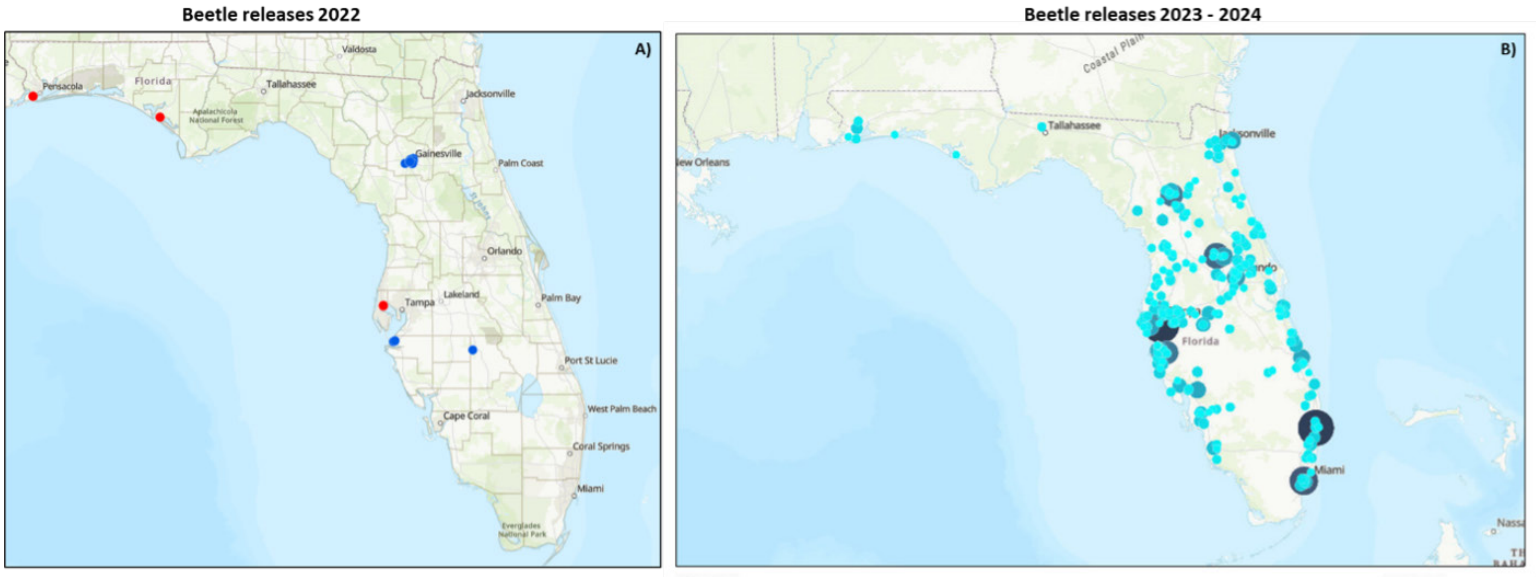
The air potato biological control program involves the mass rearing and release of *L. egena* throughout Florida, research and outreach to the public (Figure 6). From 2022 to 2024, FDACS-DPI produced a total of 131,293 beetles and released 91,473 (ca. 70%). The remaining beetles were used to maintain the colonies in our mass-rearing.

Figure 6. Mass production and release of Lilioceris egena, new biological control agent of the invasive air potato vine.



In 2022-2023, *Lilioceris egena* was released in state and federal parks for research purposes only (Figure 7A). In 2023-2024, FDACS-DPI incorporated Florida residents in its mass-release program. Involving the public has been one of the factors that made the air potato program one of the most successful in the continental US (Figure 7B).

Figure 7. *Lilioceris egena* releases in Florida. A) Beetles released for research purposes only. B) Florida residents were included in the release program.



Cactus Moth

The cactus moth (*Cactoblastis cactorum*) is an invasive pest with the potential to harm sensitive coastal and arid habitats in the U.S. and neighboring Mexico (where cacti are commercially and culturally important). A braconid parasitoid, *Apanteles opuntiarum*, is being considered as a biological control agent for cactus moth mitigation. After a decade of research testing the host range and efficacy of this parasitoid, a petition was submitted to USDA-APHIS in July 2023 to request permission to release it in the US to control the invasive cactus moth. This parasitoid is native to South America, and populations used for research at the division are descended from parasitized moth larvae, collected and imported from Argentina. The division has continued cooperative agreements with the USDA for financial and field support on this project.

Utilizing an artificial diet, the BCRF produced 107,248 and 103,696 cactus moth pupae for FY23 and FY24, respectively. Early instar larvae were provided for parasitization by *A. opuntiarum*, which were held in FDACS-DPI's containment facility. For FY23, 11,208 larvae were provided and in FY24, 14,982 larvae were provided. *A. opuntiarum* wasp production was 36,723 and 25,645 for FY22 and FY23, respectively.

A. opuntiarum has demonstrated itself to be an effective biological control agent for *C. cactorum*. It is also highly host-specific,

parasitizing only *Cactoblastis* species, none of which are native to the U.S. After host range testing was completed in 2022 and the submission of the USDA-APHIS petition in 2023, efforts at FDACS-DPI have shifted to preparing for mass release. Two critical aspects of mass release are optimization of colony rearing and development of a release protocol.

Multiple aspects of mating, such as wasp age, sex ratio and mating time were tested during this time interval. We found using younger wasps for 2-3 days in a 50:50 sex ratio provided optimal mating rates for colony rearing. Parameters of host exposure to the parasitoid, such as host group size, cactus-infestation time, exposure time and exposure within and without cactus, were also investigated. Parasitism rates were higher with longer exposure (3-5 days instead of 1 day) and exposure without the cactus, providing two methods to increase production in a mass-rearing colony. Lastly, mating jars with passive emergence were implemented to reduce the need for manual wasp collection, and returning parasitized cactus moth larvae to artificial diet (after exposure to parasitoids in cactus) was assessed as a method to reduce dependence on fresh cactus.

Release protocol development can be challenging without a release permit. Small-scale caged release trials in the lab have indicated releasing the wasps as pupae improves survival and parasitism rates. Field releases were conducted in spring 2024 in Argentina, within the native range of the cactus moth and parasitoid. Three release containers were tested and all three resulted in 20-30% parasitism of artificially-infested cactus. However, the sheltered tubes proved more reliable in that they resulted in the lowest variation in parasitism rates compared to tubes alone or shelter alone. We also found that wasps will disperse at least 1.4 m to other infested plants. Follow-up experiments will assess long-range dispersal.

Three cactus plots are being maintained to provide the cactus pads needed for rearing and as a safeguard against weather events and pest/disease infestations. In March of 2023 and 2024, additional C. *cactorum* pupae parasitized by *A. opuntiarum* were brought from Argentina to introduce wild genes into the captive colony. An ongoing laboratory study is assessing if additional shipments of the parasitoid from Argentina are needed to maintain an adequately diverse and functionally robust parasitoid population. Monitoring of moths and tagged wild cactus plants at sites on the west, east and panhandle coasts of Florida is ongoing. FDACS-DPI will use this data to develop a baseline impact of *C. cactorum* on cactus and eventually to measure impact of release of the biocontrol agent, *A. opuntiarum*. We are well-prepared for a positive response to our petition and anticipate a response from USDA-APHIS in the next year or two.

Chinese Tallow

Chinese tallow tree, *Triadica sebifera* (L.) Small (*Sapium sebiferum* (L.) Roxb.), is an invasive plant native to parts of East Asia. It is designated as a noxious weed by the state of Florida and is listed as a Category I invasive plant. Tallow trees grow and spread rapidly, outcompeting native plant species and reduce overall biodiversity by creating monocultures. A specialist flea beetle, *Bikasha collaris* (Baly), feeds and reproduces on Chinese tallow in its native range. A colony of *B. collaris* beetles was established at the USDA-ARS-Invasive Plant Research Laboratory quarantine facility in Ft. Lauderdale, Florida in November 2008. Extensive host specificity testing was conducted to determine *B. collaris* is host-specific and cannot complete its life cycle on anything other than Chinese tallow. While the release of *B. collaris* has not yet been formally approved, a recommendation to release *B. collaris* was issued by the Technical Advisory Group for the Biological Control Agents of Weeds (TAG) on August 10, 2016. Additionally, USDA-APHIS published an Environmental Assessment on the potential release of *B. collaris* in 2020. A colony of *B. collaris* was established at FDACS-DPI in Gainesville, FL on March 7, 2022.

A small colony of *B. collaris* along with its host material, *T. sebifera*, was maintained from March 2022 through June 2024 in anticipation of being approved by USDA-APHIS for mass-release. During this time, a standard operating procedure was created for best small-scale colony rearing practices. From July 2022 – December 2022, colony maintenance and propagation remained a priority while we worked to procure a custom-made growth chamber for planned sub-lethal temperature studies as well as an additional quarantine greenhouse. From January 2023 – July 2023, we initiated a small preliminary study to determine the ideal rearing method for mass rearing. Four different rearing methods were tested with maintenance requirements and space consumption taken into consideration. We found the 64oz cage (*B. collaris* eggs added to a small *T. sebifera* root ball in soil, sealed in a darkened, vented 64oz Tupperware container) showed the highest potential for a successful mass-rearing method for *B. collaris* (Figs 1, 2). These results were presented as a poster presentation at the 2023 Annual Florida Entomological Society Meeting in Jupiter, Florida.

Figure 7. Percent emergence of *B. collaris* from four different rearing methods.

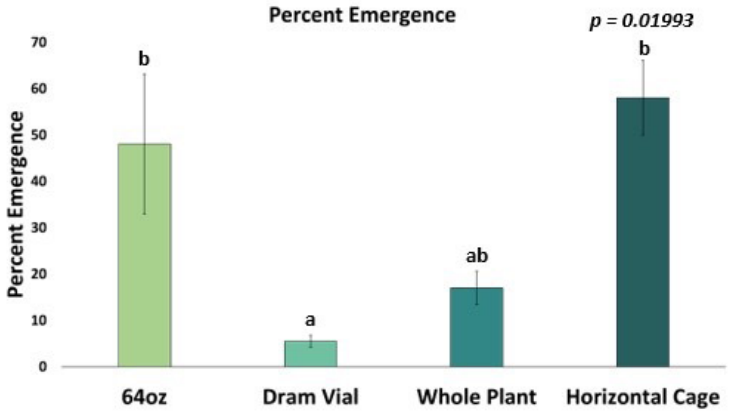
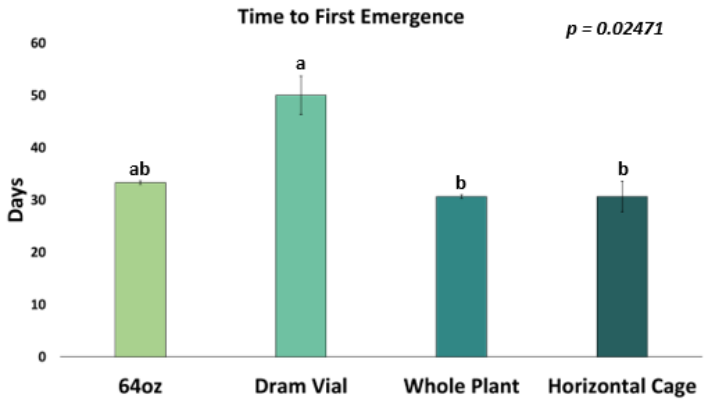


Figure 8. Time to first emergence of *B. collaris* from four different rearing methods.



Many pests were observed hosting on Chinese tallow throughout the length of the rearing program. Several of these pests, namely scale insects (Hemiptera: Coccoidea), had never before been recorded on tallow. From August 2023 – December 2023, we prepared a manuscript in collaboration with scale insect experts from FDACS-DPI's ENPP Bureau which was subsequently submitted to the Florida Entomologist journal. Our manuscript was accepted for publication in June 2024, with a publication date of September 2024 (Lucas et al. 2024).

Great efforts were taken to improve outreach and education regarding Chinese tallow and its potential biological control agents, as there was much misinformation surrounding the topic. We authored and internally published an informational flyer (FDACS-P-02191 04/23) that was distributed to the general public at several outreach events including the Florida State Fair and the Indian River Lagoon Science Festival. Additionally, in October 2023, representatives from the bureau traveled to New Orleans, LA to attend the first ever research symposium on Chinese tallow management efforts. This meeting consisted of numerous researchers and stakeholders from universities and institutions throughout the Southeast who shared valuable information on current Chinese tallow research.

In June of 2024, the decision was made to conclude our Chinese tallow biological control research as the federal approval process to mass-release *B. collaris* appeared to be at an indefinite stand-still. The remaining *B. collaris* colony and *T. sebifera* host plants were officially culled in 2024. A federal permit to import *B. collaris* and another tallow biocontrol agent, *Gadirtha fusca*, from Asia was submitted in November 2023. While that permit has not yet been approved at the time of this writing, we expect an update soon. Upon that permit's approval, and if *B. collaris* receives APHIS approval for release in the future, we are confident we will be able to quickly start a new colony and resume our research efforts.

Methods Fruit Fly Research

The SES Research Scientist position was unfilled from March 19, 2022 to May 31, 2023. Hence, the reported work corresponds to June 2023 – June 2024.

The overarching scope of the different objectives and assays listed below was to determine the capture performance over time of different lures, traps and liquid preservatives for economically-impacting agricultural exotic pests in the USA, (i.e., true fruit flies (Diptera: Tephritidae)). We aimed to achieve the best capture performance over time thus limiting labor replacing lures in traps, while preserving capture efficacy and the integrity of specimens for subsequent taxonomic or genetic work.

Objective 1. Capture efficiency of Liquid Preservatives in Multilure traps. The current preservative used state-wide in Florida traps, Prestone LowTox, was discontinued by the manufacturer. Alternative urge as supplies become scarce. Four different commercial formulations were tested. Preservatives comprised the discontinued Prestone LowTox (used in Florida), as well as other preservatives used in other fruit fly programs, (i.e., California and Texas (Food-grade Propylene glycol, PG), Hawaii (Splash antifreeze), and previously used in Texas and Hawaii (Sierra antifreeze)). Torula yeast/borax and water were used as positive and negative controls, respectively. The assay was developed during four months (spring-summer 2023). The six different treatments were deployed across a surface area of 27.72 km^2 (10.70 mi^2) of the Sterile Medfly Preventive Release Program (PRP) area of Florida in Tampa. The urban and residential Tampa Bay area was used for this assay given the history of Medfly introductions in this area and its inclusion within the Sterile Medfly PRP. Replication and statistical analysis were performed using JMP Pro. Using the Mediterranean fruit fly, *Ceratitis capitata*, as a model system, we determined *Splash* RV & Marine antifreeze (10% ethanol based+3% Propylene glycol, PG), showed no statistical differences in capture performance as the positive control Torula yeast/borax. Lower performance was observed for 10% PG alternatives, (i.e., food-grade PG, Sierra and Prestone Low-Tox antifreezes). We are replicating the study in 2024 to further corroborate these results.

Objective 2. Preservation efficiency (physical + genetic) of specimens in Liquid preservatives. Maintaining the physical and genetic integrity of specimens in liquid-based trap preservatives is crucial to detect and validate identification of cryptic species that may remain undetected in the bulk captures of traps, validate specimens identifications such as new introductions or invasions and determine geographic origin and source populations. Hence, we used the same preservatives tested in Objective 1 to concurrently determine which one offered the best capture and preservation capacity. We used a DNA extraction and gel electrophoresis amplifying a 709 bp fragment of the mitochondrial cytochrome *c* oxidase subunit I (COI) gene region *via* PCR followed by gel electrophoresis, to determine integrity of specimens at two and three weeks in the preservative liquids. In addition, we used a 1-5 score to determine the physical integrity of specimens in the different liquids using external anatomy and internal anatomy to score integrity from perfect (5) to none (0). A positive control was incorporated as well (ethanol 95%). Visual observations were carried out by an expert entomologist at FDACS Fruit Fly Identification Laboratory, Palmetto, FL using a Zeiss Discovery V.12 stereo microscope (Zeiss, Germany). These weeks correspond to the timeframe specimens remain in field traps in the current PRP. Replication and statistical analyses were performed to corroborate results.

Splash and pure PG Food Grade were the best preservatives maintaining physical and genetic integrity of the specimens; the preservative that presented the best ratio Captures:Integrity of *C. capitata* was Splash closely followed by Food-Grade PG. In addition, we incorporated climatic variables to determine their impact in captures, (i.e., temperature, wind direction and gust). All climatic variables were not statistically significant for captures during the release period of the irradiated male fruit flies (7:53 am-11:53 am), but were so across the day (7:53 am-7:53 pm). A steep decline in captures was observed when temperatures reached 31°C (87.8°F).

We are further exploring the impact of climate in captures in 2024 with controlled environment cage bioassays, as these variables can have implication in costs of releases, specially in the extreme heat season in Florida (August with 104° F).

Objective 3. Parallel performance of **chemical attractant mixed formulations versus individual chemical formulations** on captures of Mediterranean fly, *Ceratitis capitata* (Diptera: Tephritidae). There is a pertinent need to find alternative lures to the current 3C lure used in the PRP program, given the 3C can only work as an attractant up to 2 weeks, declining afterwards. With cooperation of the USDA-ARS for the manufacture of alternative single chemical lures, the lure combinations tested were 1) the standard commercial 3C (i.e., combined trimethylamine hydrochloride, putrescine dihydrochloride and ammonium acetate); 2) a novel gel-based USDA-ARS 3-in-1 formulation; 3) a trap combined USDA-ARS gel-based formulation of each individual components (1+1+1), (i.e., 1 (trimethylamine hydrochloride) +1 (putrescine free-base) +1 (ammonium acetate)); 4) the standard commercial 2C (combined putrescine dihydrochloride and ammonium acetate) plus the gel-based USDA-ARS formulation of trimethylamine hydrochloride (2C+1); and 5) a protein Torula yeast/borax solution as a positive control. Distribution of five different lure treatments was done across a surface area of 53.44 km^2 (20.63 mi^2) of the Sterile Medfly PRP area of Florida. Replication and statistic support was done using JMP Pro. Based on a Generalized Linear Mix Model accounting for landscape heterogeneity and host plant as random effects in the context of a highly variable urban and residential landscape, we determined Medfly captures were a direct consequence of lure type, weathering interval and their interaction, while landscape heterogeneity (Grid) affected variance but not mean captures, and host did not affect mean nor variance of captures. The individual USDA-ARS formulated components (1+1+1) outperformed the remaining lure combination tested over time, displaying capture efficacy for up to two months. Given these results, similar assays were then performed in Hawaii and Guatemala. Similar results were obtained, (i.e., individual formulations outperformed 3C mixed formulations).

Objective 4. Weathering of Methyl-eugenol (ML, 6g) and Cue-Lure (CL, 3g) plugs under Florida weather conditions to determine capture capacity over time for Oriental fruit fly (*Bactrocera dorsalis*) and Melon fruit fly (*Zeugodacus cucurbitae*). Lures were weathered for 14-12-10-8 weeks (ME plugs) and 20-18-16-14-12-10 weeks (CL). These were then shipped to Hawaii for field testing, aiming to determine capture efficiency per weathering time against Oriental fruit fly (*Bactrocera dorsalis*) and Melon fruit fly (*Zeugodacus cucurbitae*), respectively. Hawaii's assay was done in cooperation with the USDA. In addition, a second fraction of the lures were sent to USDA-Miami, for Gas Chromatography Flame Ionization Detector (GC-FID) analysis of the chemical content per weathering time. GC-FID was done in cooperation with the USDA-Miami. CL performed as effectively as the control fresh plugs for 20 weeks, while ME did so for 6 weeks. CL matched Hawaii's weathering data from assays performed previously in that region. ME showed lower capture performance after 6 weeks in Florida weathering, while in Hawaii, weathering decline occurred at 12 weeks. GC-FID residual mass chromatography of replicates of these lures, for the same weathering periods, show a steep reduction in ME 6g plugs with most of the initial chemical mass disappearing at week 14 (78% loss) while the 3g CL plugs show 51.3% loss of the initial chemical mass of the chemicals. ME, with the double mass of CL (6g vs. 3 g), dissipates quicker in the field and has a shorter capture performance time-span than CL.

The very different temperature range between Hwaii (constant 17.7C-25.3C through most of the year) and Florida (reaching 40C in August) might account for the observed differences in ME performance.

Objective 5. Efficacy of Wax Bait Stations with Spinosad insect toxicant to determine mortality of Mediterranean Fruit Fly, *C. capitata* and Caribbean Fruit Fly, *Anastrepha suspensa*, over increasing wax bait weathering time (January-August 2024).

Wax bait stations (N=96), a wax-based cardboard matrix composed of paraffin wax + corn syrup and granulated sugar feeding stimulants + a toxicant organic insecticide, Spinosad, used to increase mass trapping performance of Medflies (sourced from Pedro Rendon, USDA-APHIS Guatemala) were weathered at the SIRF facility fence in Sarasota, FL in laboratorial conditions (12x12x12 inch cages) to assess the mortality of fruit flies at 24-48-72 hours over different weathering times spanning from 1 month to eight months. Irradiated male Mediterranean flies were obtained at the SIRF facility in Sarasota, FL whereas pupae of cages were maintained in a rearing chamber at 70% humidity and 25° C (Darwin Chamber model 2186232 lab-g1hd-7x9). The age of the flies was always standardized and synchronized with the wax bait monthly assays, (i.e, 6-days adults for Mediterranean and Caribbean species and 14-days matured adults for Caribbean). Replication of Wax-bait treatments (4 cages) and a No Wax bait cage control (1 cage) were done each month. Flies (N=50 per cage) had water and food ad libitum. Remaining fruit flies after assays completion were cold-euthanized.

One-and-two-month Wax bait weathering times induced the same mortality across assays, with mortality reaching 97-99%. Mortality for both species declined in the subsequent months (month 3 onwards) but remained consistent in the 45%-75% percentile to the end of the assays (8 months total). These results concur with previous reports for wild Mexican fly, *Anastrepha ludens* in Texas and support the inclusion of Wax bait in monitoring protocols for fruit flies.

We fitted a generalized linear mixed model (GLMM) with the glmmTMB R package to determine the effect of the Wax bait treatment on Caribfly mortality across month and age groups (6-and-14 days old). Mortality of 6-days individuals was significantly lower than 14 days-old mortality (p=0.0001). This finding suggests age and/or sex of cohorts might influence behavior. For example, mature females (14-days old) might be more active feeding to produce eggs, thus increasing contact and feeding with the toxic Wax bait station coating. The proportion of females was mostly at a ratio of 3:1 females:males for the first three months and 1:1 in subsequent months except the last month with 92% females. Additional experiments are needed to focus solely on female mortality to substantiate this hypothesis. We are expanding this assay to field cage assays in subsequent workplans and in cooperation with USDA-Miami.

Bureau of Citrus Budwood Registration

Since 1952, the Bureau of Citrus Budwood Registration has provided disease-free, true-to-type budwood to the Florida Citrus Industry. The first step in this process involves the selection of superior parent tree material provided from in-state, domestic out-of-state and international sources and institutions. The budwood from the parent trees is made available to the industry from our Chiefland Budwood Foundation.

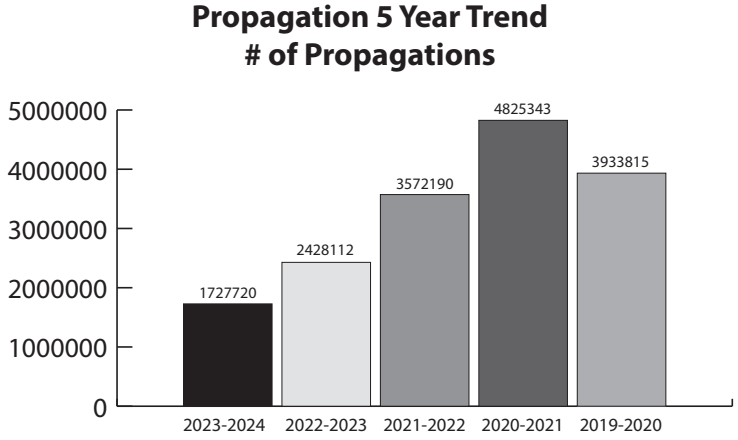
Last biennial period, Budwood introduced a new program, the Accelerated Budwood Initiative (ABI). The purpose of this program is to mass produce budwood of certain selected varieties of high interest to the industry. The agency and the bureau accomplished the mass production of budwood by utilizing a leased nursery facility in Trenton, Florida. Last biennial period, the mass production of the Donaldson tree, a tree discovered at the USDA-Whitmore Farm in Groveland, Florida, became top priority. The Donaldson tree continues to yield strong production despite citrus greening disease. In addition to the Donaldson tree, Parson Brown, Roble, Carney 2 and Carney 3 varieties, also showing HLB tolerance were being mass produced for the industry. By June 30, 2024, the bureau had produced over 10,000 plants and distributed over 15,000 eyes to industry for propagation from this facility alone. During the 2022-2024 biennial period, the bureau had the opportunity to introduce five new varieties, that may be promising to the fight against citrus greening, into the ABI program. Three early maturing variety selections called Lennon Early R20-T30, Lennon Early R21-T36 and Hamlin N14-10 were introduced along with two late maturing variety selections, Sweet Orange UF OLL-DC-3-36 and Sweet Orange UF OLL-DC-3-40. Expedited propagation of each variety is ongoing at the Trenton facility. In 2023, the original five ABI varieties were included in the Citrus Research and Field Trial (CRAFT) Foundation program. This program provides funding to citrus growers to plant field trials and record data in real-world growing conditions utilizing various factors of interest such as different scion/rootstock combinations. CRAFT added the ABI varieties to the Cycle 5 projects to encourage the planting of these promising varieties due to their potential tolerance to HLB. The Florida Department of Citrus's Program for Expedited Propagation (PEP) received $1 million in funding for citrus nurseries to begin propagation of the new ABI varieties. The Bureau distributed Donaldson trees to 23 nurseries to increase plant material for propagation of field trees.

Chiefland

The varieties housed in the Chiefland Foundation greenhouses continue to evolve as new selections are received from breeders and industry. The Bureau worked with UF/IFAS and USDA breeders to identify selections that could be removed from Chiefland to create room for new varieties. In December 2023, greenhouses 1-4 received new roof panels. The trees in the Chiefland Seed Source block now produce sufficient fruit yields which can be utilized within the Bureau's Parent Tree Program. The Bureau plans on installing a seed extraction machine and pole barn to provide seed to citrus nurseries in the future.

Citrus Nursery Inspection

Citrus nursery inspectors conduct inspections on active registered citrus nurseries every 30 days. The team of one manager and five inspectors continue to diligently inspect all certified nursery sites and greenhouse structures to ensure insect pests and diseases are not present. Samples of leaves, stems and fruit are sent to FDACS-DPI's plant pathology lab for testing and identification, as well as soil samples to our nematology lab for certification. Scion and seed source trees are tested annually for pathogens and sent to the Florida Citrus Repository lab in our LaCrosse facility. The nurseries are required to submit bud cutting reports which are used to track propagations in the nursery. The report details where the budwood originated, scion variety, rootstock, number of buds cut and number of trees budded.



Top 15 Variety Clones

	2023-2024	# Budded	2022-2023	# Budded	2021-2022	# Budded
1	Valencia SPB-1-14-19	350,552	Valencia SPB-1-14-19	1,002,045	Valencia SPB-1-14-19	1,628,926
2	Ray Ruby GFT CGIP-103	177,623	Hamlin 1-4-1	114,466	Vernia UF 35-15	293,334
3	Hamlin 1-4-1	126,298	Vernia UF 35-15	112,639	Hamlin 1-4-1	174,304
4	Ruby Red Gft F-58-39	101,483	Meyer Le US	76,047	Valencia F-55-4	122,516
5	WG Man 911-C-37	87,100	Persian Lime SPB-7	65,785	Meyer Le US	119,865
6	Meyer Le US	63,207	Ruby Red Gft F-58-39	62,303	Valencia SPB-1-14-31	108,910
7	Persian Lime SPB-7	57,222	WG Man 911-C-37	61,100	Hamlin 8-1-4	78,090
8	Vernia UF 35-15	47,119	Ray Ruby Gft CGIP-103	54,197	Star Ruby Gft DPI-60	73,604
9	Hamlin UF N13-32	43,570	Star Ruby Gft DPI-60	49,404	Orri CGIP-134	72,150
10	Flame Gft US 1-26-71	42,132	Valencia F-55-4	49,229	Persian Lime SPB-7	61,960
11	Minneola F-60-5	32,252	Orri CGIP-134	41,718	Ray Ruby Gft CGIP-103	49,906
12	Key lime SPB-51-12	29,107	Calamondin DPI-555	36,943	Flame Gft US 1-26-71	45,045
13	WG Man 911-C-03	24,500	Sweet Orange UF OLL8	35,958	WG Man 911-C-37	43,950
14	Sweet Orange UF OLL8	22,469	Key Lime SPB-51-12	31,241	Key Lime SPB-51-12	39,407
15	Cara Cara Navel CGIP-104	21,333	Hamlin UF N13-32	29,006	Calamondin DPI-555	37,389

Top 15 Rootstocks

	2023-2024	# Budded	2022-2023	# Budded	2021-2022	# Budded
1	Sour Orange	278,499	US-942	772,275	US-942	944,047
2	US-897	208,878	Kuharske	378,875	Kuharske	618,206
3	US-942	185,540	X-639	242,129	X-639	498,462
4	Swingle Citrumelo	160,676	Swingle Citrumelo	228,849	Swingle Citrumelo	330,438
5	X-639	126,159	US-812	181,130	Sour Orange	216,988
6	Volkamer Lemon	117,554	Volkamer Lemon	142,668	US-812	181,315
7	US-812	114,632	Sour Orange	107,121	Volkamer Lemon	139,413
8	C-54	44,712	Own Root	81,030	Own Root	129,120
9	Rangpur Lime	36,084	US-897	64,992	C-146	108,193
10	Cleopatra Mandarin	24,350	Rough Lemon	49,101	US-897	85,319
11	Kuharske	22,216	C-54	21,588	Rough Lemon	77,340
12	C-35	21,374	US-802	19,455	C-35	68,574
13	Rough Lemon	21,276	C-35	17,895	US-802	55,625
14	Key Lime	21,174	Kinkoji	17,599	C-54	36,239
15	Own Root	20,680	C. Macrophylla	14,252	Cleopatra Mandarin	18,529

Budwood Sources			
Chiefland Foundation	**2023-2024**	**2022-2023**	**2021-2022**
# of Mother Trees - Scion	2,166	1,839	1,758
# of Varieties in Scion	1,186	1,075	1,019
# of Seed Source Trees - Rootstock	671	668	668
# of Varieties in Seed Source	62	64	64

Nursery Source Tree Blocks	**2023-2024**	**2022-2023**	**2021-2022**
# of Active Nurseries Inspected	62	65	67
# of Scion Trees	2,930	2,993	2,803
# of Seed Source Trees	5,605	8,189	8,930
# of Participants with Scion Blocks	24	26	23
# of Scion Blocks	34	38	37
# of Participants with Seed Source	18	23	21
# of Seed Source Blocks	35	35	32

Budwood Cut (# budeyes)	**2023-2024**	**2022-2023**	**2021-2022**
DPI Chiefland Foundation	96,758	105,046	141,041
DPI Trenton Facility	18,325	N/A	N/A
Nursery Scion Trees	816,980	868,526	1,298,221
Nursery Increase Trees	892,167	1,454,540	2,218,738
Total	1,804,353	2,428,112	3,658,000

Citrus Budwood Bureau Diagnostics and Testing Facilities

LaCrosse

The LaCrosse Quarantine Repository accepts domestic out-of-state and international citrus varieties for entry into the Parent Tree Program (PTP). The budwood received through the PTP undergoes shoot tip graft (STG) therapy which cleans up viruses and viroids present in the plant material. Bio-indexing and molecular testing are conducted on the budwood after the STG therapy is completed to ensure the plant material is disease free. Once the plant material tests clean, trees are propagated from the budwood creating clean disease-free trees. One tree is then selected to be planted in the Chiefland Foundation as the "Mother" tree, serving as the primary source of clean budwood in Florida for that variety. This facility also runs the annual diagnostic pathogen testing for the Chiefland Foundation trees and the in-state citrus nursery source trees. The backup repository is being converted from in-ground trees to potted trees to better utilize space and resources. The backup repository will house the same varieties as the Chiefland Foundation to serve as an additional source of disease-free source material. The backup repository will contain over 1,200 varieties with new selections being added yearly.

Winter Haven

The Winter Haven Citrus Germplasm Laboratory and Greenhouses accepts in-state submissions mainly from UF/IFAS and USDA breeders into the PTP. STG therapy is also utilized in Winter Haven for submissions. The clean disease-free budwood undergoes the same process as in LaCrosse to propagate and select "Mother" trees for the Chiefland Foundation.

Parent Tree Program and Diagnostic Testing Data			
	2023-2024	**2022-2023**	**2021-2022**
# of Domestic out-of-state or international submissions	10	8	0
# of Domestic out-of-state or international releases	1	6	3
# of In-state submissions	52	53	55
# of In-state releases	110	59	61
# of Foundation Scion and Seed Source trees tested	2,188	2,307	2,145
# of Nursery Scion and Seed Source trees tested	3,910	6,630	6,840
# of Total diagnostic assays performed	115,368	58,299	60,596

CITRUS BUDWOOD TECHNICAL ADVISORY COMMITTEE MEMBERS

Producer	Nursery	Regulatory	Research
Peter Chaires	*Phillip Rucks	Justin Ezell	Dr. Kim Bowman
Daniel Scott	Tommy Thayer	Ajia Paolillo	Dr. Fred Gmitter
Joby Sherrod	Nate Jameson	Dr. Susan Halbert	Dr. Matthew Mattia
Ronnie English	Clay Pederson	Callie Walker	Dr. Ozgur Batuman
	Danny Finch		

*Committee Chairman

The Florida Citrus Arboretum

Florida Department of Agriculture and Consumer Services, Division of Plant Industry
Bureau of Citrus Budwood Registration
3027 Lake Alfred Road (Hwy 17), Winter Haven, FL 33881-1438 Phone, (863) 298-3042
Tree list as of June 30,2024

Location	Variety Clone	Rootstock	Date Set
ARB-01-01	Mandarin UFDawn 09-13	US-897	3/31/2016
ARB-01-02	W Murcott CGIP-122	Flying Dragon Trifoliate	3/31/2011
ARB-01-03	US Furr-ST	Kinkoji	3/31/2011
ARB-01-04	Tango CGIP-168	Sour Orange	4/2/2014
ARB-01-05	Kishu SL CGIP-137	Sour Orange	3/31/2011
ARB-01-06	Nasnaran DPI-50-49	Volkamer Lemon	10/1/2023
ARB-01-07	Sun Chu Sha US 9-12-12	US-897	3/30/2020
ARB-01-08			
ARB-01-09	Shekwasha US 9-1-27	Flying Dragon Trifoliate	7/9/2012
ARB-01-10	Batangus US 10-45	Kinkoji	2/26/2020
ARB-01-11			
ARB-01-12	Sunki DPI-50-50	US-897	3/31/2016
ARB-01-13	Man X Org LT UF RBB-7-34	Sour Orange	3/30/2023
ARB-01-14	Mandarin UFGlow 10-02	US-897	4/6/2020
ARB-02-01	Mandarin UFSunrise 09-04	US-897	3/31/2016
ARB-02-02	Mandarin Mid UF 711	Bittersweet	3/3/2020
ARB-02-03	Orri CGIP-134	US-897	4/2/2014
ARB-02-04	Tahoe Gold CGIP-140	Kinkoji	3/31/2011
ARB-02-05	Gold Nugget CGIP-139	Kinkoji	3/31/2011
ARB-02-06	Ugli DPI-74	Volkamer Lemon	2/29/2024
ARB-02-07	Owari Sat F-60-25B	Kinkoji	6/14/2004
ARB-02-08	Silver Hill Sat US	Kinkoji	4/2/2014
ARB-02-09	Shiranui CGIP-132	US-897	5/15/2023
ARB-02-10	Fallglo US 10-61-3	Kinkoji	6/14/2004
ARB-03-01	Lennon Flame Grapefruit	Kinkoji	5/20/2024
ARB-03-02	Isle O Pine Gft US	Cleopatra	4/11/1990
ARB-03-03	Royal Gft US 4-39	Flying Dragon Trifoliate	8/11/2014
ARB-03-04	Ortanique F-24-26	Volkamer Lemon	11/14/2023

Location	Variety Clone	Rootstock	Date Set
ARB-03-05	Sunshine US 10-13	Volkamer Lemon	2/23/2023
ARB-03-06	US Seedless Surprise	Sour Orange	7/14/2021
ARB-03-07	Kimbrough Sat CGIP-108	Sour Orange	12/8/2022
ARB-03-08	Early Pride US 1-62-122	US-897	3/31/2016
ARB-03-09	Seedless Snack UF N40W-6-3	US-897	3/31/2016
ARB-03-10	Jaffa F-53-38	Volkamer Lemon	11/16/2023
ARB-03-11	Minneola F-60-5	Flying Dragon Trifoliate	4/2/2014
ARB-03-12	Fremont US 6-49	Sour Orange	3/30/2023
ARB-03-13	Marathon	Bittersweet	3/28/2022
ARB-03-15	Cipo US 10A-7-10	Goutou	9/11/1997
ARB-04-01	Red Pum UF C2-5-12	US-897	3/31/2016
ARB-04-02	Red Pum UF 5-1-99-5	US-897	3/31/2016
ARB-04-03			
ARB-04-04	Red Shaddock UF 5-4A	Cleopatra	4/11/1990
ARB-04-05	Red Pum UF UKP-1	Swingle	9/1/2020
ARB-04-06	Shambar Gft US 3-63	Bittersweet	4/11/2024
ARB-04-07	Pummelette UF 5-1-99-2	US-897	3/5/2020
ARB-04-08	Early Pride US 1-62-122	US-942	6/12/2019
ARB-04-09	Ponderosa Le DPI-203-8	Volkamer Lemon	3/10/2021
ARB-04-10	Lisbon Le UF 3-9	US-942	5/15/2023
ARB-04-11	Bearss Le SPB-341-95-33	Sour Orange	2/25/2022
ARB-04-12	Nova US 7-41	Kinkoji	4/14/1999
ARB-04-13	Nocatee F-25-26	2247x2075x01-02	3/30/2023
ARB-04-14	Tangor UF 20-16	Kinkoji	4/16/2024
ARB-04-15	Dweet Tangor F-8-18	Bittersweet	3/17/2022
ARB-05-01			
ARB-05-02	Le Pum 748-32	Kinkoji	3/16/2000
ARB-05-03	Hirado Pum 939-10	Kinkoji	5/26/2010
ARB-05-04	Siamese Pink Pum UF 6-12A	Kinkoji	4/14/1999

Location	Variety Clone	Rootstock	Date Set
ARB-05-05	Shambar Gft US3-63	Flying Dragon	4/2/2014
ARB-05-06	Duncan Gft F-57-19	Bittersweet	5/10/2022
ARB-05-07	Citron DPI-201	Kinkoji	5/16/2010
ARB-05-08	Nine Pound Le DPI-201-21	Kinkoji	4/2/2014
ARB-05-09	Volkamer Le US 9-2-19	Cleopatra Mandarin	7/17/1991
ARB-05-10	Harvey Le F-41-39	Sour Orange	6/12/2019
ARB-05-11	Rough Le Estes SPB-602	Sour Orange	5/26/2010
ARB-05-12	Rough Le red UF 8-7	Kinkoji	3/31/2011
ARB-05-13	Bangladesh Le DPI-633-1	Volkamer Lemon	2/25/2020
ARB-05-14	Vangasay Le US 9-1-23	Volkamer Lemon	12/8/2022
ARB-05-15	Daisy CGIP-120	Volkamer Lemon	12/8/2022
ARB-05-16	Wekiwa US 11/7	Volkamer Lemon	10/9/2023
ARB-05-17			
ARB-05-18	King 18-1-1	Volkamer Lemon	2/29/2024
ARB-06-01	US Seedless Surprise	Volkamer Lemon	7/14/2021
ARB-06-02	Jackson Gft DPI-16	US-897	4/2/2014
ARB-06-03	Large Pink Pum US 6-57	Kinkoji	6/14/2004
ARB-06-04	Siamese Swt Pum DPI-203-16	Kinkoji	6/14/2004
ARB-06-05	Flame Gft US 1-26-71	Swingle Citrumelo	6/12/2019
ARB-06-06	Summer Gold Gft UF N2-28	Volkamer Lemon	10/24/2023
ARB-06-07	Ray Ruby Gft CGIP-103	Swingle Citrumelo	4/2/2014
ARB-06-08	Citron DPI-201	Kinkoji	4/17/2009
ARB-06-09	Etrog Citron DPI-223-861	Kinkoji	10/19/2023
ARB-06-10	Garrett B/O DPI-666-1	Volkamer Lemon	6/8/2020
ARB-06-11	Sweet Orange UF OLL-DC-3-36	Kinkoji	5/23/2024
ARB-06-12	Sweet Orange UF OLL-DC-3-40	Kinkoji	5/23/2024
ARB-06-13	Sweet Orange UF OLL8	UFR-04	9/2/2020
ARB-06-14	Variegated Rough Le US 10-6-11	Sour Orange	3/1/2021
ARB-06-15	Variegated Cara Blush 941-4	Volkamer Lemon	5/24/2023
ARB-06-16	Raratonga Swt US	Volkamer Lemon	10/26/2023
ARB-06-17	Orlando F-57-5	Sour Orange	12/8/2022
ARB-06-18	White Tangelo 956-1	Kinkoji	7/9/2012
ARB-07-01	Liang Ping Pum UF 8811	Cleopatra Mandarin	7/17/1991
ARB-07-02	Pummelo UF N7-4	US-897	3/31/2016
ARB-07-03	Pink Pum Hyb US 10-1-1	Cleopatra Mandarin	7/17/1991
ARB-07-04	Pandan Wangi Pum US	Cleopatra Mandarin	7/17/1991
ARB-07-05	Ichang Papeda US 42	Own Root	4/17/2009
ARB-07-06	Ichang Le US 2-33	Kinkoji	3/16/2000
ARB-07-07			
ARB-07-08	Kaffir Lime US	Sour Orange	5/15/2023
ARB-07-09	Meyer Le SPB-199-1-1	Cleopatra Mandarin	7/17/1991
ARB-07-10	Sweet Lime F-10-10	Bittersweet	6/9/2022
ARB-07-11	Sweet Orange UF OLL4	UFR-04	9/2/2020
ARB-07-12	Baboon Le US 2-25	Flying Dragon Trifoliate	3/31/2011
ARB-07-13	Persian Lime SPB-7	Volkamer Lemon	8/31/2022

Location	Variety Clone	Rootstock	Date Set
ARB-07-14	Ugli DPI-74	Kinkoji	4/14/1999
ARB-07-15			
ARB-07-16	Khalily US 2-29	Volkamer Lemon	3/15/2023
ARB-07-17	Salustiana UF	Kinkoji	10/24/2023
ARB-07-18	Dancy F-59-8	Sour Orange	5/19/2021
ARB-08-01	US-942	Volkamer Lemon	3/1/2021
ARB-08-02	Crisafulli Navel 956-6	US-897	4/2/2014
ARB-08-03	Swingle US 22-55	Bittersweet	6/21/2023
ARB-08-04	Madam Vinous UF 13	Cleopatra Mandarin	2/23/2023
ARB-08-05	Flying Dragon US	Own Root (Not budded)	4/17/2009
ARB-08-06	Madam Vinous UF 13	Cleopatra Mandarin	4/11/2024
ARB-08-07	Salad Tree		3/23/2022
ARB-08-08	Salad Tree		5/25/2022
ARB-08-09	Meyer Lemon -	Sour Orange	6/12/2019
ARB-08-10	Sundiatgo US 5-17	Kinkoji	7/9/2012
ARB-08-11	Sanbokan US 7-55	Kinkoji	6/14/2004
ARB-08-12	Hyuganatsu US 12-43	Sun Chu Sha	8/1/1994
ARB-08-13	Everbearing Le US 9-1-64	Kinkoji	7/9/2012
ARB-08-14	Calamandarin F-9-14	Cleopatra Mandarin	4/14/1999
ARB-08-15	Yuzu F-9-15	Kinkoji	7/21/2000
ARB-08-16	Parson Special CGIP-101	Cleopatra	3/16/2000
ARB-08-17	Yosemite Gold CGIP-141	US-897	3/31/2020
ARB-09-01	Itaborai UF 31-6	Flying Dragon Trifoliate	4/16/2003
ARB-09-02	Thompson Navel US 6-6	Bittersweet	4/11/2024
ARB-09-03	Sinton Citrqt US	US-812	6/3/2005
ARB-09-04	Centennial Kum US	2247x2075-01-2	2/27/2020
ARB-09-05	P Tri DPI-50-7	Volkamer Lemon	6/18/2020
ARB-09-06	Willits US 12-8-19	Sour Orange	8/3/2023
ARB-09-07	RS US STR-4-1	Kinkoji	5/20/2024
ARB-09-08			
ARB-09-09			
ARB-09-10	Limeberry DPI-50-43	Own Root	5/26/2010
ARB-09-11			
ARB-09-12	Rangpur Lime F-3-8	Bittersweet	11/3/2022
ARB-09-13	Lakeland Lqt F-55-26	Cleopatra	7/17/1991
ARB-09-14	Lemonquat US 2-31	Volkamer Lemon	4/21/2022
ARB-09-15	Sunquat DPI-50-27	Goutou	6/14/2004
ARB-09-16	Marisol Clem CGIP-124	Sour Orange	8/23/2022
ARB-09-17	Fina Sodea Clem CGIP-123	Sour Orange	8/24/2020
ARB-09-18			
ARB-09-19	Keraji DPI-50-38-3	Own Root	7/9/2012
ARB-09-20	Leo X Te US 5-8-122	Bittersweet	4/11/2024
ARB-10-01	Sunstar US 6-6	Unknown	11/15/2023
ARB-10-02	Pope F-53-28	Volkamer Lemon	11/14/2023
ARB-10-03	Glen Navel F-56-11	US-942	6/12/2019
ARB-10-04	St. Michael 9-4-3	Kinkoji	5/20/2024
ARB-10-05	Finger Lime Giant (possible Sydney Relative)	Own Root (not budded)	6/27/2012
ARB-10-06	UF SunLime	Bittersweet	7/14/2022

Location	Variety Clone	Rootstock	Date Set
ARB-10-07	Finger Lime Giant DPI-205-4	Volkamer Lemon	1/9/2020
ARB-10-08	Finger Lime DPI-205-1	Swingle Citrumelo	1/9/2020
ARB-10-09	UF RedLime	Volkamer Lemon	7/14/2022
ARB-10-10	Microcitrus Papuana US	US-812	5/26/2010
ARB-10-11	Red Finger Lime DPI-50-36	Own Root (not budded)	5/26/2010
ARB-10-12			
ARB-10-13			
ARB-10-14	Key Lime SPB-51-12	Kuharske Citrange	7/9/2012
ARB-10-15	Round Lime DPI-205-2	Cleopatra Mandarin	3/5/2020
ARB-10-16	Key Lime Thornless F-59-39	Kinkoji	8/11/2014
ARB-10-17	Red Lime 899	Sour Orange	5/15/2023
ARB-10-18	Orange Jasmine	Own root (not budded)	10/23/2019
ARB-11-01	Earlygold UF 33-4	Flying Dragon Trifoliate	4/16/2003
ARB-11-02	Valquarius	Unknown	6/12/2019
ARB-11-03	C moi F-11-8W	2247x2075-01-02	12/16/2022
ARB-11-04	Pineapple SL US 10B-6-30	Kinkoji	10/4/1994
ARB-11-05	Raratonga Swt US	Swingle Citrumelo	2/21/1992
ARB-11-06	Valencia SPB 1-14-19	US-942	5/15/2023
ARB-11-07	Florida EV1 UF B7-70	Swingle Citrumelo	6/12/2019
ARB-11-08	Orange Hyb US 6-58-35	Sour Orange	11/14/2023
ARB-11-09	Orange Hyb US 1-89-11	US-942	11/14/2023
ARB-11-10	Willowleaf S/O F-12-9	Own Root (Not budded)	6/13/1980
ARB-11-11	Natsumikan DPI-50-48	Own Root (Not budded)	5/1/1980
ARB-11-12	Kinkoji DPI-50-44	Own Root (Not budded)	5/1/1980
ARB-11-13	Smooth Flat Sev US 2-2-14	Kinkoji	4/14/1999
ARB-11-14	Corniculata DPI-50-35	Own Root (Not budded)	6/9/2010
ARB-12-01	Cadenera US 5-15	Kinkoji	5/26/2010
ARB-12-02	Homosassa 56-10-28	Cleopatra	6/14/2004
ARB-12-03	Mediterranean Swt F-58-38	Smooth Flat Seville	4/14/1999
ARB-12-04	Parson Brown F-56-2	Kinkoji	9/11/1997
ARB-12-05	Enterprise 609-14-17	US-897	7/9/2012
ARB-12-06	Vernia UF 35-15	US-942	6/12/2019
ARB-12-07	Sugar Belle UF LB8-9	Volkamer Lemon	3/22/2023
ARB-12-08	Sugar Belle UF LB8-9	Sour Orange	9/24/2020
ARB-12-09	A+Volk UF 19-11-31	Own Root	3/29/2022
ARB-12-10	Bittersweet SPB-400-40-179N	US-812	6/3/2005
ARB-12-11	Variegated S/O US 18-4	US-812	6/3/2005
ARB-12-12	Sour Orange F-49-7	US-812	7/9/2012
ARB-12-13	Bouquet De Fleurs UF 18	Smooth Flat Seville	4/14/1999
ARB-13-01	Gardner US 6-16	Kinkoji	6/3/2005
ARB-13-02	Wild Turkey Navel 941-11-30-1	Kinkoji	5/26/2010
ARB-13-03	Succari US 7-21	Volkamer Lemon	11/13/2023
ARB-13-04	Roble 502-4-12	Volkamer Lemon	11/2/2022
ARB-13-05	Florida EV2 UF SF14W-65	Volkamer Lemon	11/13/1023
ARB-13-06	Kinkoji DPI-50-44	Volkamer Lemon	8/10/2023
ARB-13-07	Volkamer LE US 9-2-19	Volkamer Lemon	5/15/2023
ARB-13-08	Zhu Luan DPI-50-21	Own Root (Not budded)	4/11/1990
ARB-13-09	Nansho Daidai DPI-50-45	Cleopatra Mandarin	4/6/2020
ARB-13-10	Cleopatra F-1-7	Cleopatra Mandarin	10/31/2022
ARB-14-01	US-401-P1	Sour Orange	5/21/2024
ARB-14-02	Dream Navel DPI-58	Flying Dragon Trifoliate	4/17/2009
ARB-14-03	Navelo 81-16-15	Flying Dragon Trifoliate	5/7/2009
ARB-14-04	Santa Cat Navel US 1	Kinkoji	3/16/2000
ARB-14-05	Hamlin 1-4-1	Kuharske Citrange	5/15/2023
ARB-14-06	Cara Cara Navel CGIP-104	Sour Orange	5/15/2023
ARB-15-01			
ARB-15-02	Marmelos F-16-1	Own Root (Not budded)	6/5/1987
ARB-15-03	Afraegle F-16-2	Own Root (Not Budded)	4/11/1990
ARB-15-04	Gabonensis F-16-3	Own Root (Not budded)	4/11/1990
ARB-15-05	Cara Cara Navel CGIP-104	C-35 Citrange	8/11/2014
ARB-15-06	Donaldson 9-10-28	Kinkoji	2/23/2023
ARB-16-01	C Excelsa US 60-169-502	Sour Orange	5/26/2010
ARB-16-02	Curry Leaf DPI-50-51	Own Root (Not Budded)	9/22/1979
ARB-16-03	Araegle F-16-2	Own Root (Not Budded)	4/11/1990
ARB-17-01	Calamondin DPI-555	Sun Chu Sha Mandarin	3/31/2016
ARB-17-02	Jackfruit	Own Root (Not Budded)	3/1/2019
ARB-17-03	Glycosmis F-17.5-2	Own Root (Not Budded)	3/1/1978
ARB-17-04	Atalantia US 11-8-76	Own Root (Not Budded)	8/20/1992
ARB-17-05	Hesperethusa UF	Own Root (Not Budded)	9/28/1990
ARB-17-06	Hesperethusa UF	Own Root (Not Budded)	9/28/1990
ARB-17-07	Hercules F-17-7S	Own Root (Not Budded)	Unknown
ARB-17-08	Buxifolia DPI-50-40	Own Root (Not Budded)	12/11/2019
ARB-18-01	Eremocitrus US	Smooth Flat Seville	5/8/1992
ARB-18-02	Hercules F-17-7S	Own Root (Not Budded)	9/11/1987
ARB-18-03	Prickly Ash F-17-8	Own Root (Not Budded)	4/20/1988
ARB-18-04	Hamlin UF N13-32	Sour Orange	2/23/2023
ARB-18-05	Joe's Early CGIP-238	Volkamer Lemon	4/11/2024
ARB-18-06	Donaldson 9-10-28	Sour Orange	2/23/2023
ARB-19-01	Thomasville Citrqt US 1-20	Kinkoji	4/25/1997
ARB-19-02	White Finger Lime UF KB-37	Volkamer Lemon	9/9/2022
ARB-19-03	Rohde Red 472-11-4	Kinkoji	6/14/2004
ARB-19-04	Valencia -	Unknown	6/12/2019

Location	Variety Clone	Rootstock	Date Set
ARB-19-05	Valencia -Akcay Sekeri 3-3-10	Unknown	11/18/2020
ARB-19-06	Donaldson 9-10-28	Kinkoji	2/23/2023
ARB-20-01	Pamburus US	Own Root (Not Budded)	8/18/1983
ARB-20-02	Clausena Lansium "Wampee"	Own Root (not budded)	2/16/2023
ARB-20-03	US-2706	Kinkoji	4/16/2024
ARB-20-04	Wild Turkey Navel 941-11-30-1	Kinkoji	3/31/2011
ARB-20-05	Lane Navel CGIP-121	Kinkoji	4/14/1999
ARB-20-06	Bahianinha Navel US 9-6-47	Kinkoji	4/2/2014
ARB-20-07	Donaldson 9-10-28	Volkamer Lemon	2/23/2023
ARB-21-01	Sapote W F-20-7	Own Root (not budded)	5/1/1978
ARB-21-02	Sapote W DPI-204	Own Root (not budded)	8/18/1983
ARB-21-03	Budd B/O DPI-82	Volkamer Lemon	4/27/2021
ARB-21-04	Midknight CGIP-119	US-897	7/9/2012
ARB-21-05	Sanguinelli B/O US 10-5-17	Volkamer Lemon	11/13/2023
ARB-21-06	Tresca US 10C-2-4	Kinkoji	7/9/2012
ARB-21-07			
ARB-OFF-01	Chinotto S/O US 8-41	Sun Chu Sha Mandarin	4/2/2014
ARB-OFF-02	Procimequat UF	Own Root (Not Budded)	3/1/1978
ARB-OFF-03	Procimequat UF	Volkamer Lemon	6/22/2021
ARB-OFF-04			
ARB-OFF-05	Hong Kong Kum US 10-2	Own Root (not budded)	8/11/2014
ARB-OFF-06			

Location	Variety Clone	Rootstock	Date Set
ARB-OFF-07			
ARB-OFF-08			
ARB-OFF-09	Buddhas Hand F-8-7	2247x2075-01-2	3/17/2022
ARB-OFF-10	Seedless Snack UF N40W-6-3	2247x6070-02-2	3/22/2022
ARB-OFF-11	Seedless Snack UF N40W-6-3	2247x6070-02-2	3/22/2022
ARB-OFF-12	Buddhas Hand F-8-7	Sour Orange	3/17/2022
ARB-OFF-13	Limeberry DPI-50-43	Own Root (not budded)	Unknown
ARB-OFF-14	Red Finger Lime DPI-50-36	Own Root (not budded)	8/11/2014
ARB-OFF-15			
ARB-OFF-16	Meiwa Kum F-27-30	Sour Orange	10/18/2023
ARB-OFF-17	Chinotto S/O US 8-41	Sun Chu Sha	7/9/2012
ARB-POT-01	Marumi Kum DPI-50-47	US-942	6/9/2022
ARB-POT-02	Marumi Kum DPI-50-47	Volkamer Lemon	6/9/2022
ARB-POT-03	Procimequat UF	Bittersweet	2/21/2023
ARB-POT-04	Hong Kong Kum US 10-2	Sour Orange 2/21/2023	6/22/2021
ARB-POT-05	Finger Lime DPI-205-1	Bittersweet	6/6/2022
ARB-POT-06	Chinotto S/O US 8-41	Volkamer Lemon	6/22/2021
ARB-POT-07	Eremocitrus x Shekwa	Own Root (not budded)	4/10/2020
ARB-POT-08	RS UF 18-13	Unknown	2/29/2024
ARB-POT-09	Sour Orange UF 18-11	Kinkoji	10/21/2021
ARB-POT-10	Sour Orange UF 18-11	Kinkoji	10/21/2021
ARB-POT-11	Lemonquat US 2-31	Cleopatra Mandarin	3/31/2023
ARB-POT-12	Calamondin DPI-555	Volkamer Lemon	3/31/2023

Budwood Availability and Propagations by Variety Clone (2023-2024)

Some varieties are unavailable as they are not yet released; others may only be available to nurseries with license agreements.

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
A+FD UF 19-11-10			1	®, CBI	1,512
A+Volk UF 19-11-31			1	®, CBI	
Abers S/O US 8-35	1	8	1		
Acid Fruit Hyb UF C4-15-8			1	®, CBI	4
Acid Fruit Hyb UF C4-3-35			1	®, CBI	
Acid Fruit Hyb UF C4-5-20			1	®, CBI	
Acid Fruit Hyb UF C4-8-40			1	®, CBI	2
Akcay Sekeri 3-3-10			1		
Ambersweet US 10-14-65	1	1			
Ambersweet US 10-5-65	1	1	3		
Ann Sat 911	1	1			
Atalantia US 11-8-76			1		
Atwood Navel CGIP-201			2		
Australian Finger Lime 697 CGIP-233	1	1	3		75
Avana 4N CGIP-189			2		
Baboon Le US 2-25			1		
Bahia 48			1	®, CBI	
Bahianinha Navel US 9-6-47			3		
Bangladesh Le DPI-633-1			1		
Barao UF 135			1	®	
Bearss Le SPB-341-95-33	6	13	7		16,924
Benton UF	1	4	1		
Bergamot US 9-12-15			1		34
Berna UF			1	®	
Bigaradier Apepu S/O US 13-39			1		
Bingo UF 7-6-27	7	28	5	®, Fast	3
Bittersweet F-21-14	1	5			
Bloomsweet Gft DPI-50-38-1			1		
Blue Lake Orange 956-2			1	®	
Bouquet De Fleurs UF 18			1		
Bower Mandarin			1	®, CBI	
Brazilian Le US 3-18			1		
Brown Select Sat 61-0-1	4	5	2		1,574
Budd B/O DPI-82	1	1	3		2,681
Buddhas Hand F-8-7	3	4	1		609
Burgundy Gft 416-7-1			1		
C moi F-11-8W			1		
C neoaurantium DPI-50-46			1		
C latipes DPI-203-19-b	1	4	1	®	
C macrophylla DPI-226			3		4
C tachibana US 1-67			1		
C-146 UF	2	47	2		
C-22 Bitters UF	2	61	2		
C5282 CGIP-153			2	®	
C-54 Carpenter UF	3	230	2		

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
C-57 Furr UF	2	140	2	®	
Cadenera US 5-15			1		
Calamandarin F-9-14			1		
Calamondin DPI-555	6	31	2		13,519
Callie Orange DPI-203-17	1	5			
Cambria Navel CGIP-179	1	3	2		
Cameron Le US			1		
Cara Cara Navel CGIP-104	5	16	13		21,143
Carney Orange DPI-229-2	3	4	4		7,739
Carney Orange DPI-229-3	4	8	4		6,634
Carrizo 188 Thionin-EDR-1 US TG			1	®, CBI	
Carrizo F-52-16	1	4	3		
Carrizo-Mthionin-1 US TG			1	®, CBI	
Carrizo-Mthionin-2 US TG			1	®, CBI	
Carrizo-Mthionin-3 US TG			1	®, CBI	
Carrizo-ScFv-1 US TG			1	®, CBI	
Carrizo-ScFv-2 US TG			1	®, CBI	
Carrizo-ScFv-3 US TG			1	®, CBI	
Carrizo SPB-330	1	6			
Carrizo-Thionin-LBP-1 US TG			1	®, CBI	
Carrizo-Thionin-LBP-2 US TG			1	®, CBI	
Carvalhal 3-3-37			1		
Centennial Kum US	1	2	4		4,106
Changsha + Benton UF 18-9-6			1	®, CBI	
Changsha US 9-12-9			1		
Chinese Pum UF 5-17			1		
Chinotto S/O US 8-41	1	2	1		
Chislett Late Navel CGIP-190			2		
Cipo US 10A-7-10			1		75
Citrandarin CGIP-222			1		
Citrange C-35 F-24-10	3	37	1		
Citrangequat Hyb US 10-3-4			1		
Citron DPI-201	1	2	1		
Citrum F-80-6			1		
Citrum F-80-8			1		
Citrum F-W-4			1		
CIVAC 19 CGIP-241	1	4	1	®	
Clementine Haploid CGIP-180			1	®	
Clementine US	1	5	1		128
Cleopatra F-1-7	6	26	1		
Cocktail Gft DPI-50-38-5			1		
Crassifolia Kum CGIP-105			1		
Crisafulli Navel DPI-221-1	1	2	1		
Curry Leaf DPI-50-51	2	3	2		
Cybrid Dancy KW-5-7			1	®, CBI	10
Cybrid Flame UF C4-3-32	1	1	1	®, CBI	56
Cybrid Red UF N40FW-6-13			1	®, CBI	10
Daisy CGIP-120	1	1	1		4

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
Daisy LS CGIP-191			1		
Dancy F-59-8	4	9	3		4,479
Dancy UF 12-32			1	®, CBI	616
Delta CGIP-118			2		
Dickinson 595			1		
Dickinson Gold Valencia 595-1	1	2	1		
Disticha DPI-50-24			1		
Dobashi Sat DPI-50-28	1	1	1		
Donaldson 9-10-28	8	23	9	CBI	17,060
Dream Navel DPI-58			5		933
Duncan Gft F-56-33			3		69
Duncan Gft F-57-19	4	6	2		1,500
Dweet Tangor F-8-18			1		
Early Pride US 1-62-122	5	9	6	®, (NV)	84
Earlygold UF 33-4	2	2	2		2,381
Ellendale DPI-84-11-32			1		4
Eloise CGIP-155			1	®	
Enterprise 609-14-17			1		
Erem X Shek US 3-67			1		
Eremocitrus US			1		
Escondido Le UF			1		
Etrog Citron DPI-223-861	1	3	1		
Eureka Le DPI -	4	13	2		839
Eureka Le SL #2 CGIP-226	1	1	5	®	
Eureka Le SL CGIP-223	2	6	1		
Eureka Le UF 3-27			1		
Eustis Lqt US 16-6-12	2	2	1		
Everbearing Le US 9-1-64			1		
Fairchild US 6-8			4		
Fallglo US 10-61-3	2	6	2		28
Faustrimedin DPI-205-3			1		
Fertic Te DPI-216			3		
FG-1731 UF			1	®, CBI	4
Fina Sodea Clem CGIP-123			5		
Finger Lime DPI-205-1	3	4	2		990
Finger Lime Giant DPI-205-4	5	13	3		4,575
Finger Lime UF 4x Sydney OP			1		
Finger Lime UF KB-38			1		3,135
Fisher Navel CGIP-135			2		60
Flame Gft US 1-26-71	8	30	7		39,385
Florida EV1 UF B7-70	7	28	2	®, CBI	30
Florida EV2 UF SF14W-65	7	22	2	®, CBI	20
Flying Dragon US	1	3	4		
Folha Murcha UF 211			1	®	
Fortune US 9E-10-23			1		4
Foster Gft 65-1-8-27			1		
Fremont US 6-49			1		
Fukumoto Navel CGIP-133			2		

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
Furr LS UF 18A-10-11			1	®, CBI	2
Gardner US 6-16			3		
Garrett B/O DPI-666-1			2	®	
Garrett B/O DPI-666-2			2	®	
Garrett B/O DPI-666-3			2	®	
Gillets UF			1		6
Glen Navel F-56-11	8	24	12		17,987
Gold Nugget CGIP-139	3	4	3	®, (NV)	200
Goutou US-3			1		
Grand Frost Lemon CGIP-232	1	4	1	®, CBI	
Grapefruit Hyb UF 1906			1	®, CBI	2
Grapefruit Hyb UF 1919			1	®, CBI	15
Grapefruit Hyb UF 1924			1	®, CBI	134
Grapefruit Hyb UF 1929			1	®, CBI	2
Grapefruit Hyb UF 2004			1	®, CBI	
Grapefruit Hyb UF 2005			1	®, CBI	
Grapefruit Hyb UF 2007			2	®, CBI	
Grapefruit Hyb UF 2008			1	®, CBI	
Grapefruit Hyb UF 2107			1	®, CBI	
Grapefruit Hyb UF 2109			1	®, CBI	
Grapefruit Hyb UF P1			1	®, CBI	
Grapefruit Hyb US 1-83-179			2	®, CBI	
Grapefruit Hyb US 1-83-227			2	®, CBI	
Grapefruit Hyb US 4-4-1			1	®, CBI	34
Grapefruit Hyb US 6-20-151			1	®, CBI	
Grapefruit Hyb US 6-45-84			1	®, CBI	
Grapefruit Hyb US 6-59-158			2	®, CBI	
Grapefruit UF 00-02			2	®, CBI	
Grapefruit UF 11-06			1	®, CBI	
Grapefruit UF 11-05			3	®, CBI	
Grapefruit UF 12-04			1	®, CBI	
Grapefruit UF 14-09			1	®, CBI	
Grapefruit UF 17-14			1	®, CBI	
Grapefruit UF 19-08			1	®, CBI	
Grapefruit UF 19-12			1	®, CBI	
Grapefruit UF 9-5-16			2	®, CBI	
Grapefruit UF N40-16-11-11			1	®, CBI	
Green Sapphire Fingerlime CGIP-248			1	®, CBI	
Hadas CGIP-221	1	1	2	®, ISR	15
Hamlin 1-4-1	17	215	36		121,666
Hamlin 188 Thionin-EDR-1 US TG			1	®, CBI	
Hamlin 188 Thionin-EDR-2 US TG			1	®, CBI	
Hamlin 74 Thionin-LBP-1 US TG			1	®, CBI	
Hamlin 8-1-4	4	43	24		1,473
Hamlin 8-1-5	3	11	15		4,354
Hamlin N14-10					268
Hamlin UF N13-32	3	9	4	®, 2015, CBI	42,770
Hamlin US 1262			1	®, CBI	

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
Hamlin US 1266			1	®, CBI	
Hamlin US 1612			1	®, CBI	
Hamlin-Mthionin-1 US TG			2	®, CBI	
Hamlin-Mthionin-2 US TG			3	®, CBI	
Hamlin-Mthionin-3 US TG			2	®, CBI	
Harvey Le F-41-39	8	22	3		9,866
Hass Pink Navel DPI-203-21			1		
Hesperethusa UF			1		
Hirado Pum US 1-65	5	21	4		8,566
Homosassa 56-10-28			1		
Hong Kong Kum US 10-2			4		
Hudson Gft US			1		
Hyuganatsu US 12-43			1		
Iapar 73 UF 217			1	®	
Ice Tea Le UF C4-6-49			1	®, PR	54
Ichang Le US 2-33			1		
Imperial Gft CGIP-151			1		
Isle O Pine Gft US			1		
Itaborai UF 31-5	1	1			
Itaborai UF 31-6			2		
Jackson Gft DPI-16	1	1	5		
Jaffa F-53-38			1		
Jincheng UF 175			1		
Joe's Early CGIP-238	1	1	1		
K X R UF			1		
Kaffir Lime UF	6	21	1		14,602
Kao Phuang Pum UF 5-2			1		
Kara US 9E-9-21			1		
Karna US			1		
Kedem CGIP-147	1	1			
Keraji DPI-50-38-3			1		
Key Lime Giant US	1	1	1		
Key Lime SPB-51-12	8	34	2		27,607
Key Lime Thornless F-59-39	2	2	1		1,251
Khalily US 2-29			1		
Kiella Calusa S/O DPI-666-4	1	9	1		
Kimbrough Sat CGIP-108	1	1	2		
King 18-1-1	2	3	2		4
Kinkoji DPI-50-44	1	6	1		4
Kinnow LS CGIP-193			1		
Kinnow US 9E-9-27			1		
Kinokuni US 11-65			1		
Kirkwood Red Navel CGIP-239	1	1	2		
Kishu SL CGIP-137	3	7	3		802
Kiyomi Tangor CGIP-136			1		
Kuharske 100-1-10	6	209	3		
Kuharske 100-1-18	2	50			

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
Kunembo US 3-10-3			2		
Lakeland Lqt F-55-26	3	11	3		18,942
Lane Navel CGIP-121	1	1	6	®, CBI	30
Lange Rosy Red Valencia CGIP-243			1	®, CBI	768
Large Pink Pum US 6-57			1		
Le Pum 748-29			1		4
Le Pum 748-32			1		
Leanri Mandarin CGIP-240	1	1	1		
Lee US 2-56	1	1	1		250
Lemon Hyb UF C4-3-4			1	®, CBI	
Lemon Hyb UF C4-4-16			1	®, CBI	4
Lemon Hyb UF C4-5-14			1	®, CBI	
Lemon Hyb UF C4-8-3			1	®,CBI	3
Lemon Hyb UF C4-8-34			1	®,CBI	2
Lemon Hyb UF LB-6-17			1	®, CBI	2
Lemon UF 1-10-56			1	®, CBI	
Lemon UF 1-14-10			1	®, CBI	
Lemon UF 1-1-42			1	®, CBI	
Lemon UF 1-14-24			1	®, CBI	
Lemon UF 1-1-55			1	®, CBI	3
Lemon UF 1-15-50			2	®, CBI	
Lemon UF 1-19-55			2	®, CBI	2
Lemon UF 1-20-31			1	®, CBI	3
Lemon UF 1-20-6			1	®, CBI	3
Lemon UF 1-2-8			1	®, CBI	
Lemon UF 1-3-17			1	®, CBI	
Lemon UF 1-6-18			1	®, CBI	
Lemon UF 1-8-57			1	®, CBI	3
Lemon UF 1-9-42			1	®, CBI	558
Lemon UF 2-0-19			1	®, CBI	
Lemon UF 2-21-5			1	®, CBI	
Lemon UF 2-23-39			1	®, CBI	
Lemon UF 2-2-48			1	®, CBI	
Lemon UF 2-3-28			2	®, CBI	
Lemon UF 2-3-33			1	®, CBI	3
Lemon UF FP 18-01			1	®, CBI	
Lemon UF FP 18-03			1	®, CBI	
Lennon Flame Grapefruit			2		
Lemonquat US 2-31	1	1	1		3
Lemorlime UF C4-5-27			1	®, CBI	2
Leo X Te US 5-8-122			2	®	
Limeberry DPI-50-43			1		
Lime Hyb UF C4-8-48			1	®, CBI	2
Lime Hyb UF C4-10-11			1	®, CBI	2
Lime Hyb UF C4-10-8			1	®, CBI	2
Lime Hyb UF C4-6-52			1	®, CBI	2
Lime Hyb UF C4-8-14			1	®, CBI	2
Lime Hyb UF C4-9-33			1	®, CBI	2

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
Lime Hybrid UF 17-02			1	®, CBI	
Lime Hybrid UF 17-03			1	®, CBI	
Lime SL Hyb UF C4-4-26			1	®, CBI	2
Lime SL Hyb UF C4-6-35			1	®, CBI	6
Limeberry DPI-50-43			1	®, CBI	
Limonia UF			1		
Lisbon Le UF 3-9	3	4	2		
Little Ruby Fingerlime CGIP-246			1	®, CBI	
Long Fruit Kum DPI-603-20-50	2	7	2		5,008
Lue Gim Gong F-53-18			2		
M+LB8-8			1	®, CBI	3
M-7 Early Navel CGIP-194	1	7			
Madam Vinous UF 13	2	4	1		
Malayan Kum UF 10			1		
Man Hyb UF VNB-36-4			1	®, CBI	2
Man Hyb UF VNB-40-4			1	®, CBI	2
Man x Org LT UF RBB-7-34			3	®, Fast	35
Man X Org UF 6-2-55			1	®, CBI	
Man X Org UF RBB-6-25			1	®, CBI	74
Man X Org UF RBB-7-34			2	®, Fast	15
Mandalate CGIP-154	1	1	1	®, NV	3
Mandalime UF 13-08			1	®, CBI	335
Mandalime UF 15-04			1	®, CBI	
Mandarange UF 4-71			2	®, CBI	
Mandarange UF SB-7-13			2	®, CBI	2
Mandarange UF SB-8-17			2	®, CBI	3
Mandarange UF SB-8-70			2	®, CBI	
Mandared CGIP-166			3	®	
Mandarin 4x Cybrid 304 UF			1	®, CBI	
Mandarin DPI-50-34			1		
Mandarin LS UF N40W-5-1			1	®, CBI	
Mandarin LS US 1-22-79			1	®, CBI	
Mandarin LS US 4-13-31			1	®, CBI	
Mandarin LS US 4-13-39			1		
Mandarin LS US 4-13-7			1	®, CBI	
Mandarin Mid UF 711			3	®, Fast	36
Mandarin Mid UF 711 Mixup			2	®, Fast	30
Mandarin SL UF C4-15-21 (19)			4	®, Fast	
Mandarin SL US 1-35-21			1		
Mandarin SL US 1-35-81			1	®, CBI	
Mandarin SL US 1-87-170			1	®, CBI	
Mandarin SL US 1-88-113			1	®, CBI	
Mandarin SL US 6-1-41			1	®, CBI	
Mandarin SL US 6-2-110			1	®, CBI	
Mandarin SL US B1-SH-6-9			1	®, CBI	
Mandarin UF 05-04			1	®, CBI	
Mandarin UF 06-03			3	®, CBI	
Mandarin UF 09-08			1	®, CBI	

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
Mandarin UF 10-04			1	®, CBI	
Mandarin UF 11-01			1	®, CBI	
Mandarin UF 11-02			1		
Mandarin UF 11-08			1	®, CBI	120
Mandarin UF 11-10			1	®, CBI	
Mandarin UF 12-01			2	®, CBI	160
Mandarin UF 12-03			1	®, CBI	
Mandarin UF 12-06			2	®, CBI	
Mandarin UF 12-07			1	®, CBI	
Mandarin UF 12-08			2	®, CBI	
Mandarin UF 13-09			1	®, CBI	
Mandarin UF 13-12			1	®, CBI	
Mandarin UF 13-13			1	®, CBI	
Mandarin UF 13-14			1	®, CBI	
Mandarin UF 13-17			1	®, CBI	180
Mandarin UF 14-04			1	®, CBI	
Mandarin UF 14-08			1	®, CBI	
Mandarin UF 1424			1	®, CBI	239
Mandarin UF 1425			1	®, CBI	
Mandarin UF 15-03			1	®, CBI	
Mandarin UF 15-05a			2	®, CBI	
Mandarin UF 15-05b			1	®, CBI	
Mandarin UF 15-06			1	®, CBI	
Mandarin UF 15-07			1	®, CBI	
Mandarin UF 15-08			1	®, CBI	
Mandarin UF 15-09			1	®, CBI	
Mandarin UF 15-17			1	®, CBI	
Mandarin UF 16-33			1	®, CBI	
Mandarin UF 16-34			1	®, CBI	
Mandarin UF 16-39			1	®, CBI	
Mandarin UF 1703			1	®, CBI	
Mandarin UF 17-04			1	®, CBI	
Mandarin UF 17-08			1	®, CBI	
Mandarin UF 17-11			1	®, CBI	
Mandarin UF 17-12			1	®, CBI	
Mandarin UF 17-13			1	®, CBI	
Mandarin UF 1715			1	®, CBI	
Mandarin UF 1722			1	®, CBI	
Mandarin UF 1723			1	®, CBI	
Mandarin UF 1724			1	®, CBI	
Mandarin UF 1750			1	®, CBI	
Mandarin UF 1751			1	®, CBI	2
Mandarin UF 1780			1	®, CBI	
Mandarin UF 1801			1	®, CBI	19
Mandarin UF 18-04			1	®, CBI	
Mandarin UF 18-05			1	®, CBI	
Mandarin UF 1806			1	®, CBI	
Mandarin UF 18-07			1	®, CBI	

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
Mandarin UF 18-10			1	®, CBI	
Mandarin UF 1818			1	®, CBI	15
Mandarin UF 1819			2	®, CBI	20
Mandarin UF 1859	1	1	1	®, CBI	101
Mandarin UF 18A-1-25			1	®, CBI	
Mandarin UF 18A-1-40			1	®, CBI	6
Mandarin UF 18A-2-14			1	®, CBI	
Mandarin UF 18A-2-27			1	®, CBI	2
Mandarin UF 18A-2-28			1	®, CBI	6
Mandarin UF 18A-2-31			1	®, CBI	
Mandarin UF 18A-3-32			1	®, CBI	2
Mandarin UF 18A-3-40			1	®, CBI	6
Mandarin UF 18A-4-35			1	®, CBI	173
Mandarin UF 18A-4-46			1	®, CBI	
Mandarin UF 18A-8-25			2	®, CBI	3
Mandarin UF 18A-8-40			1	®, CBI	
Mandarin UF 18A-8-42			1	®, CBI	
Mandarin UF 18A-8-45			2	®, CBI	
Mandarin UF 18A-8-48			1	®, CBI	
Mandarin UF 18A-9-27			1	®, CBI	13
Mandarin UF 18A-9-43			2	®, CBI	
Mandarin UF 19-03			1	®, CBI	
Mandarin UF 1904			1	®, CBI	
Mandarin UF 19-05			1	®, CBI	
Mandarin UF 19-06			1	®, CBI	
Mandarin UF 19-11			1	®, CBI	
Mandarin UF 1908			1	®, CBI	2
Mandarin UF 19-10			1	®, CBI	
Mandarin UF 1911			1	®, CBI	2
Mandarin UF 1912			1	®, CBI	2
Mandarin UF 1914			1	®, CBI	2
Mandarin UF 1915			1	®, CBI	7
Mandarin UF 1923			1	®, CBI	
Mandarin UF 20-03			1	®, CBI	
Mandarin UF 20-04			1	®, CBI	
Mandarin UF 20-10			1	®, CBI	
Mandarin UF 20-18			1	®, CBI	
Mandarin UF 2103			1	®, CBI	
Mandarin UF 2104			2	®, CBI	
Mandarin UF 21-05			1	®, CBI	
Mandarin UF 21-06			1	®, CBI	
Mandarin UF 21-10			1	®, CBI	
Mandarin UF 22-02			2	®, CBI	
Mandarin UF 22-03			3	®, CBI	
Mandarin UF 22-05			3	®, CBI	
Mandarin UF 22-06			3	®, CBI	
Mandarin UF 304			2	®, CBI	7
Mandarin UF 3-13-51	1	1	1	®, CBI	339

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
Mandarin UF 3-14-45			1	®, CBI	2
Mandarin UF 3-3-52			1	®, CBI	4
Mandarin UF 3-7-92			2	®, CBI	
Mandarin UF 40-10-12			1	®, CBI	
Mandarin UF 411			4	®, Fast	
Mandarin UF 6-13-30			2	®, CBI	
Mandarin UF 7-8-55			2	®, CBI	2
Mandarin UF 7-8-87			1	®, CBI	
Mandarin UF 7-9-7			1	®, CBI	
Mandarin UF 900			4	®, Fast	16
Mandarin UF 9-10-28			2	®, CBI	10
Mandarin UF 9-14			1	®, CBI	
Mandarin UF 916			2	®, CBI	
Mandarin UF 950			4	®, Fast	2,729
Mandarin UF 9-8-20			2	®, CBI	
Mandarin UF B3-18-2			2	®, CBI	2
Mandarin UF B7-2-59			2	®, CBI	2
Mandarin UF BB4-8-20			2	®, CBI	2
Mandarin UF C1-1-1			1	®, CBI	2
Mandarin UF C1-4-28			1	®, CBI	
Mandarin UF C1-6-14			2	®, CBI	
Mandarin UF C1-7-11			1	®, CBI	2
Mandarin UF C1-7-30			1	®, CBI	
Mandarin UF C1-8-29			1	®, CBI	
Mandarin UF C1-8-31			1	®, CBI	
Mandarin UF C1-8-34			1	®, CBI	2
Mandarin UF C1-9-16			1	®, CBI	7
Mandarin UF C2-1-5			1	®, CBI	
Mandarin UF C2-1-17			1	®, CBI	2
Mandarin UF C2-3-26			1	®, CBI	2
Mandarin UF C4-10-42			1	®, CBI	4
Mandarin UF C4-11-45			1	®, CBI	
Mandarin UF C4-14-1			1	®, CBI	2
Mandarin UF C4-14-15			1	®, CBI	
Mandarin UF C4-14-3			1	®, CBI	2
Mandarin UF C4-14-51			1	®, CBI	4
Mandarin UF C4-14-53			1	®, CBI	
Mandarin UF C4-15-3			1	®, CBI	
Mandarin UF C4-15-43			1	®, CBI	
Mandarin UF C4-15-50			1	®, CBI	2
Mandarin UF C4-16-23			1	®, CBI	
Mandarin UF C4-5-50			1	®, CBI	
Mandarin UF C4-6-2			1	®, CBI	10
Mandarin UF C4-7-29			1	®, CBI	
Mandarin UF C4-8-25			1	®, CBI	
Mandarin UF C7-10-47			1	®, CBI	8
Mandarin UF C7-10-50			1	®, CBI	
Mandarin UF C7-11-17			3	®, CBI	10

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
Mandarin UF C7-12-9			1	®, CBI	
Mandarin UF C7-12-14			1	®, CBI	
Mandarin UF C7-12-18			1	®, CBI	8
Mandarin UF C7-12-19			1	®, CBI	80
Mandarin UF C7-12-24			1	®, CBI	2
Mandarin UF E20-42-13			2	®, CBI	
Mandarin UF E20-45-14			2	®, CBI	
Mandarin UF E20-45-19			2	®, CBI	
Mandarin UF FP 18-04			1	®, CBI	
Mandarin UF KE-1-31			1	®, CBI	
Mandarin UF KE-3-15			1	®, CBI	
Mandarin UF KE-7-39			1	®, CBI	
Mandarin UF KE-9-9			1	®, CBI	10
Mandarin UF KW-2-18			2	®, CBI	
Mandarin UF KW-2-21			1	®, CBI	2
Mandarin UF KW5-12			1	®, CBI	2
Mandarin UF LB3-11			1	®, CBI	
Mandarin UF LB5-3			2	®, CBI	2
Mandarin UF LB7-11			2	®, CBI	2
Mandarin UF LB8-10			2	®, CBI	3
Mandarin UF LS-13-51			1	®, CBI	27
Mandarin UF N18A-8-17			1	®	2
Mandarin UF N18A-9-39	1	1	4	®, CBI	628
Mandarin UF NB17-25			1	®, CBI	
Mandarin UF RBS-13-8			2	®, CBI	
Mandarin UF RES-10-39			1	®, CBI	
Mandarin UF RES-19-22			2	®, CBI	2
Mandarin UF RES-19-56	1	1	1	®, CBI	106
Mandarin UFDawn 09-13			2	®, Fast, CBI	
Mandarin UFGlow 10-02	1	1	2	®, Fast, CBI	3,141
Mandarin UFSunrise 09-04			2	®, Fast, CBI	
Mandarin US 1-10-90			1	®, CBI	
Mandarin US 1-20-68			2	®, CBI	
Mandarin US 1-23-130			1		
Mandarin US 1-24-48			2	®, CBI	
Mandarin US 1-26-52			1	®, CBI	
Mandarin US 1-30-52			2	®, CBI	
Mandarin US 1-34-11			2	®, CBI	
Mandarin US 1-35-72			3	®, CBI	
Mandarin US 1-57-105			2	®, CBI	
Mandarin US 1-62-205			1	®, CBI	
Mandarin US 1-63-77			2	®, CBI	
Mandarin US 1-63-85			2	®, CBI	
Mandarin US 1-78-62			2	®, CBI	
Mandarin US 1-81-193			1	®, CBI	
Mandarin US 1-8-176			1	®, CBI	
Mandarin US 1-84-2			1	®, CBI	
Mandarin US 1-8-70			1		

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
Mandarin US 1-88-71			1	®, CBI	
Mandarin US 1-88-82			1	®, CBI	
Mandarin US 1-88-83			1	®, CBI	
Mandarin US 1-89-45			1	®, CBI	
Mandarin US 1-8-96			1	®, CBI	
Mandarin US 5-13-227			1	®, CBI	
Mandarin US 5-6-155			2	®, CBI	
Mandarin US 5-6-165			1	®, CBI	
Mandarin US 6-32-43			2	®, CBI	
Mandarin US 6-32-67			2	®, CBI	
Mandarin US 6-34-45			1	®, CBI	
Mandarin US 6-35-90			2		
Mandarin US 6-58-71			1		
Mandarin US 6-58-87			1	®, CBI	
Mandarin US 6-59-149			1	®, CBI	
Mandarin US C54-4			2	®, CBI	3
Mandarin US N-10-7			1	®, CBI	
Mandarin US N-8-6			2	®, CBI	
Mandarin USDA PS-N-4-26	1	2	1	®, CBI	
Mandarin USDA PS-N-4-29	1	2	1	®, CBI	
Mandarin USDA PS-N-5-33			1	®, CBI	
Marathon	4	14	4	®, CBI	946
Marisol Clem CGIP-124	1	1	2		
Marrs Sweet Orange CGIP-245			1	®, CBI	
Marsh Gft 74-1-1	1	1	4		2,320
Marsh Gft F-57-4	5	10	2		11,132
Marumi Kum DPI-50-47	1	3	2		855
Mayaca Navel 63-18-2			3		
McCarty Gft F-53-11			1		
Mediterranean Swt F-58-38			1		
Meiwa Kum F-27-29	8	22	6		10,437
Melogold CGIP-112			2		
Merav CGIP-146	1	1			
Meravit CGIP-220	1	1	2	®, ISR	30
Meyer Le US	6	44	3		56,082
Microcitrus Inodor US 80-527A			1		
Microcitrus Papuana US			1		
Midknight CGIP-119			4		
Midsweet LS UF 12-2-33			2	®, CBI	
Midsweet LS UF 2-23			1	®, CBI	
Midsweet LS UF SF11-1-24			4	®, CBI	10
Midsweet LS UF SF11-2-31			2	®, CBI	2
Midsweet US 6-9	3	4	5		578
Miho Wase Satsuma CGIP-235	1	1	1		256
Milam UF A			1		
Miller B/O UF			2	®	
Mini-Mandarin UF N18A-10-18			1	®	
Minneola F-60-5	7	33	5		29,308

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
Minnie Finger Lime			2	®	
Monreal Clem CGIP-109			1		
Moria CGIP-164	1	1			
Moro B/O 3-3-11	3	3	3		1,578
Moro B/O DPI-50-19	1	4			3,816
Moro X Tar B/O 3-2-66			1		
Morton US 1-3			1		
Mott Gft DPI-45			1		
Murcott 130-1-1S	6	13	3		4,600
Murcott LS UF LB2-19			2	®, CBI	
Murcott LS UF N40-18A-10-09			2	FL	
Murcott UF 18A-10-47			2	®, CBI	63
Murcott UF 18A-3-16			2	®, CBI	2
Murcott+Dancy UF			1	®, CBI	
Nagami Kum SPB-323-1-1	7	15	5		6,383
Nakon Pum US			1		
Nansho Daidai DPI-50-45			1		
Nasnaran DPI-50-49			1		
Natal CGIP-138			1		
Naugle Le DPI-206-1			2		
Navel Gft US 4-1			2		
Navel US 2-C			2	®, CBI	
Navel US 3-S			2	®, CBI	
Navel US1-N			2	®, CBI	
Navelo 81-16-15			1		
Nectar CGIP-148	1	1			
Nine Pound Le DPI-201-21			3		
Nocatee F-25-26			1		
Nordmann Kum DPI-203-1			1		
Norton SPB-306			1		
Nour CGIP-149			4		
Nova LS CGIP-200			2		
Nova US 7-41	1	1	3		126
Nova+Osceola UF			1	®, CBI	
Nules Clem CGIP-125	5	11	3		7,043
Odem CGIP-219	1	4	2	®, ISR	30
Okitsu Wase Satsuma CGIP-234	1	1	1		160
Orange Hyb LT US 1-76-52			2		
Orange Hyb US 1-4-12			1	®, CBI	
Orange Hyb US 1-46-15			2	®, CBI	
Orange Hyb US 1-5-211			1	®, CBI	
Orange Hyb US 1-5-213			2		
Orange Hyb US 1-5-35			2	®, CBI	
Orange Hyb US 1-65-55			2	®, CBI	
Orange Hyb US 1-74-14			1	®, CBI	
Orange Hyb US 1-74-52			1		
Orange Hyb US 1-74-92			1	®, CBI	

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
Orange Hyb US 1-75-113			2	®, CBI	
Orange Hyb US 1-75-55			1	®, CBI	
Orange Hyb US 1-79-1			1	®, CBI	
Orange Hyb US 1-85-109			1	®, CBI	
Orange Hyb US 1-85-119			1	®, CBI	
Orange Hyb US 1-85-124			1	®, CBI	
Orange Hyb US 1-85-82			1	®, CBI	
Orange Hyb US 1-89-11			2	® ,CBI	
Orange Hyb US 1-90-251			1	®, CBI	
Orange Hyb US 5-3-108			3	®, CBI	
Orange Hyb US 5-6-36			1	®, CBI	
Orange Hyb US 6-40-87			1	®, CBI	
Orange Hyb US 6-45-137			1	®, CBI	
Orange Hyb US 6-47-9			1	®, CBI	
Orange Hyb US 6-58-35			2	®, CBI	
Orange Hyb US 6-58-90			2	®, CBI	
Orange Hyb US 6-68-163			1	®, CBI	
Orange Hyb US 6-9-96			2	®, CBI	
Orange Hyb US 7650			1		
Orange Hyb US 7651			2		
Orange Hyb US 7652			2		
Orange Hyb US B1-SH-7-27			1	®, CBI	
Orange Hyb US B1-SH-7-28			1	®, CBI	
Orange Jasmine F-			1		18
Orangequat Hyb DPI-203-5			1		3
Orlando F-57-5	4	4	3		1,679
Oroblanco CGIP-111	1	2	4		96
Orri CGIP-134	2	19	9	®, ISR	7,360
Ortanique F-24-26	2	2	5		
Osceola US 3-58			2		
Oval Pink Pum DPI-212			1		
Owari Sat 874	5	14	5		17,446
Owari Sat F-60-23	1	5			
Owari Sat F-60-25B			1		
P Tri DPI-50-7			2		
P Tri Rubidoux F-16-20			1		
P Tri Wacissa F-18-1	1	2	1		
P+(CxS)			1		
Page US 2-58			3		1,169
Pandan Wangi Pum US			1		
Parana Gft CGIP-167			1		
Parson Brown F-56-2	5	8	6		5,763
Parson Special US			1		
Pera 3-3-85			1		
Pera US 18-11			1		
Pera US 7-39			1		
Persian Lime SPB-7	11	49	9		53,061

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
Pineapple 53-10-10	1	4	5		174
Pineapple F-60-3	1	3	3		
Pineapple SL US 10B-6-30	2	4	5		155
Pink Frost Grapefruit CGIP-251	1	3	1	®, CBI	
Pink Gft US FF-1-26-51-BS			1	®, CBI	
Pink Pum Hyb US 10-1-1			1		
Pink Sensation Pum 884			1		
Pixie Man CGIP-181			3		
Ponderosa Le DPI-203-8	5	11	3		7,354
Ponkan DPI-50-6	6	14	5		4,941
Pope F-53-28			1		30
Procimequat UF			1		
Pum X Gft UF 4-1			2	®, CBI	2
Pummelette UF 5-1-99-2			2	®, Fast	3
Pummelo 61-12-			1		
Pummelo DPI-203-2			1		
Pummelo DPI-203-3			2		
Pummelo DPI-203-4			2		
Pummelo Hyb UF 1820			1	®, CBI	
Pummelo Hyb UF 1861			1	®, CBI	
Pummelo Hyb UF 1862			1	®, CBI	6
Pummelo Hyb UF 3-1-21			1	®, CBI	
Pummelo Hyb UF 3-1-22			1	®, CBI	
Pummelo Hyb UF 3-1-43			1	®, CBI	3
Pummelo Hyb UF 40-6-8			1	®, CBI	
Pummelo Hyb UF 914	1	1	5	®, Fast	774
Pummelo Hyb UF C2-5-03			1	®, CBI	94
Pummelo Hyb UF C4-10-36			1	®, CBI	2
Pummelo Hyb UF EL-R2-T7			2	®, CBI	
Pummelo Hyb UF KBR-1T-41			1	®, CBI	
Pummelo Hyb UF KBR-1-T55			1	®, CBI	
Pummelo Hyb UF KBR-2T-48			1	®, CBI	
Pummelo Hyb UF KBR-2T-61			1	®, CBI	
Pummelo Hyb UF NB17-4-0219			1	®, CBI	2
Pummelo Hyb UF NB19-17-0218			1	®, CBI	21
Pummelo Hyb UF NB19-18-0218			1	®, CBI	
Pummelo Hyb UF NB19-22-0218			1	®, CBI	
Pummelo Hyb UF NB19-28-0218			1	®, CBI	
Pummelo Hyb UF NRB15-43			1	®, CBI	
Pummelo Hyb UF P2			1	®, CBI	
Pummelo Hyb US 10A-1-21			3	®	
Pummelo Hyb US 1-17-170			1	®, CBI	
Pummelo Hyb US 4-3-168			1	®, CBI	
Pummelo Hyb US 5-93-42			2	®, CBI	
Pummelo Hyb US 6-16-172			2	®, CBI	
Pummelo Hyb US 6-16-29			1	®, CBI	
Pummelo Hyb US 6-16-43			1	®, CBI	
Pummelo Hyb US 6-17-16			2	®, CBI	

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
Pummelo Hyb US 6-17-28			2	®, CBI	
Pummelo Hyb US 6-17-48			2	®, CBI	
Pummelo Hyb US 6-47-117			1	®, CBI	
Pummelo Hyb US 6-67-169			1	®, CBI	
Pummelo Hyb US LP-36-39			2	®, CBI	
Pummelo UF 16-29			1	®, CBI	
Pummelo UF 23-5-36			1	®, CBI	2
Pummelo UF C4-10-48			1	®, CBI	2
Pummelo UF N40-16-12-7			2	®, CBI	
Pummelo UF N7-4			1	®, PR	
Pummelo US 10a-7-15			1		
Pummelo US 145 NE			3		
Pummelo US NW			3		
Queen 25-2-15			3		
Rangpur Lime F-3-8			1		48
Rasnake Tangelo 625	1	1			
Ray Ruby Gft CGIP-103	10	52	10		145,117
RBB-7-34					6
Red Finger Lime DPI-50-36	6	13	2		3,833
Red Gft UF 16-11-17			3	®, CBI	3
Red Gft UF N11-29			2	®, CBI	5
Red Gft UF N40-16-11-15			2	®, CBI	
Red Gft UF N40-16-11-3			2	®, CBI	
Red Gft UF N40-16-11-7	1	1	2	®	1,778
Red Java Pum UF 6-4A			1		
Red Lime 899	3	5	2		11,877
Red Pum UF 5-1-99-5			2	®, Fast	2
Red Pum UF 5-1-99-5-LS			1	®, CBI	
Red Pum UF C2-5-12			1	®, Fast	4
Red Pum UF C4-11-19			1	®, PR	2
Red Pum UF C4-2-8			1		
Red Pum UF KW-1-50			1		2
Red Shaddock UF 5-4A			1		
Red Pum UF UKP-1			1	®, PR, CBI	
Ridge Pi SPB-602-36	1	4	1		23
Rio Red Gft CGIP-110	4	17	7		5,995
Robinson US 3-56			4		133
Roble 502-4-12	2	2	6		8,295
Rohde Red 472-11-43	4	11	1		19
Rohde Red DPI-50-3-1			1		
Rohde Red DPI-50-3-8			1		
Rohde Red DPI-50-3-9			1		
Rohde Red UF B3-42			1	®, CBI	2
Rosa UF 156			1	®	
Rosalina Navel CGIP-236					66
Rough Le Red UF 8-7	4	58	2		
Round Lime DPI-205-2			1		
Royal Gft US 4-39			1		

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
RS UF 1584			1	®, CBI	
RS UF 16-03			1	®, CBI	
RS UF 16-04			1	®, CBI	
RS UF 16-05			1	®, CBI	
RS UF 16-06			1	®, CBI	
RS UF 16-07			1	®, CBI	
RS UF 16-08			1	®, CBI	165
RS UF 16-09			1	®, CBI	
RS UF 16-10			1	®, CBI	
RS UF 16-11			3	®, CBI	
RS UF 16-12			1	®, CBI	
RS UF 18-03			1	®, CBI	
RS UF 18-13			1	®, CBI	
RS UF 16-13			1	®, CBI	
RS UF 16-14			1	®, CBI	
RS UF 16-15			1	®, CBI	
RS UF 16-16			4	®, CBI	
RS UF 16-17			1	®, CBI	
RS UF 16-18			1	®, CBI	
RS UF 16-19			1	®, CBI	
RS UF 16-20			1	®, CBI	
RS UF 16-21			1	®, CBI	
RS UF 16-22			1	®, CBI	
RS UF 16-23			1	®, CBI	
RS UF 16-26			1	®, CBI	
RS UF 16-41			1	®, CBI	
RS UF 16-42			1	®, CBI	
RS UF 16-43			1	®, CBI	
RS UF 16-44			2	®, CBI	
RS UF 16-52			2	®, CBI	
RS UF 16-5-28 Orange16	1	30	1	®, CBI	
RS UF 16-53			2	®, CBI	
RS UF 16-5-5 Orange14	1	32	2	®, CBI	
RS UF 18-01			1	®, CBI	
RS UF 18-02			1	®, CBI	
RS UF 18-03			1	®, CBI	
RS UF 18-13			1	®, CBI	
RS UF 18-2-19 White-1			2	®, CBI	
RS UF 18-2-8 Green-7			2	®, CBI	
RS UF 2247x1571-00-3 White-3			1	®, CBI	
RS UF 2247x2075-01-2			1	®, CBI	
RS UF 2247x2075-02-26			1	®, CBI	
RS UF 2247x6070-02-2			1	®, CBI	
RS UF 46x20-04-32			2	®, CBI	2
RS UF 46x20-04-6			1	®, CBI	
RS UF 46x20-04-48			2	®, CBI	
RS UF 46x20-04-6			2	®, CBI	

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
RS UF 46x20-04-S15			1	®, CBI	
RS UF 46x43-05-SDLG-51			1	®, CBI	
RS UF A+4-4-99-6-KE			1	®, CBI	
RS UF A+HBJL-1-OP-09-36			1	®, CBI	
RS UF A+Volk x Orange 19-11-8			1	®, CBI	
RS UF AMB+HBJL-2			1	®, CBI	
RS UF B21-R1-T2-11-2			1	®, CBI	
RS UF B21-R1-T25-11-6			1	®, CBI	
RS UF Blue 1			1	®, CBI	
RS UF Cleo+Carrizo			1	®, CBI	
RS UF Gft + 50-7			1	®, CBI	
RS UF Green x Orange 14-09-32			1	®, CBI	
RS UF LB8-9x50-7-16-4			1	®, CBI	
RS UF LB8-9xS10-15-18			1	®, CBI	2
RS UF LB8-9xS10-15-9			1	®, CBI	
RS UF LB8-9xS13-15-16			1	®, CBI	
RS UF Milam+HBP x Orange 14-09-10			1	®, CBI	4
RS UF Milam+HBP x Orange 14-09-9			1	®, CBI	
RS UF Milam+HBPxOrange 14-09-14			1	®, CBI	
RS UF S10xS15-12-25			1	®, CBI	2
RS UF S10X-x639-12-32			1	®, CBI	
RS UF S11x50-7-16-12			1	®, CBI	
RS UF S11x50-7-16-6			1	®, CBI	
RS UF SG-50-6			1	®, CBI	3
RS UF SO + 50-7			2	®, CBI	
RS UF SO + FDT			1	®, CBI	
RS UF STR-4-1			2	®, CBI	
Ruby Red Gft F-58-39	10	65	10		85,402
Ruby Swt (35) UF 32-10			2		
Ruby Swt (35) UF 30-24	1	1			
Ruby Valencia CGIP-195	1	1	2		1,044
Ruby Valencia SL CGIP-244	1	1	1		684
Ryan Navel CGIP-186	1	2	2		
Salustiana 3-1-71	1	1	1		
Salustiana UF			1	®	3
Sampson UF 9-1A			1		
Sanbokan US 7-55	1	2	1		1,700
Sanguinelli B/O US 10-5-17	2	10	4		5,879
Sanguinello Riccio UF 200			1	®	
Santa Cat Navel US 1			1		
Scott Red Gft #369 DPI-666-9			1	®	
Scott Red Gft #3 DPI-666-6			2	®	
Scott Red Gft #5 DPI-666-7			2	®	
Scott Red Gft #6 DPI-666-8			2	®	
Scott Red Gft #63 DPI-666-10			1	®	
Scott Red Gft #79 DPI-666-11			5	®	
Scott White Gft #10 DPI-666-12			1	®	

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
Seduced S/O DPI-666-13			1	®	
Seedless Snack UF N40W-6-3	1	1	1	®, Fast	
Seleta Agrocitros UF 132			1	®	
Seleta Branca UF 166			1	®	
Seminole SPB-342-3-3			1		
Serra D Agua UF 210			1	®	
Setoka CGIP-187	1	3	2		
Sexton F-47-24			2		
Shambar Gft US 3-63			1		
Shasta Gold CGIP-159	1	1	3	®, NV	
Shatian Pum CGIP-126			3		
Shekwasha US 9-1-27			1		
Shiranui CGIP-132	3	3	4	FL	2,821
Siamese Pink Pum UF 6-12A			3		
Siamese Pum UF 6-9A			1		
Siamese Swt Pum DPI-203-16	1	1	3		
Silver Hill Sat US	2	3	3		68
Sinton Citrqt US			1		
Smooth Flat Sev US 2-2-14			1		
Sour Orange DPI-50-9	1	1			
Sour Orange F-49-7	8	116			
Sour Orange UF 18-11			1	®, CBI	
Southern Frost Lamar Navel CGIP-253	1	3			809
St. Michael 9-4-3			2	®, CBI	
Star Ruby Gft DPI-60	8	59	4		10,765
Succari US 7-21			1		
Sue Linda Temple CGIP-237			2		
Sugar Belle LS UF 1-3			1	®, CBI	4
Sugar Belle UF LB8-9	8	18	8	®, NV	6,722
Sukega Gft CGIP-182			2		
Summer Gold Gft UF N2-28	1	1	2	®, Fast	60
Summerfield Navel DPI-70-4-9	1	10	2		17,352
Sun Chu Sha US 9-12-12	4	11	1		
Sun Hing Pum DPI-203-7			3		
Sunburst US 5	5	14	4		365
Sundiatgo US 5-17			1		
Sunki DPI-50-50	1	2	1		
Sunquat DPI-50-27			1		1,959
Sunshine US 10-13			1		
Sunstar US 6-6			5		
SuperSour 1	1	24	2	®, CBI	
Supersour 2	3	38	2	®, CBI	
SuperSour 3	3	68	3	®, CBI	
Sweet Frost Tangerine CGIP-250	1	4	1	®, CBI	
Sweet Lime F-10-10	2	2	1		786
Sweet Orange SL UF C4-16-12			2	®, PR	2
Sweet Orange UF 12-05			2	®, CBI	
Sweet Orange UF 17-06			1	®, CBI	200

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
Sweet Orange UF 19-09			1	®, CBI	
Sweet Orange UF 20-14			1	®, CBI	
Sweet Orange UF 20-19			1	®, CBI	
Sweet Orange UF 20-21			1	®, CBI	
Sweet Orange UF 20-22			1	®, CBI	
Sweet Orange UF 96-01			1	®, CBI	16
Sweet Orange UF 7-9-35			1	®, CBI	
Sweet Orange UF 99-01			2	®, CBI	
Sweet Orange UF C1-41-B			2	®, CBI	413
Sweet Orange UF KE-6-4			1	®, CBI	2
Sweet Orange UF MB-R25-T12			1	®, CBI	168
Sweet Orange UF MB-R25-T2			1	®, CBI	179
Sweet Orange UF MB-R26-T10			1	®, CBI	189
Sweet Orange UF MB-R26-T14			1	®, CBI	153
Sweet Orange UF N10-25			2	®, CBI	3
Sweet Orange UF OLL10			2	®, CBI	
Sweet Orange UF OLL-20IR-46			1	®, CBI	3
Sweet Orange UF OLL23			2	®, CBI,2015	3
Sweet Orange UF OLL4	8	70	9	®, CBI	6,285
Sweet Orange UF OLL-5			1	®, CBI	
Sweet Orange UF OLL6			1	®, CBI	
Sweet Orange UF OLL7			2	®, CBI	2
Sweet Orange UF OLL8	10	89	6	®, CBI	20,494
Sweet Orange UF OLL-DC-3-36			3	®, CBI	11
Sweet Orange UF OLL-DC-3-40			3	®, CBI	12
Sweet Orange UF OLL-FB-R10-T19			3	®, CBI	
Sweet Orange UF OLL-FB-R1-T22			1	®, CBI	
Sweet Orange UF OLL-FB-R4-T13			1	®, CBI	
Sweet Orange UF OLL-FB-R4-T4			2	®, CBI	
Sweet Orange UF OLL-FB-R7-T29			3	®, CBI	
Sweet Orange UF OLL-FB-R7-T35			2	®, CBI	
Sweet Orange UF OLL-FB-R9-T33			1	®, CBI	
Sweet Orange UF RBA-21-36			1	®, CBI	2
Sweet Orange UF RBA-22-29			1	®, CBI	4
Sweet Orange UF SFRBA-22-35			1	®, CBI	
Swingle DPI-227	2	88			
Swingle US 22-55	6	348	3		
Sydney Hyb US			2		
Tahoe Gold CGIP-140	1	1	2	®, NV	
Tami CGIP-145	1	1			
Tango CGIP-168	7	18	11	®, NV	3,593
Tangor UF 00-04			1	®, CBI	
Tangor UF 04-10			1	®, CBI	
Tangor UF 11-07			1	®, CBI	
Tangor UF 13-07			1	®, CBI	
Tangor UF 13-15			1	®, CBI	
Tangor UF 15-01			1	®, CBI	
Tangor UF 16-46			1	®, CBI	

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
Tangor UF 16-47			1	®, CBI	
Tangor UF 18-09			1	®, CBI	
Tangor UF 19-07			1	®, CBI	
Tangor UF 20-16			1	®, CBI	
Tangor UF 98-01			1	®, CBI	
Tankan US 2E-4-25			1	®, CBI	
Tarocco B/O UF 30-37			1		272
Tavares Lqt US 9-4-48			2		
TDE-1 CGIP-158			3	®	
Te X Or US 10-15-67			1	®	4
Temple 33-6-15	5	11	3		3,746
Temple LS DPI-75			3		
Thomasville Citrqt US 1-20			1		
Thompson Gft 25-3-6	4	9	4		83
Thong Dee Pum UF 5-8A			1		
Thomson Navel US 6-6			1	®	
Tift C-26 Sourhern Frost Navel CGIP-252	1	2	1	®, CBI	
Tobias 9-10-27			1		
Tresca US 10C-2-4			4	®	
Triumph Gft DPI-32-4			1		110
UF 11-4-1			1	®, CBI	4
UF 11-4-22			1	®, CBI	6
UF 40-2-19			1	®, CBI	2
UF 40-2-21			1	®, CBI	4
UF 40-2-24			1	®, CBI	
UF PB 1-2-3			1	®, CBI	
UF RedLime	1	1	2	®, CBI	1,675
UF Sunlime	1	1	1	®, CBI	1,176
UFR-01 Orange3	3	29	1	®, CBI	4
UFR-02 Orange4	2	14	2	®, CBI	2
UFR-03 Orange15	2	12			
UFR-04 Orange19	5	105	2	®, CBI	
UFR-05 White4	5	78	2	®, CBI	18
UFR-06	3	19	1	®, CBI	4
UFR-07			2	®, CBI	
UFR-08			1	®, CBI	4
UFR-09			3	®, CBI	3
UFR-10			3	®, CBI	
UFR-11			1	®, CBI	4
UFR-12			2	®, CBI	
UFR-14			1	®, CBI	4
UFR-15	1	4	2	®	62
UFR-16	2	10	2	®, CBI	2
UFR-17 Green2	5	46	2	®, PR	
US Florida Red 9-5-20			2		
Ugli DPI-74	1	1	1		
US Furr	2	4	2		
US Furr-ST			5		4

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
US Henderson 9-7-22			3	®, CBI	
US Honeycoat			2		20
US Ortanique-LS			2		
US Redblush 9-8-19			2	®, CBI	
US Seedless Surprise			2	®, NV	
US Sundragon	1	1	2		460
US Superna	2	2	3	®, CBI	250
US-1102			3	®, CBI	
US-1103			1	®, CBI	
US-1104			2	®, CBI	
US-1105			2	®, CBI	
US-1130			3	®, CBI	
US-1137			3	®, CBI	
US-119			1	®, CBI	
US-1271			2	®, CBI	
US-1279	1	6	3	®, CBI	
US-1280			1	®, CBI	
US-1281			3	®, CBI	
US-1282			3		
US-1283	2	22	3		
US-1284	2	22	3		
US-1287			3	®, CBI	
US-1293			3	®, CBI	
US-1297			3	®, CBI	
US-1305			2	®, CBI	
US-1317			3	®, CBI	
US-1318			2	®, CBI	
US-1319			3	®, CBI	
US-1321			3	®, CBI	
US-1460			3	®, CBI	
US-1473			2	®, CBI	
US-1481			2	®, CBI	
US-1516	6	134	1		
US-1611			2	®, CBI	
US-1627			1	®, CBI	
US-1629			1	®, CBI	
US-1637			1	®, CBI	
US-1644			1	®, CBI	
US-1645			3	®, CBI	
US-1649			3	®, CBI	
US-1650			1	®, CBI	
US-1653			1	®, CBI	
US-1659			1	®, CBI	
US-1660			1	®, CBI	
US-1663			2	®, CBI	
US-1664			2	®, CBI	
US-1671			3	®, CBI	
US-1672	1	1	1	®, CBI	

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
US-1673			2	®, CBI	
US-1676			1	®, CBI	
US-1678			1	®, CBI	
US-1679			1	®, CBI	
US-1680			1	®, CBI	
US-1681			1	®, CBI	
US-1687			1	®, CBI	
US-1688			1	®, CBI	50
US-1689			1	®, CBI	
US-1690			3	®, CBI	
US-1692			1	®, CBI	
US-1693			3	®, CBI	4
US-1694			1	®, CBI	
US-1695			2	®, CBI	
US-1696			1	®, CBI	
US-1701			1	®, CBI	
US-1705			1	®, CBI	
US-1709			1	®, CBI	50
US-1710			1	®, CBI	
US-1721			1	®, CBI	
US-1730			1	®, CBI	
US-1740			2	®, CBI	
US-1741			2	®, CBI	
US-1742			1	®, CBI	
US-1744			1	®, CBI	
US-1745			1	®, CBI	
US-1750			1	®, CBI	
US-1753			1	®, CBI	
US-1755			1	®, CBI	
US-1756			1	®, CBI	
US-1757			1	®, CBI	
US-1790			1	®, CBI	
US-1805			1	®, CBI	
US-1837			1	®, CBI	
US-1845			1	®, CBI	
US-1851			1	®, CBI	
US-1859			1	®, CBI	
US-1865			1	®, CBI	
US-1867			1	®, CBI	
US-1872			1	®, CBI	
US-1879			1	®, CBI	
US-1888			1	®, CBI	
US-1892			1	®, CBI	
US-2101			2	®, CBI	
US-2102			2	®, CBI	
US-2103			2	®, CBI	
US-2104			2	®, CBI	
US-2105			2	®, CBI	

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
US-2106			2	®, CBI	
US-2107			1	®, CBI	
US-2108			2	®, CBI	
US-2109			1	®, CBI	
US-2110			2	®, CBI	
US-2111	1	1	3	®, CBI	
US-2121			1	®, CBI	
US-2122			1	®, CBI	
US-2127			1	®, CBI	
US-2131			1	®, CBI	
US-2132			1	®, CBI	
US-2135			1	®, CBI	
US-2136			1	®, CBI	
US-2137			1	®, CBI	
US-2143			1	®, CBI	
US-2153			1	®, CBI	
US-2158			1	®, CBI	
US-2160			1	®, CBI	
US-2170			1	®, CBI	
US-2171			1	®, CBI	
US-2175			1	®, CBI	
US-2195			1	®, CBI	
US-2206			1	®, CBI	
US-2209			1	®, CBI	
US-2213			1	®, CBI	
US-2234			1	®, CBI	
US-2237			1	®, CBI	
US-2249			1	®, CBI	
US-2250			1	®, CBI	
US-2255			1	®, CBI	
US-2256			1	®, CBI	
US-2257			1	®, CBI	
US-2259			1	®, CBI	
US-2264			1	®, CBI	
US-2272			1	®, CBI	
US-2275			1	®, CBI	
US-2276			1	®, CBI	
US-2280			1	®, CBI	
US-2284			1	®, CBI	
US-2287			1	®, CBI	
US-2288			1	®, CBI	
US-2290			1	®, CBI	
US-2292			1	®, CBI	
US-2293			1	®, CBI	
US-2297			1	®, CBI	
US-2300			1	®, CBI	
US-2301			1	®, CBI	
US-2303			1	®, CBI	

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
US-2314			1	®, CBI	
US-2315			1	®, CBI	
US-2325			1	®, CBI	
US-2331			1	®, CBI	
US-2336			1	®, CBI	
US-2338			1	®, CBI	
US-2339			1	®, CBI	
US-2341			1	®, CBI	
US-2342			1	®, CBI	
US-2343			1	®, CBI	
US-2345			1	®, CBI	
US-2351			3	®, CBI	
US-2487			1	®, CBI	
US-2488			1	®, CBI	
US-2489			1	®, CBI	
US-2491			1	®, CBI	
US-2492			1	®, CBI	
US-2493			1	®, CBI	
US-2494			1	®, CBI	
US-2520			1	®, CBI	
US-2701			1	®, CBI	
US-2703			1	®, CBI	
US-2705			1	®, CBI	
US-2706			1	®, CBI	
US-2715			1	®, CBI	
US-376-10			1	®, CBI	
US-376-5			1	®, CBI	
US-376-6			1	®, CBI	
US-376-8			1	®, CBI	
US-377-V1			1	®, CBI	
US-377-V2			1	®, CBI	
US-378-G1			1	®, CBI	
US-378-G2			1	®, CBI	
US-380-P1			1	®, CBI	
US-382-G1			1	®, CBI	
US-383-G1			1	®, CBI	
US-384-P1			1	®, CBI	
US-385-P1			1	®, CBI	
US-386-G1			1	®, CBI	
US-387-G1			1	®, CBI	
US-389-G2			1	®, CBI	
US-390-G1			1	®, CBI	
US-391-P1			1	®, CBI	
US-392-T1			1	®, CBI	
US-393-T2			1	®, CBI	
US-401-P1			2	®, CBI	
US-801			2	®, CBI	
US-802	12	381	5		

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
US-812	13	617	2		
US-852	1	2	3		
US-896	1	10	1	®, CBI	
US-897	10	294	5		
US-942	15	1484	3		
USDA 1-105-106			4	®, CBI	
USDA 1-25-1			2	®, CBI	
USDA 1-37-12			2	®, CBI	
USDA 1-42-65			2	®, CBI	
USDA 1-42-70			2	®, CBI	
USDA 1-43-21			2	®, CBI	
USDA 1-46-30			2	®, CBI	
USDA 1-49-105			3	®, CBI	
USDA 5-51-2			3	®, CBI	
USDA 6-15-150			2	®, CBI	
USDA 6-2-53			2	®, CBI	
Valencia 10-12-7			1		
Valencia 51-3-3			1		
Valencia Appleby UF 11-71			1	®	
Valencia F-55-1			1		
Valencia F-55-23	1	4	1		512
Valencia F-55-28			1		
Valencia F-55-4	7	41	35		5,358
Valencia Late UF N7-2			2	®, CBI	2
Valencia Late UF N10-13			3	®, CBI	2
Valencia Mid UF OLL20	3	9	2	®, CBI	5,694
Valencia Navel 522-15-14	1	13			
Valencia SL UF 2-21			2	®, CBI	
Valencia SPB-1-12-7			3		
Valencia SPB-1-14-19	17	458	59		350,552
Valencia SPB-1-14-31			5		9,500
Valencia UF 1-56			2	®, CBI	2
Valencia UF 1-62			2	®, CBI	2
Valencia UF B9-65	4	13	5	®, CBI	5,850
Valencia UF BHG2-68			2	®, CBI	283
Valencia UF C2A-1-23			1	®, CBI	2
Valencia UF N40-16-7-11			1	®, CBI	535
Valencia UF N7-10			2	®, CBI	2
Valencia UF N9-12			2	®, CBI	2
Valenfresh UF N7-3			4	®, 2015	2
Valquarius LT UF SF14W-62	7	25	7	®, CBI	452
Valquarius UF SF14W-62	3	5	1	®, NV	250
Vangasay Le US 9-1-23			1		
Variegated Minneola F-2-4			1		250
Variegated Pink Le US	5	14	4		13,230
Variegated Rough Le US 10-6-11			3		
Variegated S/O US 18-4			1		
Varn Navel SPB-194-10-2			2		

Budwood Availability	Scion Trees		Chiefland Trees		Propagations
Variety Clone	# Part	#Trees	# Trees	Restricted	
Verna Le DPI-203-20-b	1	3	1	®	
Vernia UF 35-15	12	175	18		41,679
Vernia UF 35-16	1	2			
Vernia UF C2-2-1			1	®, CBI	
Vernia UF MB-R25-T7			1	®, CBI	
Vernia UF MB-R25-T9			3	®, CBI	
Vernia UF C2A-1-10			4	®, CBI	
Volkamer Le US 9-2-19	4	92	3		
W Murcott CGIP-122	4	12	4		3,827
Wash Navel F-60-18	2	5	2		711
Wash Navel F-60-19	3	9	5		12,034
Weeping Dragon			1		5
Wekiwa US 11-7			3		450
Westin UF 47-2			2		4,726
Westin UF 47-13	1	1			150
WG Man 911-02	1	3			
WG Man 911-03	1	3			
WG Man 911-17	1	1			
WG Man 911-32	1	2			
WG Man 911-B-23	1	1			
WG Man 911-B-24	1	1			
WG Man 911-B-26	1	1			
WG Man 911-C-03					24,500
WG Man 911-C-34	1	1			
WG Man 911-C-37	1	419			87,100
WG Man 911-E-22	1	1			
WG Man 911-E-26	1	1			
Wheeny Gft CGIP-183			2		
White Finger Lime UF KB-37			1		2,488
White Man UF 6-16-116			2	®, CBI	10
White Orange DPI-203-18			2		
White Tangelo 956-1			1		
Wild Turkey Navel 941-11-30-1			1		1,244
Willits US 12-8-19	1	41	1		
Willowleaf Man SPB-89-1-1			1		
Willowleaf S/O F-12-9			1		
Winola CGIP-165	1	2			
X-639 DPI-50-8	10	530	3		
Xie Shan Sat CGIP-163	2	2	4		48
Yellow Gft 345-1-15	1	1			
Yosemite Gold CGIP-141	1	1	3	®, NV	
Yuzu F-9-15	3	6	1		153

Special Projects

GIANT AFRICAN LAND SNAIL PROGRAMS
Three emergency programs for the eradication of giant African land snail were established in 2022 and 2023 in Lee, Pasco and Broward counties. Once the pest was detected and identification confirmed, delimiting surveys were conducted to determine the extent of the population. An Incident Command System was set up to run the eradication programs.

In all three events, the reports of snail finds were submitted by homeowners and property owners, then confirmed by the FDACS-DPI lab. Surveys determined emergency programs should be established and the appropriate control activities were set in motion. PE&C staff mobilized, crews contacted property owners, secured signed waivers for survey and treatments and worked with the Office of Agricultural Law Enforcement when necessary to secure warrants from homeowners who declined to sign voluntarily. Employees performed the required surveys (including special event and canine surveys), treatments, debris removal and all other activities associated with the eradication plan on a set rotating schedule. A color alert plan was developed and implemented as a risk-based approach to survey, with treatments and color changes based on last live snails found. The data for all activities is recorded in a database application for emergency programs making current information immediately available for tracking the progress in each program area. DPI's Public Information and Outreach section is involved from the start, manning a Helpline number for consumer reporting and questions, publishing materials for distribution to homeowners, assisting with contacting homeowners to advise them of the program and seeking permission for surveys and treatments, contacting local governments to make agencies aware of our presence and program activities in the area, answering questions and reassure the public, and respond to media requests.

Pasco County
In June 2022, a Pasco County master gardener forwarded photos of snails from a homeowner to the UF/IFAS Extension office for identification. An inspector with the Bureau of Plant and Apiary Inspection visited the property and collected samples which were forwarded to the FDACS-DPI lab and identified as giant African land snail, initiating the eradication program.

At the end of this reporting period, the last live snail found was on December 12, 2023, and the last dead snail on June 25, 2024. To date, 2,425 live snailsand 6,181 dead snails have been collected. Full surveys completed totaled 7,879 and 6,688 treatments performed.

Lee County
In December 2022, a condo association in Lee County alerted the department to a snail find in Ft. Myers. This regulatory incident triggered increased survey and voluntary treatment in the area. The sample was confirmed, and the emergency Incident Command System was initiated.

Continued survey resulted in an increase in the number of snails found, dead and alive, which required the establishment of a quarantine in March 2023.

At the end of this reporting period, the last live snail collected was on April 11, 2023 and the last dead snail was found November 7, 2023. A total of 12 live snails and 88 dead snails have been collected. A total of 1,625 full surveys and 1,040 treatments were completed.

Broward County
In early June of 2023, the first alert with photos of suspect snails was received from a homeowner in Miramar, FL and a Helpline call was received from another homeowner in another neighborhood nearby. The pest was confirmed as giant African land snail and a formal Incident Command System was put in place.

As of the end of this reporting period, the last live snail collected was on September 11, 2023 and the last dead snail on May 21, 2024. A total of 399 live snails and 162 dead snails have been collected. 3,806 full surveys and 2,590 treatments were completed. The program is ongoing.

All three programs continue to survey and treat as required.

LIME SWALLOWTAIL BUTTERFLY SURVEY
On September 26, 2022, a FDACS-DPI scientist was copied on email correspondence related to an iNaturalist post from September 23, 2022. The post included photos of two caterpillars on backyard, potted citrus trees identified as lime swallowtail (*Papilio demoleus*), a federally regulated plant pest. On October 4, 2022, FDACS personnel from CAPS, ENPP and Plant Inspection inspected the potted citrus from the iNaturalist report. They collected one larva and one pupa from the property and sent them to Gainesville for identification. The samples were badly degraded from Hurricane Ian, but FDACS-DPI scientists were able to tentatively identify the larva as *Papilio demoleus.* Molecular analysis confirmed the identification as *Papilio demoleus* on October 13, 2022.

From October 17-21, 2022, a delimitation survey occurred in the Upper and Lower Keys. Eleven state personnel from CAPS, ENPP and Plant Inspection surveyed Key West, Stock Island, Big Pine Key and Florida Keys Farm on Key Largo. Five new positive sites were found on Key West bringing the total to six positive sites.
From November 14– 8, 2022, 11 state personnel from CAPS, ENPP and Plant Inspection conducted another delimitation survey to include Key West, Stock Island, East Rockland Key, Ramrod Key, Big Pine Key, Marathon Key, Plantation Key and Tavernier. Two new positive sites were found on Key West. Survey sites on this trip included eight plant nurseries selling citrus. All nurseries were negative for lime swallowtail. The team also distributed information door hangers and pest alerts to the homeowners located at the positive sites and nurseries with citrus. A total of 198 properties with citrus were surveyed. Two new positive properties were discovered bringing the total to eight positive sites.
From January 23–27, 2023, 17 state personnel from CAPS, ENPP and Plant Inspection conducted a third delimitation survey. On this survey, all previous citrus sites were surveyed and the team expanded outreach to include areas of increased activity, defined as radius four properties out from the previously positive properties. A total of 378 properties with citrus were surveyed and approximately 50 properties received door hangers. There were no positive specimens collected on this survey.

From April 24–28, 2023, 10 state personnel from CAPS, ENPP and the Public Information and Outreach section returned to the Keys to re-survey the known citrus sites on Key West, Stock Island, Plantation Key and Tavernier. A representative from the Public Information and Outreach section accompanied the survey team to visit with homeowners at the previous positive sites to conduct more thorough outreach. The dissemination effort of door hangers was also increased to include approximately 400 homeowners and business sites. One new positive property was added, containing four empty chrysalids later confirmed using molecular technology, bringing the total to nine positive locations. There were 400 negative citrus sites during this period.

From June 19–23, 2023, nine state personnel from CAPS, ENPP and Methods and Technology, returned to Key West to re-survey using a scored priority system to focus on higher areas of importance. The parameters used for scoring sites to create the priority tiers included proximity to a previously known positive site, number of citrus trees present, height of citrus trees and presence of new growth on citrus. No positive specimens were collected during this period. A total of 310 citrus sites were surveyed during this period.

A heavier emphasis was also placed on distribution of door hangers. At the end of this survey, every property possible (residential and business) received a door hanger. Approximately 8,000 door hangers weredistributed in total across all survey dates. The only areas excluded from our activities were the Naval Air Station properties. However, personnel were able to speak with a couple soldiers by random chance meeting and provided them with information and pest alerts to take back to their base.
From February 5–9, 2024, six state personnel from CAPS and ENPP returned to Key West to re-survey in the previously determined high priority tiers. Five suspect specimens were collected and later identified as *Papilio cresphontes* (giant swallowtail or orange dog). A total of 299 citrus sites were survey during this period.
Since the confirmation of the original specimen, there have been six trips to Key West to survey for the lime swallowtail butterfly. At total of 588 sites (Table 1) have been visited across the Keys to conduct survey and/or outreach. At total of nine sites were positive. The last live larva was found on the November 2022 survey. The positive collected during the April 2023 survey was an empty chrysalis.

Table 1. Lime swallowtail survey totals from 10/22/2022 to 02/09/2024 for the Florida Keys.

Survey Location	Citrus Sites Surveyed (positive)	Citrus Sites Surveyed (Negative)	Citrus Sites Surveyed (Total)
Key West & Stock Island	9	488	498
East Rockland Key	0	4	4
Ramrod Key	0	1	1
Big Pine Key	0	41	41
Marathon Key	0	42	42
Plantation Key	0	1	1
Tavernier Key	0	1	1
Total	**9**	**578**	**588**

Total positive specimens from the surveys: 20 (8 larvae, 11 empty chrysalids and 1 pupa)

BACTROCERA ZONATA (SAUNDERS), PEACH FRUIT FLY, A REGULATORY INCIDENT

A single male specimen was captured in a Jackson trap baited with methyl eugenol, hung in an oak tree (*Quercus* sp.), in Davie. Increased trap densities in a 79-square-mile area around the detection site were maintained and traps were monitored closely for an estimated two life cycles. No additional flies were found, and the delimitation program was terminated on 14 June 2023. (Broward County; E1803-01-04042023; William A. Thiel, USDA-APHIS; 3 April 2023.) (Erick J. Rodriguez.)

BACTROCERA ZONATA (SAUNDERS), PEACH FRUIT FLY, A REGULATORY INCIDENT

A single male specimen was captured in a Jackson trap baited with methyl eugenol, hung in a mango tree, in Hallandale Beach. Increased trap densities in a 68-square-mile area around the detection site were maintained and traps were monitored closely for two life cycles. No additional flies were found, and the delimitation program was terminated on 28 June 2023. (Broward County; E2274-01-04212023; Carlene Sargeant, DPI; 20 April 2023.) (Erick J. Rodriguez.)

BACTROCERA DORSALIS COMPLEX (HENDEL), ORIENTAL FRUIT FLY, A REGULATORY INCIDENT

A single male specimen was captured in a Jackson trap baited with methyl eugenol, hung in a mango tree, in Winter Park. Increased

trap densities in an 81-square-mile area around the detection site were maintained and traps were monitored closely for two life cycles. No additional flies were found, and the delimitation program was terminated on 29 August 2023. (Orange County; E3694-01-07062023-07045; Bridget Herbes, USDA-APHIS-PPQ; 05 July 2023.) (Drs. Craig H. Welch and Erick J. Rodriguez.)

BACTROCERA CORRECTA (BEZZI), GUAVA FRUIT FLY, A REGULATORY INCIDENT

A single male specimen was captured in a Jackson trap baited with methyl eugenol, hung in an oak tree, in Tampa. Increased trap densities in an 80-square-mile area around the detection site were maintained and traps were monitored closely for two life cycles. No additional flies were found, and the delimitation program was terminated on 11 October 2023. (Hillsborough County; E4383-01-08152023-08360; Michael Weiss, USDA-APHIS-PPQ; 14 August 2023.) (Drs. Craig H. Welch and Erick J. Rodriguez.)

BACTROCERA DORSALIS (HENDEL), ORIENTAL FRUIT FLY, A REGULATORY INCIDENT

A single male specimen was captured in a Jackson trap baited with methyl eugenol, hung in a turkey oak tree, in Palm Harbor. Increased trap densities in a 64-square-mile area around the detection site were maintained and traps were monitored closely for two life cycles. No additional flies were found, and the delimitation program was terminated on 17 July 2024. (Pinellas County; E2826-01-05232024-05467; James Zapko, FDACS-DPI; 22 May 2024.) (Drs. Craig H. Welch and Erick J. Rodriguez.)

FIELD COLLECTING NATURAL ENEMIES OF BAGRADA BUG

In 2023, Dr. Elijah Talamas travelled to the International Centre of Insect Physiology and Ecology (ICIPE), Nairobi, Kenya, to curate specimens in the ICIPE insect collection and select specimens to include in ongoing research on parasitoids of stink bug eggs. This was followed by one week in southern Kenya, collecting specimens at a variety of field sites for research on parasitoids and to bolster the African holdings of the Florida State Collection of Arthropods.

DNA BARCODING TO IDENTIFY INTRODUCED SPECIES

Dr. Elijah Talamas, Matthew Moore, Dr. James Fulton, and Jonathan Bremer published the results of a years-long study. Malaise traps at the port of Jacksonville collected fresh specimens that were used to generate DNA barcode sequences. These specimens were also morphologically matched to historical holotype specimens collected in Jacksonville at the turn of the 20th century. The DNA sequences were used to determine that many species in Florida have intercontinental distributions. The methods provided in their publication enable large-scale analysis of DNA data for any organism.

SUCTION TRAP SURVEY

Dr. Susan Halbert, Catherine Nance, Helen Beiriger, Ashley Sturgill, and Benjamin Eickwort have continued to implement a Suction Trap Survey to monitor pests in Florida. Suction traps are large machines that sample air continuously for flying insects. They are made of 15-inch diameter PVC pipe, mounted vertically on 4X4 posts about 18 inches above ground. There is a motor in the bottom that sucks insects flying above the trap into a screen cone, and from there into a jar of preservative. Some of the traps (tall) have a 20ft tower mounted on the top of the 6 foot section that contains the motor. The traps run continuously on commercial power, and samples are collected approximately once a week. During much of this reporting period, there were seven traps located in Miami (1 tall), Belle Glade (1 tall), Immokalee (1 tall, 2 short), and Winter Haven (1 tall and 1 short). The traps were responsible for four Continental USA records and 33 county records during this reporting period.

DELPHACID SURVEY PROJECT

Although the grant funding is done, surveys of rice paddies and sugarcane fields in the Everglades Agriculture Area have continued, and Dr. Susan Halbert and Catherine Nance have continued to process the samples. There were 120 samples in 2022 and 130 samples in 2023. No new pest Hemiptera were found; however, we continued to find specimens of *Balclutha jafara*, the African and Seychelle Islands leafhopper discovered in Florida in 2021.

To assist CAPS efforts in monitoring for *Laodelphax striatellus* (Fallén), one of the world's most destructive agricultural pests, we identified 126 delphacids from trap samples submitted by the CAPS team. No targets were found.

FLORIDA PSYLLID TRAP SURVEY

Dr. Susan Halbert and Catherine Nance continued to implement Florida psyllid traps, designed and manufactured in the FDACS-DPI 3-D print laboratory. They are used to monitor for potato psyllids in over 80 high risk locations in Florida. Entomology staff made identifications of all Hemiptera. Fortunately, no potato psyllids were found, but the traps yielded at least 27 county records for various Hemiptera. Three of the county records during this reporting period were for psyllids.

CATALOGUING OF PRIMARY TYPE SPECIMENS

Progress on the catalogues of primary type specimens in the FSCA was made with annotated and illustrated publications on Hemiptera, Mecoptera, and Myriapoda published in Zootaxa. Publications on the type material of Arachnida and Diptera are nearing completion. Multiple staff members have collaborated on these efforts including Dr. Erin Powell, Dr. Susan Halbert, Dr. Oliver Keller, Dr. Samuel Bolton, Louis Somma, Lily Deeter, Sajan KC, Ann Dunn, Kath Daly, and others.

TAXONWORKS DIGITIZATION PROJECTS

During this Biennium, we have made increasingly rapid progress towards participating in the global vision of the 'extended specimen', modernizing and maximizing the value of the FSCA. Curating data into digital forms is increasingly essential to create value and impact for our collections, providing scientific data directly to researchers, creating interfaces by which the public can explore our holdings, and quantifying metrics. We have established a relationship with Taxonworks, to be the main repository for our specimen-level database. Taxonworks is a free, open-source digitization platform that facilitates museum specimen data to be served to the broader community by capturing, organizing, enriching, and sharing data. Different projects are underway to make data from our collections widely available online through

collaborative data aggregators and our own institution's portal. Approximately 500 specimens are being added per week by our diverse staff with a total of 14681 records between July 1st 2022 to June 30th 2024.

SCALENET DIGITIZATION

In the summer of 2024, a cooperative research agreement was established with the USDA for FDACS-DPI / FSCA to take over the management and development of ScaleNet, an internationally renowned database founded in 1995 that documents scale insect biological, ecological, and taxonomic information. It is a critical information resource worldwide for federal and state regulatory agencies, scientists, biological control personnel, pest management specialists, homeowners, and more. As of November 2024, ScaleNet contains data from 25,893 references pertaining to 8,566 valid species names. In 2020 alone, the website had over 3 million hits by ~17,600 independent users across 171 countries. Under our direction (research scientist Dr. Erin Powell, research associates Dr. Douglass Miller and Barbara Denno, and technician Rhys Campo), ScaleNet is being transitioned to Taxonworks to be able to aggregate and query complex data with long-term technical support.

DIGITIZATION OF PREDATORY MITES

The acarology lab has a collection of 1500 type specimens, including one of the largest collections of predatory mites (Phytoseiidae) in the world. These mites are important for the biological control of plant pests, including spider mites and thrips. But there are major problems in the taxonomy and identification of Phytoseiidae due to a range of factors. Therefore, the type specimens are being imaged. This work will lead to a number of taxonomic revisions that will aid other workers in identifying potentially important biological control agents for many pests. Some of the taxonomic revisions are already published (Döker et al., 2023; Döker et al., 2024). This work is being undertaken in collaboration with specialists of predatory mites in Turkey and Brazil. This work should be completed by the end of 2028.

KEY FOR AGRICULTURALLY IMPORTANT MITES

The FSCA houses one of the most extensive collections of agriculturally important mites in all of North America. Extensive imaging of this collection is being used to develop an electronic lucid key for the identification of spider mites and eriophyoids. This work is being undertaken by Samuel Bolton in collaboration with the USDA (APHIS and ARS). This work should be completed by the end of 2026.

REINTERPRETATION OF THE MORPHOLOGY AND TAXONOMIC STATUS OF MITES

Mites have been treated as a single taxonomic group with a shared morphology. But recent molecular evidence suggests mites are two very distinct groups. Samuel Bolton has been reinterpreting the morphology across mites, including their pattern of body segmentation (Bolton, 2022). Based on his findings, Dr. Bolton is finding that the case for mites representing a single and distinct lineage has been overstated. The two main lineages are not nearly as similar nor as distinct from other arachnids as is often thought. This project is now very near completion (probably by the end of Summer, 2025) and it will result in one final publication.

Bolton, S. J. (2022) *Proteonematalycus wagneri* Kethley reveals where the opisthosoma begins in acariform mites. *PLoS One, 17*, e0264358.

PHYLOGENETIC POSITION OF ERIOPHYOIDEA

Eriophyoidea (gall mites) represent one of the most economically important groups of mites. Molecular and morphological studies by Samuel Bolton and various collaborators show that these mites have been placed in completely the wrong taxonomic position (Klimov et al., 2018). Instead they belong with a group of worm-like mites that live in the soil (Bolton et al., 2023). This project, which begun before Dr. Bolton began working at FDACS, is now complete.

Collections

FLORIDA STATE COLLECTION OF ARTHROPODS
The Florida State Collection of Arthropods (FSCA), contains over 12 million specimens [see our website at https://thefsca.org/]. The museum's mission is to build the best possible worldwide collection of terrestrial and aquatic arthropods in support of research, education, and the regulatory functions of FDACS-DPI.

Updates to the Florida State Collection of Arthropods
The old fumigation building of the DPI that was remodeled to house the wet collections, is now called the Woodruff – Weems Special Collection Building. We continued moving into the building, curating many different collections, and work to finalize the facilities.

In the main Doyle Conner Building, remodeling of Entomology rooms E117 and E123 (where the alcohol collections were previously held) was completed winter 2024. These rooms now have several office cubicles, a sample reception area, work counters and additional compactors for the slide collection. This added needed workspace and storage for the growing staff and slide collections.

The new FSCA website continues to be improved and expanded to host more information about our staff, collections, and publications that are too numerous to be hosted by FDACS. With this base, our next step it to start adding information for the different orders and curatorial staff projects.

Research Associates Program
The 2022-2024 Biennial period saw a reinvigoration of our Research Associate Program. We currently have 97 active research associates, with 13 associates visiting for over 200 total museum days. Additionally, we had 80 different non-associate scientists visit for a total of over 250 museum days.

Young Scholars Program
In the second half of the biennium, Dr. Trevor Smith, Dr. Paul Skelley, and Dr. Kyle Schnepp facilitated the first iteration of the Florida State Collection of Arthropods Young Scholars Program with five high school aged students. This program invites students to gain hands-on experience in Entomology through the resources offered by the museum, including equipment and literature. Students collect insect specimens, process specimens following the standards set by the scientific community and contribute to and curate parts of the FSCA. Students also learn the value of specimen data, sharing their data with online natural history collection aggregators, such as the Global Biodiversity Information Facility (GBIF) to see how the larger community uses these data. The program recently developed collaboration to include field work at the University of Florida's Ordway-Swisher Biological Station.

Acquisitions
For the 2022-2024 Biennium, the FSCA received 35 separate donations, totaling over 97,000 specimens. Non-staff generated acquisitions include materials from Robert Beiriger, James Berry, David Bixler, Richard Boscoe, Carl Cook, Terhune Dickel, Thomas Donnelley, Joe Eger, David Fine, Wills Flowers, Raymond and Nancy Frey, Rosser Garrison, Robert Godefroi, Vince Golia, William Gregory, Minjin Hao, John Heppner, Dave Horn, Oliver Keller, Michael Kippenhan, Peter Kovarik, William Mauffray, Rodney and Marjorie Miller, Zachary Prusak, Mark Rothschild, Fred Skillman, Jeff Slotten, Fred and Alice West and Frank Young.

Along with the donations, annual contributions by Research Associates and staff additions, the FSCA received (it would be nice to put something about the more notable donations, but I am not sure what). Notable collections received were:

Long-time Research Associate Dr. J. Howard Frank died in early 2022, the FSCA acquired his collection of Staphylinidae, which contained roughly 25,000 specimens, a majority of which are from West Indian countries like Jamaica where Howard began his career.

Vince Golia donated his entire insect collection, mostly beetles (2022-2023). Vince collected mostly in southern Florida and found many new state and continental records for FDACS.

The Entomology section continues to receive substantial donations of Odonata from Thomas Donnelley, Rosser Garrison and William Mauffray.

A 2022 donation of a fossilized Cerambycid larva in petrified wood from Rodney Miller, is the only known fossil of the type. This and other fossils were exhibited in the Florida Museum of Natural History's "Incredible Insects" display over the summer of 2024.

FSCA Loans

The Florida State Collection of Arthropods facilitated 174 loans in the 2022-2024 period. The majority of the loans were from the Coleoptera section and in the second half of the biennium.

	2022-2023 Fiscal Year	2023-2024 Fiscal Year
Coleoptera	48	75
Hemiptera	11	14
Lepidoptera	6	4
Diptera	1	1
Hymenoptera	3	3
Thrips and non-insects	6	2
TOTALS	**75**	**99**

FSCA Tours

Following the end of Covid-19 Pandemic restrictions, the FSCA saw an increase in tours, giving at least 50 tours in the past two years. These tours have involved groups from the neighboring University of Florida, visiting researchers and members of the public.

FLORIDA CITRUS ARBORETUM

The Arboretum, housed at our Winter Haven location, currently showcases over 250 unique and historical citrus varieties and citrus relatives. We continue to make improvements to the grounds that enhance the Arboretum. Originally planted in 1975 on six and a half acres, the Arboretum contains citrus germplasm from all over the world. Commercial citrus along with many unique citrus hybrids and relatives are available for researchers, breeders, FFA groups, college students and tourists to observe, evaluate and taste. HLB remains our largest challenge, and we continue to replant using our own specially designed Individual Plant covers and follow standard industry caretaking practices. The Arboretum reflects newer releases as well as older line varieties, hybrids and relatives. Vacant spots are always available to leave room for the next great variety.

The Citrus Budwood Technical Advisory Committee (CBTAC) was formed in 1996 and made up of citrus growers, nurserymen, researchers and regulators. The CBTAC is proactive in addressing new regulatory concerns as new pest and diseases come about. Having industry stakeholders as a committee of voting members gives a key say in deciding their own destiny. The Citrus Budwood Technical Advisory Committee provides oversight to the Citrus Nursery Stock Certification Program. The committee did not meet in 2022 or 2023.

Appendix A

Employee Directory

Full Name	Org Name	Class Title
Abu-Sbeitan, Fatimah	Technical Assistance	OPS
Aguilera, Carlos	Plant Inspection	OPS
Alarcon, Jazmin	Plant Inspection	Environmental Specialist I
Albritton, Kiley	Maintenance	Property Administrator III - SES
Alcantara Brandt, Marian	Plant Inspection	Environmental Specialist I
Aleman Martinez, Juan	Plant Inspection	Environmental Supervisor I - SES
Alonso, Iris	Apiary Inspection	Environmental Specialist I
Alvarado, Ernesto	Plant Inspection	OPS
Anderson, Glenda	Plant Inspection	Administrative Secretary
Anderson, James	Plant Inspection	Environmental Specialist II
Anderson, Patti	Office Of Systematic Botany	Biological Scientist IV - SES
Andrews, Ethan	Pest Eradication & Control	Environmental Supervisor I - SES
Anto, Justin	Plant Inspection	Environmental Specialist II
Arata, Piero	Pest Eradication & Control	OPS
Armao, Patrick	Fruit Fly Protocol	Certification Specialist-Dacs - SES
Arroyo Sisco, Jose	Methods Development	OPS
Ashman, Krystal	CAPS Combined Survey	Biological Scientist IV - SES
Atchia, Isabelle	Entomology	OPS
Averhoff Chirino, Carlos	Plant Inspection	Natural Sciences Manager I
Averhoff, Elizabeth	Plant Inspection	Operations Analyst I
Avila-Caceres, Iliana	Pest Eradication & Control	Environmental Specialist I - SES
Aviles, Elsie	Plant Inspection	Administrative Secretary
Bachar, Sarah	Plant Inspection	Environmental Specialist II
Bair, Douglas	Maintenance	Maintenance Mechanic
Balderas, Berenice	Methods Development	OPS
Banaszek, Michael	Biological Control Rearing Facility	Biological Scientist III - SES
Bargeon, Arial	Bureau Of Citrus Budwood Registration	OPS
Barnett, Harold	Apiary Inspection	Environmental Specialist I
Barrios, Vincent	Plant Inspection	Environmental Specialist II
Bartlett, Abby	Plant Inspection	Environmental Supervisor I - SES
Bateman, Thomas	Pest Eradication & Control	Environmental Specialist I - SES
Batson Jr, Douglas	Pest Eradication & Control	Environmental Administrator - SES
Baumgardner, Tracy	Plant Inspection	Administrative Assistant III - SES
Beesley, Ethan	Pest Eradication & Control	Environmental Specialist I
Beiriger, Helen	Entomology	OPS
Bell, Jared	Maintenance	OPS
Ben-Avraham, Rachel	Hemp/Permitting	Administrative Assistant I
Benda, Nicole	Biological Control Rearing Facility	Biological Scientist IV - SES
Benitez, Brianna	Bureau Of Citrus Budwood Registration	Biological Scientist III
Benjamin, Victoria	Plant Inspection	Environmental Specialist II
Bennett, Carl	Pest Eradication & Control	OPS
Bennett, Sidney	Entomology	OPS
Benoist, Karla	Bureau Of Citrus Budwood Registration	Operations Analyst II
Benson, Bryan	Office Of Director Of Plant Industry	Operations And Program Manager
Bentley, Michael	Plant Inspection	Environmental Specialist II

Full Name	Org Name	Class Title
Berryman, Scott	Plant Inspection	Environmental Specialist II
Bill, Nicole	Plant Inspection	OPS
Blakey, Lisa	Fruit Fly Protocol	Agriculture & Consumer Protect Inspector
Blaney, Richard	Plant Inspection	Environmental Specialist II
Blatch, William	Fruit Fly Protocol	Agriculture & Consumer Protect Inspector
Blattenberger, Cynthia	Plant Inspection	Environmental Specialist I
Bloom, Richard	Plant Inspection	Environmental Specialist II
Bolton, Samuel	Entomology	Biological Scientist IV - SES
Bongiovanni, Antonio	Bureau Of Citrus Budwood Registration	Agriculture And Consumer Protect Spec
Bouie, James	Bureau Of Citrus Budwood Registration	OPS
Bracey, Donald	Plant Inspection	Environmental Specialist II
Brady, Robert	Bureau Of Citrus Budwood Registration	Operations & Mgmt Consultant Mgr - SES
Breier, Brittny	Fruit Fly Protocol	Agriculture & Consumer Protect Inspector
Bremer, Jonathan	Entomology	Biological Scientist II
Brito, Janete	Nematology	Biological Scientist IV - SES
Brodie, Matthew	Plant Inspection	Environmental Supervisor I - SES
Brown, Alleen	Pest Eradication & Control	OPS
Brown, David	Plant Inspection	Environmental Specialist II
Brown, Lance	Plant Inspection	Environmental Specialist II
Brown, Sean	Plant Inspection	Environmental Specialist II
Bryan, Jacob	Plant Inspection	Environmental Specialist II
Burke, Richard	Pest Eradication & Control	Agriculture And Consumer Protect Spec
Burnette, Kevin	CAPS Combined Survey	Computer Programmer Analyst I
Burton, Scott	Technical Assistance	Publications Production Specialist II
Buss, Eileen	Entomology	OPS
Caetano, Leticia	Plant Pathology	OPS
Cambana, Carlos	Plant Inspection	OPS
Camp, Nina	Plant Inspection	OPS
Campbell, Sammy	Plant Inspection	OPS
Caraballo, Ivan	Maintenance	Custodial Worker
Carbon, Peter	Bureau Of Citrus Budwood Registration	Environmental Specialist II
Carrasquilla, Suhayla	Plant Inspection	Environmental Specialist II
Carter, Donna	Pest Eradication & Control	Property Specialist
Carter, James	Pest Eradication & Control	Environmental Supervisor I - SES
Casanas, Reinaldo	Plant Inspection	Environmental Specialist II
Cassarino, Jesse	Plant Inspection	Environmental Specialist I
Castilleja, Robert	Fruit Fly Protocol	Agriculture & Consumer Protect Inspector
Casuso, Nicole	Entomology	Biological Scientist IV - SES
Cayia, Edward	Hemp/Permitting	Biological Scientist II
Cheng, Wai	Plant Inspection	OPS
Chitty, Christina	Technical Assistance	Public Information Director - SES
Churchill, William	Plant Inspection	Environmental Specialist II
Clark, Jackie	Plant Pathology	Administrative Assistant I
Clemen, Catherine	Bureau Of Citrus Budwood Registration	Agricultural Technician III
Coggins, Vester	Maintenance	Maintenance Mechanic
Colon-Collazo, Maria	Pest Eradication & Control	OPS
Combee, Lynn	Diagnostics	Laboratory Technician IV
Cook, Daisy	Personnel - Plant Industry	Senior Management Analyst I - SES
Cooper, Jonathan	Bureau Of Citrus Budwood Registration	OPS
Cottrell, Veronica	Plant Inspection	Environmental Specialist I
Counts, William	Plant Inspection	Environmental Specialist I
Craig, Alexia	Methods Development	Administrative Assistant II
Crocker, Harry	Fruit Fly Protocol	Agriculture & Consumer Protect Inspector
Croft, Amy	Methods Development	Biological Scientist I
Cruz, Maria	Pest Eradication & Control	OPS
Culpepper, Charles	Bureau Of Citrus Budwood Registration	OPS
Cutts, Logan	Plant Inspection	Environmental Specialist II
Cutts, Stephen	Apiary Inspection	Environmental Specialist I

Full Name	Org Name	Class Title
Daly, Kathryn	Entomology	OPS
Daniels, Cathy	Plant Inspection	Senior Word Processing Systems Operator
Danner, Bradley	CAPS Infrastructure	Biological Administrator III - SES
Davila, Alexander	Pest Eradication & Control	Environmental Supervisor I - SES
Davila, Jarrod	Plant Inspection	Environmental Specialist II
Davis, Charles	Plant Inspection	Environmental Specialist I
Davis, David	Biological Control Rearing Facility	Laboratory Technician III
Davis, Emilie	Methods Development	OPS
Davis, Jakira	Plant Inspection	OPS
Davis, James	Apiary Inspection	Environmental Specialist I
Dawkins, Drake	Data Processing - Plant Industry	Systems Project Analyst
De La Paz, Alexander	Office Of Systematic Botany	Biological Scientist II
Dean, Randall	Bureau Of Citrus Budwood Registration	Environmental Supervisor I - SES
Deeter, Lily	Entomology	Biological Scientist II - SES
Dennin, Louis	Apiary Inspection	Operations Analyst I
Denoux, Robert	Hemp/Permitting	Environmental Specialist II
Destefano, Karen	Plant Inspection	Environmental Specialist I
Deuel, Trudi	Entomology	OPS
Dey, Kishore	Plant Pathology	Biological Scientist IV - SES
Di Lella, Brandon	Plant Inspection	Environmental Specialist II
Dickens, Katrina	Biological Control Rearing Facility	Biological Scientist IV - SES
Dieterle, Madeline	Diagnostics	OPS
Dixon, Paola	Methods Development	OPS
Dodgen, Carly	CAPS Infrastructure	OPS
Doeblin, Kristin	Plant Inspection	Environmental Specialist II
Dombeck, Lucas	Nematology	Laboratory Technician I
Domenech, Sandra	Plant Inspection	Environmental Specialist II
Dorman, Nicholas	Entomology	Biological Scientist III - SES
Douglas, Kelly	Plant Inspection	Environmental Supervisor I - SES
Duever, Carolyn	Data Processing - Plant Industry	Data Processing Manager - SES
Dulzaides, Maria	Plant Inspection	Environmental Specialist II
Dunn, Anthony	Data Processing - Plant Industry	Distributed Computer Systems Analyst - S
Durrell, James	Hemp/Permitting	Biological Scientist IV
Eby, Jeffrey	Library	Librarian Specialist
Echevarria-Garcia, Maria	Plant Inspection	Environmental Specialist I
Echols, Mary	Plant Inspection	Environmental Specialist II
Edmondson, Vaden	Plant Inspection	Environmental Specialist I
Ellis, Kenneth	Plant Inspection	Environmental Specialist II
Emerson, Justin	Methods Development	Laboratory Technician IV
Emery, Tyson	Plant Inspection	Chief Of Plant & Apiary Inspection-Dacs
Epperson, Kiley	Diagnostics	Biological Scientist I
Ernst, Michael	Plant Inspection	Environmental Specialist I
Escobar, Haydee	Plant Inspection	Environmental Supervisor I - SES
Espino Martinez, Renan	Plant Inspection	Environmental Specialist II
Esquivel, Geovani	Pest Eradication & Control	Environmental Supervisor I - SES
Estrada, Selina	Pest Eradication & Control	Environmental Supervisor II - SES
Evans, Marcellus	Plant Inspection	Staff Assistant
Ezell, Justin	Bureau Of Citrus Budwood Registration	Chief Of Citrus Budwood Reg-Dacs
Fairbanks, Katherine	Methods Development	Biological Administrator III - SES
Fairbanks, Regina	Fiscal Office - Plant Industry	Accounting Services Administrator - SES
Falletta, David	Pest Eradication & Control	Environmental Specialist I - SES
Farina, Gregg	Plant Inspection	Environmental Specialist II
Feist, Connor	Plant Inspection	Environmental Specialist II
Finch, Allison	Entomology	OPS
Fitzpatrick, Donna	Bureau Of Citrus Budwood Registration	Agricultural Technician III
Flanagan, Matthew	Methods Development	OPS
Floyd, Bobby	Plant Inspection	Environmental Specialist II
Frechette, Jeanie	Plant Inspection	Environmental Specialist II

Full Name	Org Name	Class Title
Frere, Maya	Methods Development	Biological Scientist II
Fryman, Melanie	Bureau Of Citrus Budwood Registration	Biological Scientist III
Fulton, James	Diagnostics	Research Scientist I-Cit
Furgeson, Sara	CAPS Combined Survey	Laboratory Technician IV
Furnas, Maria	Plant Inspection	Administrative Secretary
Garcia Montesino, Yvette	Plant Inspection	OPS
Gardner, Glen	Plant Inspection	Systems Project Analyst
Garibay, Maria	Pest Eradication & Control	OPS
Garibay, Martha	Pest Eradication & Control	OPS
Garrett, Sharon	Pest Eradication & Control	Environmental Specialist I
Gaskin, Ariana	Methods Development	OPS
Gaspar, Petrona	Pest Eradication & Control	OPS
Gasparro-Brewer, Jude	Entomology	Laboratory Technician IV
Gentile, Sarah	Fruit Fly Protocol	Agriculture & Consumer Protect Inspector
George-Hill, Darleen	Methods Development	Laboratory Technician IV
Gilbert, Janet	Technical Assistance	OPS
Gill Sanabria, Jose	Apiary Inspection	Environmental Supervisor I - SES
Glasgow, Daphne	Technical Assistance	Information Specialist II - SES
Glass, Dennis	Pest Eradication & Control	OPS
Gmitter, Kacie	Plant Inspection	Environmental Specialist II
Godinez, Esteban	Plant Inspection	OPS
Golden, Kevin	Pest Eradication & Control	Environmental Specialist I
Golden, Walter	Plant Inspection	Environmental Specialist II
Gomez, Juan	Pest Eradication & Control	OPS
Gonzalez Espino, Pavel	Plant Inspection	OPS
Gonzalez Leyva, Maria	Plant Inspection	Environmental Specialist II
Gonzalez, Ariadna	Plant Inspection	Environmental Specialist II
Gonzalez, Charles	Plant Inspection	Environmental Supervisor II - SES
Gonzalez, Katherine	Plant Inspection	Environmental Specialist II
Gonzalez, Margarita	Pest Eradication & Control	OPS
Graham, Mary	Plant Inspection	Environmental Specialist II
Grainger, Dalton	Methods Development	OPS
Greco, Daniel	Data Processing - Plant Industry	Information Tech Business Consult - SES
Greer, Deborah	Entomology	Senior Clerk
Grinder, Scott	Fiscal Office - Plant Industry	Accountant II
Griner, Mitchell	Bureau Of Citrus Budwood Registration	OPS
Groninger, Chase	Plant Inspection	Environmental Specialist II
Grume, Grayson	Plant Inspection	Environmental Supervisor I - SES
Guia Riquenes, Yamiley	Plant Inspection	Environmental Specialist II
Guzman, Magdony	Pest Eradication & Control	OPS
Halbert, Susan	Entomology	Biological Scientist IV - SES
Haley, Justin	Fruit Fly Protocol	Agriculture & Consumer Protect Supv -SES
Hall Jr, James	Maintenance	OPS
Hall, Jordan	Pest Eradication & Control	OPS
Hames, Anya	Methods Development	OPS
Hames, Darci	Division Training Coordinator	Operations Analyst II
Hamm, Denise	Personnel - Plant Industry	Operations & Mgmt Consultant I - SES
Hansen, Deann	Plant Inspection	Environmental Specialist I
Hansen, Jodi	Plant Pathology	Biological Scientist IV - SES
Hanus, Joseph	Bureau Of Citrus Budwood Registration	Groundskeeping Supervisor II - SES
Harris, Gari	Pest Eradication & Control	OPS
Harrity, Catherine	Plant Inspection	Administrative Assistant I
Hart, Sam	Plant Inspection	Environmental Specialist II
Hartz, Stefan	Plant Inspection	Environmental Specialist I
Hayden, James	Entomology	Research Scientist I
Headley, Sara	Maintenance	OPS
Hector, Elhansville	Plant Inspection	Environmental Specialist II
Henry, Jennifer	Plant Inspection	Environmental Specialist I

Full Name	Org Name	Class Title
Hernandez Reyes, Jhosuan	Pest Eradication & Control	OPS
Hernandez Sosa, Norberto	Plant Inspection	Environmental Specialist II
Hernandez, Jimmy	Plant Inspection	Environmental Specialist II
Hernandez, Miguel	Plant Inspection	Environmental Specialist I
Hesse, Jennifer	Plant Inspection	Environmental Specialist I
Hicks, Jacob	Plant Inspection	Environmental Specialist I
Hildebrandt, Stephen	Bureau Of Citrus Budwood Registration	Environmental Manager - SES
Hinshaw, Cathy	Pest Eradication & Control	Administrative Secretary
Hoad, Erin	Maintenance	Senior Clerk
Hoad, Winter	Technical Assistance	Publications Production Specialist II
Hodges, Diere	Plant Inspection	Environmental Specialist II
Hodges, Greg	Office Of Director Of Plant Industry	Assistant Dir Of Plant Industry-Dacs
Hommel, Virginia	Pest Eradication & Control	Administrative Assistant II
Horsburgh, Robert	Apiary Inspection	Environmental Specialist I
Howard, James	Plant Inspection	Environmental Specialist II
Howard, Tracy	Plant Inspection	Environmental Supervisor I - SES
Huetcher, Christina	Plant Inspection	Environmental Specialist I
Huggins, Kareema	Fiscal Office - Plant Industry	Grants Specialist Supervisor II - SES
Hughes, Holly	Technical Assistance	Public Information Specialist - SES
Hutcherson, Angela	Plant Inspection	Environmental Specialist II
Hymes, Terri	Plant Inspection	Administrative Assistant I
Inkel, Lee Ann	Personnel - Plant Industry	Senior Management Analyst II - SES
Inserra, Renato	Nematology	Biological Scientist IV - SES
Jarboe, Holly	Plant Inspection	Environmental Supervisor I - SES
Jarrett, Raymond	Plant Inspection	Environmental Supervisor I - SES
Jenkins, Erin	Apiary Inspection	Assistant Chief-Inspection - SES
Jenner, Stephen	Plant Inspection	Environmental Specialist II
Jimenez, Linda	Pest Eradication & Control	OPS
Johnson, Andrew	Entomology	OPS
Johnson, Elizabeth	Pest Eradication & Control	OPS
Johnson, Rayya	Fiscal Office - Plant Industry	Professional Accountant
Jones, Callie	Plant Pathology	Laboratory Technician IV
Jones, Cheryl	Plant Inspection	Environmental Manager - SES
Joseph, David	Maintenance	Maintenance & Construction Supt - SES
Joseph, Tyler	Pest Eradication & Control	Environmental Specialist I - SES
Jusino, Mercedes	Bureau Of Citrus Budwood Registration	Laboratory Technician II
Kej, Elena	Plant Inspection	Environmental Specialist I
Kernahan, Shelby	Plant Pathology	OPS
Khousakoun, Philayrack	Plant Inspection	Environmental Specialist I
Kiefer, Hannah	Biological Control Rearing Facility	Laboratory Technician III
Knox, Zachary	Plant Inspection	Environmental Specialist II
Krok, Jesse	Plant Inspection	Environmental Specialist II
Krueger, Rebecca	Office Of Systematic Botany	OPS
Krueger, Scott	Plant Inspection	Environmental Specialist II
Lai, Kin-Kwan	Bureau Of Citrus Budwood Registration	Biological Scientist IV - SES
Lamb, Phillip	Pest Eradication & Control	OPS
Landress, Craig	Bureau Of Citrus Budwood Registration	Environmental Specialist II
Laster, Jeff	Plant Inspection	OPS
Lastra, Kimberly	Methods Development	OPS
Laurint, Mark	Plant Inspection	Environmental Specialist II
Lawrence, Alicia	Data Processing - Plant Industry	Systems Project Analyst - SES
Lawrence, Wentworth	Fruit Fly Protocol	OPS
Lebron-Rivera, Ana Margarita	Bureau Of Citrus Budwood Registration	Environmental Specialist II
Leon, Natalie	Methods Development	OPS
Leonardo, Robert	Pest Eradication & Control	OPS
Levy, Andrew	Entomology	Biological Scientist I
Lewellyn, Taylor	Bureau Of Citrus Budwood Registration	Agricultural Technician III
Li, Chunfang	Plant Pathology	Biological Scientist II

Full Name	Org Name	Class Title
Lotz, Gloria	Methods Development	Biological Scientist III - SES
Lotz, Jeffrey	Technical Assistance	OPS
Love, Katherine	Data Processing - Plant Industry	Geographic Information System Technician
Lucas, Alyssa	Methods Development	Biological Scientist IV - SES
Luiggi, Edgardo	Plant Inspection	OPS
Maclean, Liam	Bureau Of Citrus Budwood Registration	OPS
Mader, Timothy	Entomology	OPS
Madsen, Fisher	Nematology	OPS
Marcelino, Jose	Methods Development	Biological Scientist IV - SES
Marquez, Nora	Plant Inspection	Environmental Specialist II
Martinez Gonzalez, Kevin	Plant Inspection	OPS
Martinez, Milagros	Pest Eradication & Control	OPS
Mccoll, Diane	Plant Inspection	Environmental Specialist II
Mcgill, Patricia	Plant Inspection	Environmental Specialist I
Mckeever, Jennifer	Plant Inspection	Environmental Specialist II
Mclean, Gilford	Bureau Of Citrus Budwood Registration	Agricultural Technician III
Mcmahon, Sheila	Office Of Director Of Plant Industry	Administrative Assistant III - SES
Mcsweeny, Justin	Pest Eradication & Control	OPS
Mcvay, John	Plant Pathology	Biological Administrator III - SES
Meise, Matthew	Plant Pathology	OPS
Menendez Torres, Juan	Plant Inspection	Environmental Specialist II
Menocal Sandoval, Octavio	Methods Development	Biological Administrator II - SES
Merced, Daniel	Plant Inspection	Environmental Supervisor I - SES
Mikell, Lindsay	Bureau Of Citrus Budwood Registration	Laboratory Technician IV
Milian, Ciro	Plant Inspection	Environmental Specialist II
Miller Jr, George	Bureau Of Citrus Budwood Registration	Environmental Supervisor I - SES
Miller, Matthew	Plant Inspection	Environmental Supervisor I - SES
Montilla Nolasco, Arturo	Data Processing - Plant Industry	Distributed Computer Systems Specialist
Moore, Matthew	Diagnostics	Biological Scientist IV - SES
Morelli, Twylah Marie	Plant Inspection	OPS
Morrison, Harry	Plant Inspection	Environmental Specialist II
Morrison, Jack	Bureau Of Citrus Budwood Registration	Agriculture & Consumer Protect Supv -SES
Mulrooney, Shanelle	Plant Inspection	Environmental Specialist II
Murphy, Michael	Methods Development	Biological Scientist II - SES
Murray, Rosemary	Methods Development	Biological Scientist II - SES
Nance, Catherine	Entomology	Biological Scientist I
Needham, Mayumi	Entomology	OPS
Needham, Zion	Methods Development	Agriculture And Consumer Protect Spec
Negi, Vishal Singh	Plant Pathology	Research Scientist I
Negron, Noemi	Plant Inspection	Environmental Specialist II
Nerio, Nancy	Pest Eradication & Control	OPS
Newberry, William	Pest Eradication & Control	OPS
Nguyen, Johnny	Entomology	OPS
Noah, Harvey	Pest Eradication & Control	Environmental Administrator - SES
Nolen, Ashley	Bureau Of Citrus Budwood Registration	Environmental Specialist II
Nunez, Emelia	Pest Eradication & Control	Environmental Specialist I - SES
O'donnell, Bethany	Plant Inspection	Environmental Specialist II
Ochoa, Juan	Plant Inspection	Environmental Specialist I
Ong, Ryan Justin	Technical Assistance	Information Specialist II
Oppenheimer-Ortiz, Sarangeli	Fiscal Office - Plant Industry	Accountant I
Ortelli, Teresa	Plant Inspection	Environmental Specialist I
Ortiz, David	Plant Inspection	OPS
Oved, Amy	Plant Inspection	Environmental Specialist I
Paez, Claudia	Plant Pathology	Biological Scientist IV
Pandey, Manoj	Methods Development	Biological Administrator II - SES
Paolillo, Ajia	Bureau Of Citrus Budwood Registration	Environmental Manager - SES
Pappas, Amy	Bureau Of Citrus Budwood Registration	OPS
Pappas, Ashley	Biological Control Rearing Facility	Laboratory Technician IV

Full Name	Org Name	Class Title
Paris, Elizabeth	Division Training Coordinator	Senior Management Analyst I - SES
Parker, Patricia	Personnel - Plant Industry	Administrative Assistant I - SES
Paz, Stephanie	Plant Inspection	Environmental Specialist I
Perez - Tapia, Leticia	Pest Eradication & Control	OPS
Perez Cordero, Lourdes	Methods Development	Biological Scientist IV - SES
Perez, Laura	Pest Eradication & Control	Agriculture And Consumer Protect Spec
Perez, Phellicia	Entomology	OPS
Pica-Perez, Carlos	Bureau Of Citrus Budwood Registration	Agricultural Technician III
Pippin, Jeffry	Apiary Inspection	Environmental Specialist I
Pitts, Robert	Bureau Of Citrus Budwood Registration	Operations & Mgmt Consultant Mgr - SES
Podos, Christine	Plant Inspection	Environmental Specialist I
Poock, Caleb	Plant Inspection	Environmental Specialist II
Posner, Alexander	Maintenance	OPS
Post, Charles	Plant Inspection	OPS
Pounders, Elise	Biological Control Rearing Facility	OPS
Powell, Erin	Entomology	Biological Scientist IV - SES
Pride, Caroline	Plant Inspection	Environmental Specialist II
Puga, Alicia	Pest Eradication & Control	OPS
Puppelo, Anthony	Plant Inspection	Environmental Supervisor I - SES
Putney, Dustin	Methods Development	OPS
Quigley, John	Fruit Fly Protocol	Agriculture & Consumer Protect Supv -SES
Quigley, Marilyn	Fruit Fly Protocol	Administrative Secretary
Quinones, Rosamaria	Plant Inspection	Environmental Supervisor I - SES
Quirico Bautista, Carolina	Bureau Of Citrus Budwood Registration	Environmental Specialist II
Ramachandra, Bryann	Nematology	Administrative Assistant II
Ramirez, Alma	Pest Eradication & Control	OPS
Ramirez, Norma	Pest Eradication & Control	OPS
Ramos Perez, Paola	Plant Inspection	Environmental Specialist II
Reece, Carolina	Plant Inspection	Agriculture And Consumer Protect Spec-Se
Reed, Mary	Plant Inspection	Environmental Administrator - SES
Rentas Muller, Jose	Plant Inspection	Environmental Specialist II
Restrepo, Sara	Plant Inspection	Environmental Supervisor II - SES
Retana, Annavell	Pest Eradication & Control	OPS
Reynes, Lisa	Apiary Inspection	Environmental Specialist I
Richards, La Tanya	Plant Inspection	Environmental Specialist II
Ridgway, Ronald	Fiscal Office - Plant Industry	Accountant Supervisor II - SES
Rish, Steven	Fruit Fly Protocol	OPS
Rivera Robles, Ayiana	Plant Inspection	Environmental Specialist II
Rivera, Karianne	Plant Inspection	Environmental Specialist II
Roberts, Cheryl	Diagnostics	Biological Scientist II
Rodriguez Medina, Narciso	Plant Inspection	Environmental Specialist II
Rodriguez-Latona, Irene	Technical Assistance	Administrative Secretary
Rodriguez, Erick	Entomology	Biological Scientist IV - SES
Rodriguez, Julio	Plant Inspection	Environmental Specialist II
Roeder, Emily	Entomology	OPS
Rojas, Ronald	Biological Control Rearing Facility	Laboratory Technician IV
Rose, Bobbe	Plant Inspection	Environmental Specialist II
Rowley, Steven	Maintenance	Maintenance Mechanic
Ruggeberg, Raquel	Methods Development	OPS
Russell, Dyrana	Plant Inspection	Biological Scientist IV - SES
Rutherford, Timothy	Plant Inspection	Environmental Supervisor I - SES
Saengphaxay, Onanong	Plant Inspection	Environmental Specialist I
Safran, Emily	Plant Inspection	Environmental Specialist II
Salgado Harty, Hisel	Plant Inspection	OPS
Salway, William	Plant Inspection	Environmental Specialist I
Sampson, Robbie	Pest Eradication & Control	OPS
Sargeant, Carlene	Plant Inspection	Environmental Specialist I
Schapeler, Jonda	Fiscal Office - Plant Industry	OPS

Full Name	Org Name	Class Title
Scher, Barbara	Fruit Fly Protocol	Senior Clerk
Schneider, Brent	Data Processing - Plant Industry	OPS
Schneider, George	Biological Control Rearing Facility	Biological Administrator I - SES
Schnepp, Kyle	Entomology	Biological Scientist I
Schwarz, Larry	Pest Eradication & Control	OPS
Scoates, Carol	Entomology	OPS
Sellers, Mary	Plant Inspection	Environmental Specialist II
Serra, John	Fruit Fly Protocol	Agriculture & Consumer Protect Inspector
Sharpe, Mona	Fruit Fly Protocol	OPS
Shaw, Tyler	Methods Development	Biological Scientist IV - SES
Shim, Robert	Plant Inspection	OPS
Shiska, Renee	Plant Inspection	OPS
Shreve, Randi	Plant Inspection	Environmental Specialist I
Simmons, Sallie	Plant Inspection	Environmental Specialist II
Skelley, Paul	Entomology	Biological Administrator III - SES
Smith Jr, Samuel	Plant Inspection	Environmental Specialist I
Smith, Christopher	Bureau Of Citrus Budwood Registration	OPS
Smith, Ian	Plant Inspection	Staff Assistant
Smith, Jared	Pest Eradication & Control	OPS
Smith, Lane	Plant Inspection	Environmental Specialist II
Smith, Taylor	Bureau Of Citrus Budwood Registration	Biological Administrator III - SES
Smith, Trevor	Office Of Director Of Plant Industry	Director Of Plant Industry-Dacs
Snyder, Calvin	Plant Inspection	Environmental Specialist I
Snyder, James	Biological Control Rearing Facility	Laboratory Technician IV
Solis, Eduardo	Plant Inspection	Environmental Specialist I
Solis, Patricia	Pest Eradication & Control	Environmental Supervisor I - SES
Somma, Louis	Entomology	OPS
Soria, Patricia	Plant Pathology	Biological Scientist II
Soto-Adames, Felipe	Entomology	Biological Scientist IV - SES
Spence, Holly	Data Processing - Plant Industry	Administrative Secretary
Spikes, Ruthie	Pest Eradication & Control	OPS
Spiroff, Mackenzie	Entomology	OPS
Stanisky, Benjamin	Personnel - Plant Industry	OPS
Stanley, Jason	Methods Development	Chief, Method Dev& Biologic Control-Dacs
Stanley, Kelsie	Bureau Of Citrus Budwood Registration	Biological Scientist II
Steele, Sherry	Plant Inspection	Environmental Specialist III - SES
Steinkamp, Katherine	Plant Inspection	Environmental Specialist II
Stover, Kayla	Bureau Of Citrus Budwood Registration	OPS
Striker, Colton	Plant Inspection	Environmental Supervisor I - SES
Stringer, Tammie	Plant Inspection	OPS
Stumpp, Timothy	Plant Inspection	Environmental Specialist I
Sturgill, Ashley	Entomology	OPS
Summerville, Brandon	Pest Eradication & Control	OPS
Swain, Kiana	Methods Development	OPS
Sweeney, Catherine	Entomology	OPS
Talamas, Elijah	Entomology	Biological Scientist IV - SES
Tannehill, Ellen	Plant Inspection	OPS
Tapias, Nubia	Plant Inspection	Environmental Specialist I
Tasi, Alexander	Plant Inspection	Environmental Supervisor I - SES
Taylor, Donald	Bureau Of Citrus Budwood Registration	Environmental Specialist II
Tedford, Nancy	Apiary Inspection	Environmental Specialist I
Thompson, Karla	Plant Inspection	Environmental Specialist II
Thul, Angela	Apiary Inspection	Environmental Specialist I
Traficante, Dale	Entomology	Biological Scientist I
Turrubiartez, Maria	Pest Eradication & Control	OPS
Tyler, Lisa	Plant Inspection	Environmental Specialist II
Urbina Yanez, Hector	Plant Pathology	Biological Scientist IV - SES
Valdez, Sylvia	Pest Eradication & Control	OPS

Full Name	Org Name	Class Title
Vargas, Mileydis	Entomology	Biological Scientist II
Vau, Silvia	Nematology	Biological Scientist II
Velazquez, Alicia	Plant Inspection	Environmental Specialist I
Villareal, Virginia	Pest Eradication & Control	OPS
Viloria, Chantelle	Plant Inspection	Environmental Specialist II
Violett, Larry	Plant Inspection	Environmental Supervisor II - SES
Vivian, Robert	Fiscal Office - Plant Industry	Professional Accountant
Vu, Don	Data Processing - Plant Industry	Computer Programmer Analyst I
Walker, Caroline	Pest Eradication & Control	Chief Of Pest Erad And Control-Dacs
Walker, Kaleigh	Bureau Of Citrus Budwood Registration	Biological Scientist III - SES
Walker, Kayla	Plant Inspection	Environmental Specialist II
Walker, Mark	Plant Inspection	Environmental Specialist I
Wallace, Howard	Plant Inspection	Environmental Supervisor I - SES
Walsh, Diana	Entomology	OPS
Waters, Christina	Bureau Of Citrus Budwood Registration	OPS
Webb, Gary	Plant Inspection	Environmental Specialist II
Welch, Craig	Entomology	Biological Administrator I - SES
Wen, Li	Fiscal Office - Plant Industry	Professional Accountant
West, Leann	Plant Inspection	Environmental Specialist II
Whilby, Leroy	Entomology	Chief, Entmolgy,Nematolgy&Plnt Path-Dacs
Wiggins, John	Plant Inspection	Environmental Specialist III - SES
Williams, Fige	Pest Eradication & Control	Administrative Secretary
Wilson, A	Methods Development	Laboratory Technician IV
Wilwerding, Daniel	Plant Inspection	Environmental Specialist I
Xue, Ruimin	Nematology	Laboratory Technician IV
Yong Cong, Mary	CAPS Combined Survey	Biological Scientist IV
Zamora, Christine	Plant Inspection	Environmental Manager - SES
Zamora, Rocio	Pest Eradication & Control	Administrative Secretary
Zapko Jr, James	Plant Inspection	OPS
Zenoble, Mark	Plant Inspection	Environmental Specialist II
Zito, John	Plant Inspection	Environmental Specialist II
Zorn, Zachary	Hemp/Permitting	OPS
Zuck, Cameron	Entomology	OPS
Zugar, Keith	Plant Inspection	Environmental Supervisor I - SES
Zuniga, Maria	Pest Eradication & Control	OPS

Appendix B

Peer-Reviewed Publications

ENTOMOLOGY

Awad, J., Zimmermann, D. and Talamas, E. (2024). A photographic catalogue of Platygastroidea (Insecta, Hymenoptera) in the Natural History Museum of Vienna. *European Journal of Taxonomy,* 938: 1–58.

Barjadze, S., Halbert, S.E., Moore, M.R. and Kanturski, M. (2022). Morphology, molecular phylogenetics, and DNA barcoding revealed a new unusual species of the aphid genus Pleotrichophorus from the USA (Insecta, Hemiptera: Aphididae). *Zootaxa, 5183* (1), 390–422. https://www.mapress.com/zt/article/view/zootaxa.5183.1.16.

Barjadze, S., Halbert, S.E. and Ben–Shlomo, R. (2022). A new gall–producing species of *Geoica* Hart, 1894 (Hemiptera: Aphididae: Eriosomatinae) from Israel. *Zootaxa 5183* (1), 343–354. https://www.mapress.com/zt/article/view/zootaxa.5183.1.24.

Buss, E.A. and Skelley, P.E. (2023). An initial list of arthropods on hemp (*Cannabis sativa* L.: Cannabaceae) in Florida. *Florida Department of Agriculture and Consumer Services, Division of Plant Industry, FDACS-P-02203, Entomology Circular Number 445*, 1–12.

Eiseman, C.S., Norrbom, A.L., Pote, S.L., Sutton, B.D. and Steck, G.J. (2023). A review of the leaf–mining fruit flies (Diptera: Tephritidae) of Canada and the USA, with new host plant and distribution records. *Proceedings Entomological Society of Washington 125*(2), 1–24.

Cooper, W.R., Marshall, A.T., Foutz, J., Wildung, M.R., Northfield, T.D., Crowder, D.W., Leach, H., Leskey, T.C. Halbert, S.E. and Snyder, J.B. (2022). Directed sequencing of plant specific DNA identifies the dietary history of four species of *Auchenorrhyncha* (Hemiptera). *Annals of the Entomological Society of America 115*(3), 275–284.

Clavijo-Bustos, J., Skelley, P.E. and Dellacasa, M. (2023). *Aidophus gema* (Scarabaeidae, Aphodiinae, Didactyliini), a new species from Colombia, with notes on the genus *Aidophus* Balthasar and the tribe Didactyliini from the country. *Annales Zoologicai Fennici* 60, 85–93. DOI: 10.5735/086.060.0110

Dederich, A.E., Halbert, S.E. and von Dohlen, C.D. (2022). Description of a new species of *Hamamelistes* forming galls on *Fothergilla* spp. (Hamamelidaceae) and the generic limits of Hormaphidini (Sternorrhyncha: Aphididae: Hormaphidinae). *Zootaxa 5183* (1), 203–219. https://www.mapress.com/zt/article/view/zootaxa.5183.1.16.

Döker, I., Atchia, I., Jose, A. and Bolton, S.J. (2024). Complementary description of two *Anthoseius* De Leon (Acari: Phytoseiidae) species based on their holotypes with new synonyms. *Acarologia 64*, 192–201.

Dyer, J.E., Talamas, E.J., Leskey, T.C. and Bergh, J.C. (2022). Evaluating Chemical Cues Associated with *Halyomorpha halys* Toward Enhanced Sensitivity of Surveillance for *Trissolcus japonicus*. *Environmental Entomology 51*, 679–687.

Dyer, J.E., Talamas, E.J., Leskey, T.C. and Bergh, J.C. (2022). Influence of Trap Location in the Tree Canopy on Captures of Adventive *Trissolcus japonicus* (Hymenoptera: Scelionidae). *Journal of Economic Entomology 15*, 904–908.

Harris–Shultz, K.R., Halbert, S.E., Moore, M.R. and Ni, X.–z. (2024). First record of *Melanaphis donacis* (Hemiptera: Aphididae) in Georgia. *Journal of Entomological Science 59*(4.

Hayden, J.E. (2023). *Chabula acamasalis* (Walker), a crambid moth, a new Continental USA record. *Tri–ology 61*(4), 7, 12.

Hayden, J.E. (2023). *Lascelina pedernalensis* Neunzig, a phycitine moth, a new Continental USA record. *Tri–ology 62*(2), 3, 8.

Hayden, J.E. (2023). *Promalactis suzukiella* (Matsumura), Suzuki's promalactis moth, an oecophorid moth, a new Florida State record. *Tri–ology 62*(2), 1, 8–9.

Hayden, J.E. (2024). *Afeda sp.*, a cosmopterigid moth, a new Continental USA record. *Tri–ology 62*(4), 3, 7–8.

Hayden, J.E. (2024). *Eudarcia sp.*, a meessiid moth, a new Continental USA record. *Tri–ology 62*(3), 3, 8.

Hayden, J.E. (2024). Marmara salictella Clemens, willow stem miner, a new Florida State record. Tri–ology 62(4): 9.

Hayden, J.E. (2024). *Stereomita andropogonis* Braun, a gelechiid moth, a new Florida State record. *Tri–ology 62*(4), 9.

Hayden, J.E. and de la Paz, A. (2023). *Endothenia microptera* (Clarke), a tortricid moth, a new Florida State record. *Tri–ology 61*(4), 8, 10.

Hayden, J.E. and Adams, J.K. (2024). *Dinumma deponens* Walker, an erebid moth, a new Florida State record. *Tri–ology 62*(4), 8–9.

Hayden, J.E. and Moore, M.R. (2023). *Papilio demoleus* Linnaeus, lime swallowtail, a new Continental USA record. *Tri–ology 61*(4), 3, 9, 11.

Hayden, J.E. and Belmont, R.A. (2023). *Montescardia fuscofasciella* (Chambers), a bracket–fungus moth, a new Florida State record. *Tri–ology 62*(2), 8.

Hayden, J.E., Heppner, J.B. and Moore, M.R. (2023). *Choreutis sexfasciella* (Sauber), a choreutid moth, a new Florida State record. *Tri–ology 61*(4), 8, 12.

Hayden, J.E., Moore, M.R. and Solis, M.A. (2024). *Herpetogramma stramineata* (Hampson), a crambid moth, a new Continental USA record. *Tri–ology 62*(4), 2, 8.

Hribar, L.J., Hayden, J.E., Minno, M.C. and Center, T.D. (2024). An Asian moth, *Chabula acamasalis* (Walker, 1859) (Lepidoptera: Crambidae), collected in Monroe County, Florida, USA. *Specimen 22*, 1. https://doi.org/10.56222/28166531.2024.22.

IPPC Secretariat. (2022). ISPM 27. Annex 32: Genus Ceratitis Wiedemann. Rome. FAO on behalf of the Secretariat of the International Plant Protection Convention. [Lead authors: N. Barr, M. De Meyer, M. Virgilio, G. J. Steck] [published 2023–Oct 19]

Japoshvili, G., Arabuli, T., Salakaia, M., Tskaruashvili, Z., Kirkitadze, G. and Talamas, E. (2022). Surveys for *Halyomorpha halys* (Stål) (Hemiptera: Pentatomidae) and its biocontrol potential by parasitic wasps in the Republic of Georgia (Sakartvelo). *Phytoparasitica 50*, 127–137.

Kimmel, C.B., de Bem Oliveira, I., Campbell, J.W., Khazan, E., Bremer, J.S., Rossetti, K., Standridge, M., Shaw, T.J., Epstein, S., Tsalickis, A. and Daniels, J.C. (2024). Integrated vegetation management within electrical transmission landscapes promotes floral resource and flower–visiting insect diversity. *PLOS ONE 19*(8), e0308263. https://doi.org/10.1371/journal.pone.0308263

Leimroth, A., Somma, L.A., Russell, D.N., Cutts, L.P., Ryan, M., Babb, R.D., Hajek, K.E. and Holycross, A.T. (2022). Geographic distribution: *Anolis sagrei* (Brown Anole): USA: Arizona. *Herpetological Review 53*(4), 628–629.

Minkina, Ł., Anichtchenko, A., Vasiljeva, A., and Skelley, P.E. (2022). Four new species of the genus *Rhyparus* Westwood, 1845 (Coleoptera: Scarabaeidae: Aphodiinae) with modified pygidium and last abdominal ventrite in females. *Baltic Journal of Coleopterology 22(1),* 81–101.

Minkina, Ł., Gama, E.R.R and Skelley, P.E. (2024). Two new species of the genus *Ataenius* Schmidt, 1810 (Scarabaeidae: Aphodiinae: Eupariini). *The Coleopterist Bulletin 78(2),* 255–264. https://doi.org/10.1649/0010-065X-78.2.255

Moore, M.R., Halbert, S.E., McVay, J.D. and Miller, G.L. (2022). *Thelaxes suberi*, an oak aphid (Hemiptera: Aphididae: Thelaxinae) new to the Western Hemisphere. *Proceedings of the Entomological Society of Washington 123*, 808–819.

Norrbom A.L., Moore, M.R., Paynter, Q., McGrath, Z., Probst, C.M., Korneyev, V.A., Wiegmann, B.M., Cassel, B., Rodriguez, E.J., Steck, G.J., Sutton, B.D., Branham, M.A. and Ruiz–Arce, R. (2024). Color morphs in *Anastrepha nigrotaenia* (Enderlein), new combination (Diptera: Tephritidae) and resultant synonymy. *Proceedings of the Entomological Society of Washington 126*(1):21–55. https://doi.org/10.4289/0013–8797.126.1.21

Pandolfi, A. and Schnepp, K.E. (2024). New distributional records of the genus *Tetragonoderus* Dejean, 1829 from the United States of America, including an updated key to species (Coleoptera: Carabidae). *Fragmenta Entomologica 56*(1), 65–72.

Pecci-Maddalena, I.S.C., Lopes-Andrade, C. and Skelley, P.E. (2023). Catalogue of *Mycotretus* Lacordaire, 1842 (Coleoptera: Erotylidae: Tritomini): an annotated, illustrated and historical approach. *European Journal of Taxonomy 876,* 1–182. doi.org/10.5852/ejt.2023.876.2149

Popovici, O.A., Fallahzadeh, M., Saghaei, N., Copeland, R. and Talamas, E. (2024). A new species–group in *Calliscelio* Ashmead (Hymenoptera: Scelionidae) takes shape. *Zootaxa 5463*, 201–214.

Popovici, O.A., Masner, L., Lahey, Z. and Talamas, E. (2022). Revision of the Palearctic species of *Fidiobia* Ashmead (Hymenoptera, Platygastroidea). *Journal of Hymenoptera Research 92*, 23–144.

Potter, M.E., Bremer, J.S., Moore, M.R., Talamas, E.J. and Shrewsbury, P.M. (2023). *Telenomus cristatus* Johnson (Hymenoptera, Scelionidae): new diagnostic data, distribution records and host associations. *Biodiversity Data Journal 11*, e111347. https://doi.org/10.3897/BDJ.11.e111347

Powell, E. (2023). *Pseudaulacaspis coloisuvae* Williams and Watson, an armored scale intercepted on orchids. *Pest Alert 02196*.

Powell, E. (2024). "Trash Bug versus mealybug: Unique insect interaction filmed for first time", *Entomology Today.* https://entomologytoday.org/2024/02/15/trash–bug–versus–mealybug–unique–insect–interaction–filmed–first–time/

Powell, E. and Miller, D. (2024). Three new species of Puto giant mealybugs (Hemiptera: Coccomorpha: Putoidae) from Mexico and Guatemala, with keys to New World adult females and World adult males. *Zootaxa 5443* (3), 301–336. https://doi.org/10.11646/zootaxa.5443.3.1

Powell, E., Moore, M. and Stocks, I. (2023). *Lepidosaphes laterochitinosa*, a mussel scale in Broward County. *Pest Alert 01527*.

Powell, E. and Taylor, L.A. (2023). An introduction to some common and charismatic Florida spiders: *ENY2080/IN1366, EDIS*. doi.org/10.32473/edis–IN1366–2023

Powell, E.C., Halbert, S.E., Deeter, L.A. and Keller, O. (2023). An annotated and illustrated catalog of the primary type material of Hemiptera deposited in the Florida State Collection of Arthropods. *Zootaxa 5355*, 1–107.

Raju, M.-d.R., Arifunnahar, M., Mostafiz, M.-d.M., Alim, M.-d.A., Hossain, M.-d.A. and Talamas, E.J. (2022). *Hadronotus pubescens* (Motschoulsky) (Hymenoptera, Scelionidae): Redescription, biological attributes, and parasitism on eggs of *Riptortus pedestris* (Fab.) (Hemiptera, Alydidae). *Journal of Hymenoptera Research 94*, 139–161.

Ramírez–Ahuja, M., Gómez–Govea, M., Trujillo–Rodríguez, G.J., Garza–González, E., Rodriguez–Sanchez, I.P. and Talamas, E.J. (2023). *Telenomus alecto* (Crawford) (Hymenoptera: Scelionidae), parasitoid of *Diatraea magnifactella* Dyar (Lepidoptera: Crambidae) from Jalisco, Mexico: a study based on morphological and molecular evidence. *Florida Entomologist 105*, 307–312.

Rodriguez, E.J., Steck, G.J., Moore, M.R., Norrbom, A.L., Diaz, J., Somma, L.A., Ruiz–Arce, R., Sutton, B.D., Nolazco, N., Muller, A. and Branham, M.A. (2022). Exceptional larval morphology of nine species of the *Anastrepha mucronota* species group (Diptera: Tephritidae). *ZooKeys 1127*, 155–215.

Shang, C.-J., Talamas, E.J., Wang, X., Chen, Y.-M. and Zang, L.-S. (2024). *Trissolcus comperei*, a newly–reported egg parasitoid of *Halyomorpha halys* from China. *Biological Control 105583*.

Skelley, P.E., Smith, A.B.T. and Mora-Aguilar, E.F. (2022). A review of the flightless genus *Nanotermitodius* Howden, 2003 (Coleoptera: Scarabaeidae: Aphodiinae: Rhyparini). *ZooTaxa 5200(4)*, 355–364.

Skelley, P.E. and Vaz-de-Mello, F.Z. (2022). A second species of *Batesiana* Chalumeau, 1983 (Coleoptera: Scarabaeidae: Aphodiinae: Eupariini). *The Coleopterists Bulletin 76(4),* 612–618. DOI.org/10.1649/0010-065X-76.4.612

Skelley, P.E. (2023). Subgenera of *Dacne* Latreille, 1797 (Erotylidae: Erotylinae: Dacnini) given full generic rank. *Insecta Mundi 0971*, 1–9.

Snyder, J., Dickens, K.L., Halbert, S.E., Dowling, S., Russell, D., Henderson, R., Rohrig, E. and Ramadugu, C. (2022). The Development and Evaluation of Insect Traps for the Asian Citrus Psyllid, *Diaphorina citri* (Hemiptera: Psyllidae), Vector of Citrus Huanglongbing. *Insects 2022, 13, 295*, 1–17. https://doi.org/10.3390/insects13030295.

Stalcup, K., Powell, E. and Taylor, L.A. (2023). Twin–flagged jumping spider, *Anasaitis canosa* (Walckenaer, 1837) (Arachnida: Araneae: Salticidae): *ENY802/IN1395* EDIS.doi.org/10.32473/edis–IN1395–2023

Steck, G.J., Ndlela, S., Somma, L.A., Diaz, J., Moore, M.R. and Awad, J. (2022). Description of the immature stages of *Dacus bivittatus* (Diptera: Tephritidae), the Greater Pumpkin Fruit Fly. *Proceedings of the Entomological Society of Washington 124*(3),661–682.

Straser, R.K., Daane, D.M., Talamas, E. and Wilson, H. (2022). Evaluation of egg parasitoid *Hadronotus pennsylvanicus* as a prospective biocontrol agent of the leaffooted bug *Leptoglossus zonatus*. *BioControl 191*, 1–11.

Talamas, E., Awad, J., Tortorici, F. and Johnson, N.F. (2023). Platygastroidea in the Oxford University Museum of Natural History: taxonomic updates and a photographic catalog of type specimens. *Insecta Mundi 1030*, 1–16.

Tang, W., Skelley P.E., Taylor-B A.S. and Salzman, S. (2024). Review of *Pharaxonotha* Reitter (Coleoptera: Erotylidae: Pharaxonothinae) inhabiting cones of the cycad *Zamia* L. (Cycadales) in Panama, with descriptions of five new species. *Insecta Mundi 1043,* 1–40.

Todd, T.N., Steck, G.J. and Barr, N.B. (2024). New invasion or expansion: evaluating the genetic relationships of *Bactrocera dorsalis* (Diptera: Tephritidae) among detections in Florida. *Florida Entomologist 107, 20240025*

Wyckhuys, K.A.G., Akutse, K.S., Amalin, D.M., Araj, S.-E., Barrera, G., Beltran, M.J.B., Ben Fekih, I., Calatayud, P.-A., Cicero, L., Cokola, M.A., Colmenarez, Y.C., Dessauvages, K., Dubois, T., Durocher–Granger, L., Espinel, C., Fallet, P., Fernández–Triana, J.L., Francis, F., Gómez, J., Haddi, K., Harrison, R.D., Haseeb, M., Iwanicki, N.S.A., Jaber, L.B., Khamis, F.M., Legaspi, J.C., Lomeli–Flores, R.J., Lopes, R.B., Lyu, B., Montoya–Lerma, J., Montecalvo, M.P., Polaszek, A., Nguyen, T.D., Nurkomar, I., O'Hara, J.E., Perier, J.D., Ramírez–Romero, R., Sánchez–García, F.J., Robinson–Baker, A.M., Silveira, L.C., Simeon, L., Solter, L.F., Santos–Amaya, O.F., Talamas, E.J., Tavares, W., Trabanino, R., Turlings, T.C.J., Valicente, F.H., Vásquez, C., Wang, Z., Wengrat, A.P.G.S., Zang, L.-S., Zhang, W., Zimba, K.J., Wu, K., Elkahky, M. and Hadi, B.A.R. (2024). Global scientific progress and shortfalls in biological control of the fall armyworm *Spodoptera frugiperda*. *Biological Control 191*, 1–27.

Yan, C.-J., Talamas, E., Lahey, Z. and Chen, H.-Y. (2022). *Protelenomus* Kieffer is a derived lineage of *Trissolcus* Ashmead (Hymenoptera, Scelionidae), with comments on the evolution of phoresy in Scelionidae. *Journal of Hymenoptera Research 94*, 121–137.

NEMATOLOGY

Álvarez-Ortega, S., Subbotin, S.A., Wang, K.-H., Stanley, J.D., Vau, S., Crow, W. and Inserra, R.N. (2023).

Morphological and molecular diversity among pin nematodes of the genus *Paratylenchus* (Nematoda: Paratylenchidae) from Florida and other localities and molecular phylogeny of the genus. *Plants*, 12(15): 2770. https://doi.org/10.3390/plants12152770

Álvarez-Ortega, S., Subbotin, S.A. and Inserra, R.N. (2023). Diversity and molecular phylogeny of the genus *Paratylenchus* from Florida and other localities. Abstracts of the ONTA 53rd Annual Meeting, *Program Book,* pg. 28, September 24-29, 2023, Cairo, Egypt.

Brito, J.B., Moore, M.R., Vau, S.J., Xue, R., Combee, L.A., Leahy, R., Roberts, C.G. Stanley, J. (2023). First report of *Meloidogyne javanica* infecting industrial hemp (*Cannabis sativa*) in Florida, USA. Nematropica 53:1-5

Greco, N. and Inserra, R.N. (2024). Detection of resistance, susceptibility, tolerance and virulence in plant-nematodes interactions: Part I- Sedentary endoparasitic nematodes. In: (S. Molinari, ed.) *Plant Nematode Interactions*, pp 103-169, Humana Press, New York.

Inserra, R.N., Stanley, J.D., Steck, G., Anderson, P.J. and Smith, T.R. (2023). Phytosanitary measures and certification programs implemented in Florida. *Bollettino Accademia Gioenia, Scienze Naturali (Catania)*. 56 (386), FP42-FP69 (2023). https://doi.org/10.35352/gioenia.v56i386110

Oliveira, C.J., Riva, G., Brito, J.A., Xue, R. and Desaeger, J.A. (2023). First report of *Meloidogyne javanica* infecting strawberry (*Fragaria* × *ananassa*) in the United States. Journal of Nematology e2023/V0l.53. DOI: 10.2478/jofnem-2023-0034

Oliveira, AK. S., Pedrosa, E.M.R., Leitao, D.A.H.S., Brito, J.A., Silva, E.F.F. and Dickson, D.W. (2023). Vertical migration of second-stage juveniles of *Meloidogyne enterolobii* as influenced by temperature and host plant. Journal of Nematology e2024/Vol.56.

Oliveira, C.J., Subbotin, S.A., Desaeger, J.A., Dahlin, P., Vau, S. and Inserra R.N. (2024). Morphological and molecular analysis of two mycophagous nematodes, *Aphelenchoides bicaudatus* and *A. rutgersi* (Nematoda: Aphelenchoididae) from Florida strawberry. Journal of Nematology e2024-1/ Vol. 56. DOI: 10.2478/jofnem-2024-0012

Pasche, J., Brito, J.A., Vallad, G.E., Brawner, J.T., Snyder, S.L., Fleming, E.A., Yang, J., Terra, W.C. and

Martins, S.J. (2023). Assessing the impact of successive soil cultivation on *Meloidogyne enterolobii* infection and on soil bacterial assemblages. Plant Pathology 72:1326-1334.

Stanley, J., Brito, J.A., Vau, S. and Whilby, L. (2022). Plant-parasitic nematode regulatory programs implemented by Florida, USA. Presented at the 61st Annual Meeting of the Society of Nematologists (SON). September 26-29, Anchorage, Alaska. Program and Abstracts. https://nematologists.org/2022_ALASKA.

Stanley, J.D., Inserra, R.N. and Noah, H.A. (2023). Giant African land snail *Lissachatina fulica* eradication programs in Florida, USA, and the detection of the rat lung worm *Angiostrongylus cantonensis*. Abstracts of the 53rd ONTA Annual Meeting, *Program Book,* pg. 21, September 24-29, 2023, Cairo, Egypt.

Toledo, B.F., Leitão, D.A.H.S, Brito, J.B., Fleming, E.A., Brawner, J., Yang, J., Vallad, G.E., Terra, W.C. and

Martins, S.J. (2022). Assessing the impact of suppressive and conducive soils on the co-infection of tomato plants with *Meloidogyne enterolobii* and *Fusarium oxysporum*. Plant Health, 2022. August 06-10, Pittsburgh, PA.

Vau, S., Whilby, L., Stanley, J. and Brito, J.A. (2022). Florida Department of Agriculture and Consumers Services – Division of Plant Industry Laboratory Identification Sample Tracking Application - LIST. Presented at the 61st Annual Meeting of the Society of Nematologists (SON). September 26-29, Anchorage, Alaska. Program and Abstracts. https://nematologists.org/2022_ALASKA.

Vau, S. and Stanley, J. (2023). Quarantine actions and growing requirements to protect the Florida citrus industry from burrowing nematode and citrus greening has resulted in a reduction in nematode pests of citrus and citrus nurseries. Presented at the 62st Annual Meeting of the Society of Nematologists (SON). July 9-14, Columbus, Ohio. Program and Abstracts. https://nematologists.org/2023 OHIA.

(Book Chapter) Evaluation of plant response to nematode infestations

Renato Inserra, Research Scientist

A cooperative project with a senior nematologist of the Italian Council of Research, Bari Italy, for the book Plant Nematode Interactions, Humana Press (Springer Nature), New York, USA, resulted in a book chapter describing suggested protocols to evaluate the reaction of the most important crops and fruit trees to infestation by the most damaging plant parasitic nematodes (PPN) with sedentary endoparasitic habits, with the aim of assessing resistance and tolerance traits, sources of resistance in progenies from breeding programs, the reaction to nematodes of newly released cultivars and the virulence of the most noxious PPNs. These protocols consist of classical screening techniques not involving biochemical and molecular analyses.

PLANT PATHOLOGY

Dey, K., Velez-Climent, M., Soria, P., McVay, J.D. and Adkins, S. (2024). First Report of Mixed Infection of Jasmine Mosaic-Associated Virus (JMaV) and Jasmine Virus H (JaVH) in Jasmine Species in Florida, United States, *Plant Health Progress* PHP-08-23-0073-BR.

Fatemi, S., Haelewaters, D., Urbina, H., Brown, S., Houston, M.L. & Aime, M.C. (2022). *Sporobolomyces lactucae* sp. nov. (Pucciniomycotina, Microbotryomycetes, Sporidiobolales): An abundant component of romaine lettuce phylloplanes. *Journal of Fungi* 8:302.

Huang, Y., Jones, C., Urbina, H. and Zhang, S. (2023). First report of leaf blight caused by *Curvularia aeria* and *C. senegalensis* on tomato (*Solanum lycopersicum* L.) discovered in Florida, USA. *Plant Disease* 107:4027.

Jailani, A.A.K., Da Silva, S., Freeman, J.H., Dey, K., Velez-Climent, M. and McVay, J.D. (2023). First Report of Cucurbit Chlorotic Yellows Virus Affecting Squash and Pumpkin in Florida. *Plant Health Progress* 24(3):392-393.

Jibrin, M.O., Liu, Q., Huang, Y., Urbina, H., Gazis, R. and Zhang S. (2022). *Lasiodiplodia iraniensis*, a new causal agent of tuber rot on yam (*Dioscorea* species) imported into the United States and implications for quarantine decisions. (Short Communication) Plant Disease 106: 3027-3032.

Klock, M., Urbina, H., Barnett, L., Thrall, .P & Harm, K. (2022). Provenance of rhizobial symbionts is similar for invasive and noninvasive acacias introduced to California. FEMS *Microbiol Ecol* 98:138.

Mardones, M., Carranza-Velaquez, J., Mata-Hidalgo, M., Amador-Fernandez, X. & Urbina, H. (2023). Taxonomy and phylogeny of the genus *Ganoderma* (Polyporales, Basidiomycota) in Costa Rica. *MycoKeys* 100:5-47.

Mardones, M., Trampe-Jaschik, T., Piepenbring, M., Romberg, M. K., Morales, C.O. & Urbina, H. (2022). *Telimena* (Telimenaceae, Phyllachorales) species on Neotropical host plants: new species, combinations and key for species on Polygonaceae. *Nova Hedwigia* 114:435–460.

Negi, V. S., Srinivasan & Dutta, B. (2024). Diversity, abundance, and domain architecture of plant NLR proteins in Fabaceae. *Heliyon* 10(14) e34475.

Paez, C., Nakasome, X., Smith, J., Urbina, H., Eickwort, J. & Smith, M. (2024). *Parvodontia relampaga* sp. nov: A novel Cystostereaceae fungal pathogen causal agent of relámpago blight of woody plants in Florida, USA. *Fungal Biology* 128:1758-1770.

Urbina, H. & Ahmed, M. Z. (2022). Characterization of the entomopathogenic fungal species, *Conoideocrella luteorostrata*, on the scale insect pest *Fiorinia externa* infesting the Christmas tree *Abies fraseri* in the USA. *Florida Entomologist* 105:10–21.

Urbina, H. & Aime, C. (2023). First USA continental record of coffee leaf rust (*Hemileia vastatrix*) on coffee (*Coffea arabica*) in southwest Florida, USA. *Plant Disease* 108:228.

Urbina, H., Jones, C., Moore, M. & Gazis, R. (2023). Detection of aroid leaf rust *Pseudocerradoa paullula* on Swiss cheese plant *Monstera deliciosa* in the continental USA. *Plant Disease* 107:2520.

Urbina, H., Jones C, Moore, M. & Gazis, R. (2023). Susceptibility of centipede tongavine, *Epipremnum pinnatum*, commercially grown in nurseries in Florida to Aroid leaf rust, *Pseudocerradoa paullula*. *Plant Disease* 108:217.

Urbina, H., Jones, C., Moore, M. & Hansen, J. (2024). Southern blight of water lily: The first host record of *Agroathelia rolfsii* on *Nelumbo nucifera* discovered in Florida, USA. Plant Disease, 108:1404.

Velez-Climent, M,. P Soria, P., Dey, K,. Mou, D. F., McVay, J. D. & Bahder, B. W. (2022) Detection and Characterization of Viruses and Viroids in *Diospyros* Species from Florida, U.S.A. *Plant Health Progress* 23(3):308-316.

Velez-Climent, M., Yanez, H. U., Fryman, M., McVay, J. D. & Dey, K. (2022). Bidens mottle virus identified on Zinnia elegans in Florida. *Phytopathology* 112(11):148.

Botany

Renato N. Inserra, R.N., Stanley, J.D., Steck, G., Anderson, P.J. and Smith, T.R. (2023). Phytosanitary measures and certifications programs implemented in Florida. *Bulletin of the Gioenia Academy of Natural Sciences of Catania*. University of Catania.

Molecular Diagnostic Laboratory

Brito, J. A., Moore, M. R., Vau, S. J., Xue, R., Combee, L. A., Leahy, R., Roberts, C. G., Stanley, J. (2023). First report of *Meloidogyne javanica* infecting industrial hemp (*Cannabis sativa*) in Florida, USA. Nematropica 53: 1-5.

Halbert, S. E., Allen, J. S., Moore, M. R., Fairbanks, K. E. O., Sano, M., Miller, G. L. (2023). *Myzus fataunae* (Hemiptera: Aphididae), Pilea aphid, new to North America. Insecta Mundi 0976: 1-10.

Harris-Shultz, K. R., Halbert, S. E., Moore, M. R., Ni, X. (2024). First record of *Melanaphis donacis* (Hemiptera: Aphididae) in Georgia. Journal of Entomological Science 59(4): 524-527.

Moore, M. R., Talamas, E. J., Bremer, J. S., McGathey, N., Fulton, J. C., Lahey, Z., Awad, J., Roberts, C. G.,

Combee, L. A. (2023). Mining biodiversity databases establishes a global baseline of cosmopolitan Insecta mOTUs: a case study on Platygastroidea (Hymenoptera) with consequences for biological control programs. NeoBiota 88: 169-210.

Norrbom, A. L., Moore, M.R., Paynter, Q., McGrath, Z., Probst, C. M., Korneyev, V. A., Wiegmann, B. M., Cassel, B., Rodriguez, E. J., Steck, G. J., Sutton, B. D., Branham, M. A., Ruiz-Arce, R. (2024). Color morphs in *Anastrepha nigrotaenia* (Enderlein), new combination (Diptera: Tephritidae) and resultant synonymy. Proceedings of the Entomological Society of Washington 126(1): 21-55.

Potter, M. E., Bremer, J. S., Moore, M. R., Talamas, E. J., Shrewsbury, P. M. (2023). *Telenomus cristatus* Johnson (Hymenoptera, Scelionidae): new diagnostic data, distribution records and host associations. Biodiversity Data Journal 11: e111347.

Powell, E. C., Deeter, L. A., Moore, M. R., Ahmed, M. Z., Miller, D. R. (2024). Taxonomy, hosts, and distribution of an emerging invasive mealybug, *Phenacoccus miruku* (Hemiptera: Coccomorpha: Pseudococcidae), in Florida. Florida Entomologist 107 (no. S1): 20240024.

Powell, E. C., Moore, M. R., Stocks, I. C. (2023). PEST ALERT: *Lepidosaphes laterochitinosa* (Green), an adventive mussel scale in south Florida. Florida Department of Agriculture and Consumer Services, Division of Plant Industry. FDACS-P-01527.

Rodriguez, E. J., Norrbom, A. L., Steck, G. J., Moore, M. R., Sutton, B. D., Ruiz-Arce, R., Wiegmann, B. M., Cassel, B., Nolazco, N., Muller, A., Gangadin, A., Romero, B., Rivera, M., Rodriquez, P., Keil, C. B., Quisberth Ramos, E., Branham, M. A. (2023). New host plant and distribution records of *Anastrepha* species (Diptera: Tephritidae) primarily from the western Amazon. Proceedings of the Entomological Society of Washington 125: 89-164.

Urbina, H., Jones, C., Moore, M. R., Gazis, R. (2023). Detection of Aroid Leaf Rust *Pseudocerradoa paullula* on Swiss Cheese Plant *Monstera deliciosa* in the contintental United States. Plant Disease 107(8): 2520.

Urbina, H., Jones, C., Moore, M. R., Hansen, J. (2024). Southern blight of water lily: The first host record of *Agroathelia rolfsii* on *Nelumbo nucifera* discovered in Florida, USA. Plant Disease 0 0:ja.

Zahniser, J. N., Halbert, S. E., Moore, M. R., Mottern, J. L., Beuzelin J. M. (2023). *Balclutha jafara* (Hemiptera: Cicadellidae): integrative identification of a species introduced in the Western Hemisphere, and notes on other *Balclutha*. Zootaxa 5361(4): 526-554.

Honey Bee Diagnostic Library

Kadri, S. M., Fulton, J. C., Orsi, R. O., Prouty, C., Epperson, K., J., and Ellis, J. D. (In Press). Molecular disease diagnosis of Brazilian Africanized honey bees. Journal of Apicultural Research.

Adhikari, A., Fulton, J. C., Lane, B., Brawner, J. T., Rollins, J., Harmon, P. F., and E. M. Goss. 2024. Chromosome scale genome of Bipolaris gigantea, pathogen of invasive grass, Microstegium vimineum. PhytoFrontiers. https://doi.org/10.1094/PHYTOFR-09-24-0094-A.

Talamas, E. J., Bremer, J. S., and J. C. Fulton. 2024. Pest alert: Yellow-Legged Hornet, Vespa velutina. Florida Department of Agriculture and Consumer Services Division of Plant Industry: FDACS-P-02198.

Gurland, H. N., Fulton, J. C., Iredale, M. E., and A. Vu. 2024. Monitoring for Amoebic Disease (Malpighamoeba mellificae) in Honey Bee Colonies. EDIS 2024(5): ENY2112/IN1431. https://doi.org/10.32473/edis-in1431-2024.

Uchanski, M. E. and J. C. Fulton. 2024. Compendium of pepper diseases, disorders, and pests, second edition. Roberts, P., Sanogo, S., and F. Ochoa Corona. Section 9: Abiotic and Physiological Disorders. Color Spotting (Stip). https://doi.org/10.1094/9780890547168.09.03.1.

Ryals, D., Fikere, M., Carpenter; M. H., Given, K. J., Fulton, J. C., Moore, M. R., Villalobos, E. M., Underwood, R., Dickey, M., Sweet, A. D., Allen, J. M., Rangel, J., López-Uribe, M. M., Brito, L. F., Paterson, A. H., and B. A. Harpur (In Review). Assessing ancestry and diversity in honey bees (Apis mellifera) through low-pass whole-genome sequencing.

Fulton, J. C., Bolton, S. J., Moore, M. R., Kyles, S., Klimov, P., and J. D. Ellis (In Review). Macrocheles muscaedomesticae, a first record of phoresy on Apis mellifera.

Buss, E. A., Skelley, P. E., Allen, J., Bolton, S., Deeter, L., Fulton, J. C., Greer, D., Halbert, S., Hayden, J., Moore, M. R., Nance, C., Powell, E., Powell, G. S., Rodriguez, E. J., Roeder, E., Schnepp, K. E., Soto-Adames, F. N., Steck, G. J., Talamas, E., and T. Smith (In Review). A preliminary look at non-native arthropods identified and possibly established in Florida, 1990-2023, as recognized by the Florida Department of Agriculture and Consumer Services – Division of Plant Industry.

Epperson, K., Bremer, J., Talamas, E., Cutts, L., and J. C. Fulton (In Review). Cyclops honey bee in Florida.

Fulton, J. C., Moore, M., Smit, H. A., and Harpur, B. (In Draft). Molecular characterization of Africanized honey bee in the Caribbean.

Marcelino, J., Boardman, L., Moore, M., Fulton J. C., Urbina, H., Patterson Rosa, L., Fuchs, S., Grünewald, B., and J. Ellis. (In Draft). A cost-and-time effective workflow for detecting defensive honey bee of African ancestry and Apis mellifera capensis.

Appendix C

Presentations and Outreach

Entomology Presentations

- At the Entomological Collections Network Annual Meeting in November, 2022, Dr. Erin Powell presented a talk titled "The regulatory and academic value of the FSCA Coccoidea and Aleyrodidae collection." Additionally, Dr. Kyle Schnepp presented a talk titled "*Trichodesma* (Coleoptera: Ptinidae): A study in the importance of insect collections."
- Dr. Elijah Talamas presented a talk at the annual meeting of the Florida Entomological Society in 2023. It was titled "Parastioids of bug eggs in Florida: a nexus of adventive species, biological control, and biogeographic exploration."
- At the Center for Systematic Entomology Meeting in January, 2023, Dr. James Hayden presented a talk titled "Diversity of Lathrotelinae (Lepidoptera: Crambidae)." Dr. Erin Powell presented a talk titled "Grass-infesting mealybugs."
- Dr. Erin Powell attended the Association of Southeastern Biologists Meeting and presented a talk titled "Mud dauber wasps and Joro spiders: Natural enemies in the United States" on March 26th, 2023, in Winston-Salem, North Carolina.
- Dr. Erin Powell attended the International Coccidology Symposium and delivered a talk titled "Revising the *Tridiscus* Ferris grass-infesting mealybugs of North America" at Tbilisi, Georgia (Republic of) on July 17th, 2023.
- Dr. Erick Rodriguez's paper "Interactive identification key to third instars of *Anastrepha* Schiner (Diptera, Tephritidae)." was presented at the 10th International Congress of Dipterology, held 16-21 July, 2023 in Reno, Nevada.
- Dr. Erin Powell delivered a talk for Master Gardeners on spider biology at Matheson History Museum, October 26, 2023
- Annual meeting of the Entomological Society of America. "Parastioids of bug eggs in Florida: a nexus of adventive species, biological control, and biogeographic exploration" Presented by Dr. Elijah Talamas in 2023.
- At the annual meeting of the Entomological Collections Network in November, 2023. Dr. Elijah Talamas presented a talk titled "Bee Digitization at the Florida State Collection of Arthropods." Dr. Erin Powell submitted a virtual presentation titled "Cataloguing, imaging, and digitizing the type specimens of the Florida State Collection of Arthropods (FSCA)." Dr. Kyle Schnepp presented a talk titled "The Impact of Research Associates on the Growth of the Florida State Collection of Arthropods."
- In February, 2024, at the Center for Systematic Entomology Meeting, Dr. James Hayden presented a talk titled "Systematics of Glaphyriinae, the cole-crambids (Lepidoptera: Pyraloidea)." Dr. Erin Powell was a co-author on a student talk titled "Genomic insights of recent invasion of Lebbeck mealybug in Florida (Hemiptera: Pseudococcidae)." She also presented a talk titled "A trash talk: Defensive behaviors of debris-carrying lacewing larvae (Neuroptera: Chrysopidae) and their mealybug prey (Hemiptera: Pseudococcidae)." Dr. Samuel Bolton presented a talk titled "Why won't belief in mite monophyly just die already?"
- Dr. Erick Rodriguez presented a paper titled "Interactive identification key to third instars of fruit fly pest genera (Diptera, Tephritidae)." at the 11th Tephritid Workers of the Western Hemisphere meeting, held 3-7 June 2024 in Montego Bay, Jamaica.
- Dr. Paul Skelley presented a talk "Buried treasure of the Tuza: A keystone species that creates a unique ecosystem for many inquiline arthropods" as a Seminario Extraordinario at the Instituto de Biología de la Universidad Nacional Autónoma de México, Mexico City, Mexico, on August 12, 2024.

Entomology Outreach

- **Guest Lecturing:** In Fall 2023, staff were again invited to instruct graduate students of the UF Entomology and Nematology Department course 'Insect Diagnostics' (ENY6942) in a series of guest lectures and laboratories on the identification of mites (Dr. Samuel Bolton), fruit flies (Dr. Erick Rodriguez), scale insects (Dr. Erin Powell), thrips (Dr. Felipe Soto-Adames) and aphids (Dr. Susan Halbert and Catherine Nance). Two biological scientists (Lily Deeter and Jude Brewer) also gave a hands-on workshop on slide-mounting microscopic specimens.
- Dr. Erin Powell traveled to Beltsville, Maryland in September of 2022 and 2023 to visit the Smithsonian (USNM) slide collection. She is collaborating with USDA researchers (Drs. Douglass Miller, Ian Stocks, Gregory Evans, and Scott Schneider) on projects that include descriptions of three new species of giant mealybugs, a revision of grass-infesting mealybug genera, the description of a new species of whitefly on endangered ferns, and an analysis of scale insects that have invaded the United States over the past twenty years.

- Dr. Erin Powell has ongoing collaborations with Dr. Andrew Mongue (University of Florida) and various graduate students to understand the population genetics of the invasive mealybug, *Nipaecoccus viridis*, that mainly infests citrus in Florida groves. Drs. Powell and Mongue are also working with Drs. Filip Husnik and Jinyeong Choi (Okinawa Institute of Science and Technology) to construct a higher-level phylogeny of scale insects with worldwide representation.
- Erick J. Rodriguez, Research Scientist and Andrew Levy, Biological Scientist, participated in the New World Screwworm training held on August 23rd, 2023, organized by the Division of Animal Industry (FDACS) and USDA, APHIS, and hosted by the Division of Plant Industry – Entomology Section in Gainesville, Florida.
- Entomologists aided with the FAMU NexGen program, presenting on their specialized groups on May 31st, 2024.
- Workshop: Dr. Erin Powell delivered a Florida First Detector workshop, talks on crape myrtle bark scale and phantasma scale, Hernando County extension office, May 29, 2024
- Workshop: Dr. Erin Powell delivered a Region III workshop inspector training on phantasma scale, West Palm Beach, Florida, February 1, 2024.
- Dr. Erin Powell taught two 3-hour sessions for Insect Diagnostics (UF-ENY6942) course at the University of Florida. On September 14th, 2023 she discussed Scale Identification to Family and on September 28th, 2023 she discussed Mealybug Identification to Species.
- Dr. Erin Powell delivered a lecture on Opiliones biology for the Spider Biology (UF-ENY4905) course at the University of Florida, November 28, 2022,
- Dr. Erin Powell served as a student competition judge for Association of Southeastern Biologist's meeting, March 23–26, 2023
- Dr. Erin Powell, Dr. Felipe Soto-Adames, Dr. Paul Skelley, and Kyle Schnepp serve on the board of Center for Systematic Entomology, helping with the journal Insecta Mundi and the annual meeting (Jan 2023 to present).
- Dr. James Hayden served on the advisory committee of one Masters student at UF, Jacob Bethin, 2022-2024.
- Dr. James Hayden was a guest lecturer in UF Insect Classification Course, March 31, 2024. "Trichoptera and Lepidoptera" lecture by Riley Gott and myself, then gave demonstration about pinning micro-moths.
- The entomology section was involved with public outreach at the *Incredible Insects* exhibit at the Florida Museum of Natural History. Some display specimens and insect fossils were provided. In live demonstrations, they performed insect curation techniques for visitors, and answered questions about the study of entomology, and the duties and services that FDACS DPI performs. It ran from May 25th thru September 2nd, 2024.
- Jonathan Bremer and Cameron Zuck manned the pollinating insect table at the Friends of the Lower Suwannee & Cedar Keys National Wildlife Refuges Junior Ranger program on December 8, 2023 and talked to a bunch of kids about pollinators.
- For the past two years Dr. Samuel Bolton has taught Introduction to Morphology and Taxonomy, Spider Mites and Eriophyoidea for the Agricultural Acarology workshop at the Tropical Research and Education Center at the University of Florida. This course is held in May.
- On June 16th, 2024, Dr. Samuel Bolton also taught part of the soil mite course (Endeostigmata and Introduction to Acariformes) for the Acarology Summer Program at the University of Arkansas. This is a program that has been running for more than 70 years.
- Dr. Samuel Bolton taught mite ID for Insect Pest Diagnostics course (managed by Lyle Buss) on October 5th, 2023.
- Dr. Samuel Bolton taught Introduction to Morphology and Taxonomy and Spider Mites for the Agricultural Acarology workshop at the Tropical Research and Education Center, University of Florida, May 8th–9th, 2023.
- From March 23rd to 30th, 2024, Dr. Susan Halbert attended the International Research Conference on Huanglongbing in Riverside, CA and presented a paper on Florida statewide epidemiology of the disease. She also participated in the advisory group for a grant to Dr. Chandrika Ramadugu, who is doing conventional breeding for resistance to HLB.
- On Friday, November 8th, 2024 DPI Entomology hosted the UF entomology and nematology coffee hour. We provided food and coffee to UF entomologists as well as FDACS employees, and provided opportunity for networking between the two organizations. Estimated 50-70 people attended the coffee hour.

Nematology

- Quarantine actions and growing requirements to protect the Florida citrus industry from burrowing nematode and citrus greening has resulted in the reduction in nematode pests of citrus and citrus nurseries.
  Silvia Vau, Biological Administrator II
  An oral presentation on the citrus nursery stock certification program (Rule 5B-62, Florida administrative Code) and the impacts on the reduction of citrus nematodes was presented at the 62ndAnnual Meeting of the Society of Nematologists, July 9-14, Columbus, Ohio.
- Detection of the rat lung worm in samples of the giant African snail *Lissachatina fulica* from Florida
  Jason Stanley, Bureau Chief of Methods Development and Biological Control
  An oral presentation on the techniques used in Florida to detect and extract the third stage juveniles of the rat lung worm *Angiostrongilus cantonensis* from specimens of the giant African snail *Lissachatina fulica* was presented at the ONTA 53rd Annual Meeting, held in Cairo, Egypt, in September 2023.
- *Meloidogyne spartinae*: A closer look at this unique root-knot nematode species
  Janete A. Brito, Research Scientist

A poster about a root-knot nematode species *Meloidogyne spartinae* with a unique ecosystem was presented at the ONTA 53rd Annual Meeting, held in Cairo, Egypt, in September 2023.

- Regulatory and Phytosanitary Programs in Nematology
  Renato Inserra, Research Scientist
  An oral presentation on the phytosanitary programs conducted in Florida was presented on November 25, 2022, during the ordinary session of the Accademia Gioenia of Natural Sciences of Catania, Italy. A paper on the topics discussed in the talk was prepared in cooperation with DPI botanist and entomologists and published in the Bulletin of the Accademia.
- Plant-parasitic nematode regulatory programs implemented by Florida, USA
  Jason Stanley, Bureau Chief of Methods Development and Biological Control
  An oral presentation on the plant-parasitic nematodes regulatory programs implemented in Florida was presented at the 61st Annual Meeting of the Society of Nematologists. September 26-29, 2022, Anchorage, Alaska.
- Florida Department of Agriculture and Consumer Services Division of Plant Industry Laboratory Identification Sample Tracking Application – LIST
  Silvia Vau, Biological Administrator II
  An oral presentation about the development and benefits of the novel Laboratory Identification Sample Tracking Application – LIST, was presented at the 61st Annual Meeting of the Society of Nematologists. September 26-29, 2022, Anchorage, Alaska.

Plant Pathology

- McVay, J., Bonkowski, J. & Urbina, H. (2023). Poster: Comparative genomics of *Ceratobasidium theobromae* strains associated with vascular streak dieback of Cacao in Asia and Red Maple in North America. 12th International Congress of Plant Pathology, Aug 20-25, Lyon, France.
- McVay, J. & Urbina H. (2022) Presentation: An emerging plant pathogen of woody plants causal agent of vascular steak dieback (VSD) in the USA. 22nd ornamental workshop on insects and diseases. Raleigh, NC, Oct 18–22.
- McVay, J. & Urbina, H. (2023). Poster: *Ceratobasidium theobromae*: An emerging plant pathogen of woody plants causal agent of vascular steak dieback (VSD).18th Biennial Meeting of the Florida Phytopathological Society. Immokalee, FL, May 17–19.
- Negi, V. (2024). Presentation: Role of FDACS in Managing Plant Pathogens: Strategies and Challenges. Invited speaker, University of Georgia Tifton Campus.
- Paez, C. (2023). Presentation: Wood decay fungi in trees in Gainesville and Tampa Florida and their decay capability. The 27th Annual Trees Florida (Florida ISA chapter) Cape Coral.
- Paez, C. (2024). Virtual Presentation: Emerging Forest Diseases. Suncoast CISMA (Cooperative Invasive Species Management Area).
- Urbina, H. (2023). Presentation: Advances in molecular detection of *Phyllosticta citricarpa*, causal agent of citrus black spot, on asymptomatic plant tissue in Florida. XI Congreso Latinoamericano de Micologia (XI Latin American Mycological Congress) Aug 14–18.
- Urbina, H. (2024). Presentation: Status of *Pseudocerradoa paullula*: The new pathogen causing aroid leaf rust (ALR) in broadleaf ornamentals in the USA. 24nd ornamental workshop on insects and diseases. Raleigh, NC, Oct 22–24.
- Urbina, H., Meise, M., Jones, C., Walker, C. & McVay, J. D. (2024). Poster: Improved methodology for survey of *Phyllosticta citricarpa* on asymptomatic leaf tissue. International Mycological Congress, Maastricht Netherlands, Aug 11-14. 2024.
- Urbina, H., Meise, M., Jones, C., Walker, C. & McVay, J. D. (2024). Poster: New *Phyllosticta*-specific quantitative PCR assay for rapid diagnosis of lesions in produce and detection of novel pathogenic species. International Mycological Congress, Maastricht Netherlands, Aug 11- 14.
- Urbina, H., McVay J. & Paez, C. (2023). Poster: Relampago blight: A novel basidiomycete pathogen of hardwoods and conifers in Southeastern USA. 18th Biennial Meeting of the Florida Phytopathological Society. Immokalee, FL, May 17–19.
- Urbina, H. & Paez, C. (2022). Presentation: A novel basidiomycete pathogen causal agent of relampago blight of hardwoods and conifers in Southeastern USA. 22nd ornamental workshop on insects and diseases. Raleigh, NC, Oct 18–22.

Botany

- Florida Rare Plant Task Force presentation:
  4/27/2023 "EPAC and How Plant Species Are Listed"
- Florida Native Plant Society video presentations:
  12/16/2022 "Noxious Weed Regulations" 812 views
  12/8/2023 "Botanical Basics Series, Part 1: Getting to Know Plants" 785 views
  1/5/2024 "Botanical Basics Series, Part 2: Getting to Know Flowers and Fruits" 473 views
- UF/IFAS & DPI Webinar
  3/3/2023 "Identifying Aroid Rust Host Plants"
- Association for Southeastern Biologists presentation:
  3/23/2024 "Regulating Noxious Weeds and Invasive Species: An Example from Florida"

A list of the outreach events and presentations CAPS personnel participated in.

Presentations/Outreach	Date(s)	Attendees
Florida First Detector Workshop – Hernando County – Spotted lanternfly presentation	11/16/22	~20
Florida First Detector Workshop – Sumter County – Giant African Land Snail presentation	04/14/23	~15-20
Florida First Detector Workshop – Marion County – Giant African Land Snail and Asian Long Horned Beetle presentations	04/2/231	~15-20
Florida First Detector Workshop – Hillsborough County – Giant African Land Snail presentation	05/19/23	~15-20
Florida First Detector Workshop – Martin County – Giant African Land Snail presentation	05/31/23	~70
Florida First Detector Workshop – Seminole County – Giant African Land Snail presentation	06/07/23	~15-20
Biological Threat Assessment Group (BTAG) meeting – CAPS Program presentation	06/22/23	~30
South Florida Trail Rider Meeting – Miami-Dade County – Florida CAPS Domestic Survey Program and Giant African Land Snail Review presentations	05/07/24	15
Next Gen Program Outreach to FAMU	05/29-05/31/24	5
Florida First Detector Workshop – Manatee County – Giant African Land Snail presentation	05/30/24	~15-20
Florida First Detector Workshop – Seminole County – Giant African Land Snail presentation	06/14/24	~20

Lists the regional and national meetings attended by CAPS and the CAPS annual workshops.

Meetings and Workshops	Date(s)	Location
National CAPS Committee (NCC) Annual Meeting	01/31 - 02/01/23	Buzzards Bay, MA
Florida CAPS Annual Workshop	02/15/23	Gainesville, FL
Southern Plant Board Meeting	05/23-05/25/23	Gulf Shores, AL
National CAPS Committee (NCC) Annual Meeting	01/30 & 01/31/24	Baton Rouge, LA
Florida CAPS Annual Workshop	02/28/24	Gainesville, FL
Southern Plant Board Meeting	05/07-05/09/24	Lexington, KY

Molecular Diagnostic Laboratory

- McClelland, A. R., Moore, M. R., Bremer, J. S., Talamas, E. J., Halbert, S. E., Brown, B. T., Purcell, M. F., Hentz, M. G. (2024). You can run, but you will never escape: A new species of *Psyllaephagus* Ashmead (Hymenoptera: Encyrtidae), parasitoid of the classical biological control agent *Boreioglycaspis melaleucae* (Moore) (Hemiptera: Psylllidae) in Florida. Presented at the 2024 Center for Systematic Entomology Annual Meeting and Conference. February 10, Gainsville, Florida.
- Moore, M. R., Talamas, E. J., Bremer, J. S., McGathey, N., Fulton, J. C., Lahey, Z., Awad, J., Roberts, C. G., Combee, L. A. (2023). Cosmopolitan parasitoids: Mining biodiversity databases reveals unexpected abundance of intercontinental distributions in platygastroid wasps. Presented at the 2023 Center for Systematic Entomology Annual Meeting and Conference. January 28, Gainsville, Florida.
- Powell, E. C., Moore, M. R., Miller, D. Grass-infesting mealybugs and the FSCA Coccoidea collection. Presented at the 2023 Center for Systematic Entomology Annual Meeting and Conference. January 28, Gainsville, Florida.

Honey Bee Diagnostic Laboratory

- Kadri, S. M., Orsi, R. O., Prouty, C., Epperson, K., J., Ellis, J. D., and J. C. Fulton. Molecular disease diagnosis of Brazilian Africanized honey bees. 2024 American Bee Research Conference: January 10-12, 2024. https://doi.org/10.55406/ABRC.4.24.1
- Fulton, J. C. and K. J. Epperson. Honey Bee Diagnostics Lab. UF/IFAS Spring Bee College 2024: March 15, 2024. https://entnemdept.ufl.edu/media/entnemdeptifasufledu/honeybee/pdfs/2024_Spring_Agenda.pdf.
- Fulton, J. C. and E. J. Talamas. *Vespa velutina*. UF/IFAS Spring Bee College 2024: March 16, 2024.
- Fulton, J. C. Vespa velutina: The Yellow-Legged Hornet. Two Bees in a Podcast: April 16, 2024. https://creators.spotify.com/pod/show/ufhbrel/episodes/Episode-160-Vespa-velutina-The-Yellow-Legged-Hornet-e2ieovn.
- Fulton, J. C. and E.J. Talamas. Northern Giant Hornet and Yellow Legged Hornet. Palms and Invasive Species Florida First Detector: Friday, June 14th.
- Talamas, E.J. and J. C. Fulton. *Vespa velutina*. UF/IFAS Summer Bee College 2024: August 23, 2024. https://entnemdept.ufl.edu/media/entnemdeptifasufledu/honeybee/pdfs/2024_Summer_HBC_Agenda_Poster-1-(1).pdf
- Fulton, J. C. and K. J. Epperson. American/European Foulbrood. UF/IFAS Summer Bee College 2024: August 24, 2024.
- Epperson, K. J. and J. C. Fulton. Honey Bee Diagnostics Lab. UF/IFAS Summer Bee College 2024: August 24, 2024.
- Fulton, J. C. and K. J. Epperson. FDACS Bee Diagnostics Lab: What We Do. FSBA Annual Meeting & Conference: October 4th, 2024.
- Fulton, J. C. and K. J. Epperson. Sampling Procedure. Bureau of Plant & Apiary Inspection – Fall Apiary Training 2024: November 13th, 2024.

Methods

- Menocal, O., Murray, R, Herr, J. and Needham, Z. 2023. Biology of Lilioceris egena (Weise) (Coleoptera: Chrysomelidae) New biological control agent of air potato. Annual Meeting Southeastern Branch – ESA. March 12 – 15. Little Rock, Arkansas.
- Menocal, O. and Murray, R. 2023. Biology of Lilioceris egena: A new biocontrol agent of air potato. 2023 Annual Meeting Florida Entomological Society. July 30 – Aug 2, Jupiter, Florida.
- Murray, R. and Menocal, O. 2023. New biological control agent for air potato. Mass rearing protocol of Lilioceris egena. Poster. 2023 Annual Meeting Florida Entomological Society. July 30 – Aug 2, Jupiter, FL. Florida Entomological Society.
- Menocal, O. and Murray, R. 2023. Lilioceris egena (Weise): An additional biocontrol agent of air potato. Annual Meeting Entomological Society of America. November 5 – 8. National Harbor, Maryland.

Permitting and Containtment

To increase awareness of an encourage compliance with State regulations and permit requirements, the Permit Section has sought opportunities to engage with various stakeholders. These events may be attended by other Division staff. Key events attended by members of the Permit Section are highlighted below. *Denotes a presentation delivered by a Permit Section representative.

- *July 16, 2022: Saw Palmetto Berry Harvesting Workshop, UF/IFAS Volusia County Extension Office
- September 3, 2022: Repticon Tampa
- January 14, 2023: Repticon Pembroke Pines
- *February 1, 2023: University of Florida Environmental Health & Safety - Plant/Pest Permitting Session
- February 5, 2023: Reptilian Nation Expo
- February 18, 2023: UF DPM February Flora & Fauna Festival
- *April 11, 2023: Permit Regulations Presentation with USDA APHIS PPQ at the University of South Florida
- June 10, 2023: Repticon Tampa with Florida Fish and Wildlife Conservation Commission (FWC)
- *June 15, 2023: Saw Palmetto and Hemp Cultivation Regulations Workshop - Florida Agricultural Crimes Intelligence Unit
- *July 15, 2023: Saw Palmetto Berry Harvesting Workshop, UF/IFAS Volusia County Extension Office
- July 29, 2023: Repticon Orlando
- *August 23. 2023: Nonnative Invertebrate Permitting Presentation at the Nonnative Fish and Wildlife Technical Assistance Group (NFWTAG) Meeting by FWC
- February 3, 2024: Reptilian Nation Expo
- April 14, 2024: Sustainability Fair
- May 18, 2024: Repticon Jacksonville
- May 30, 2024: FL Agricultural and Mechanical University (FAMU) NextGen Program Graduate Student Tour – Permitting & Containment

Additionally, in response to consumer inquiries and the need to provide more information about permit requirements and Division regulatory authority, the following FDACS publications were developed by the Permit Section and produced by PIO.

- Regulations Saw Palmetto Berry Harvesting (FDACS-P-02186)
- Arthropod Regulations in Florida (FDACS-P-02199)
- Commonly Permitted Feeder Arthropods (available on FDACS website)
- Isopods Permitted in Florida (available on FDACS website)

Milestones & Achievements

Biological Scientist Summits – Inter/Intra-agency Learning Opportunities

The Permit Section explores opportunities for continued professional development and increased understanding of the regulatory role and responsibilities of our Division. The creation of "Biological Scientist Summits" by the Chairperson has facilitated interactions with regulatory officials not only within our Division and Department but also other State and Federal agencies.

Through in-the-field collaboration and classroom learning, Permit Section scientists have gained critical knowledge and exposure to the permitting as well as relevant inspection processes across the state. During these summits, the team meets in-person to conduct permitted facility inspections, discuss current permitting topics of concern, and observe/participate in exercises led by another Bureau/Division/agency. A summary of the inter/intra-agency activities is as follows:

- Summit #1 – South, Fall 2022
- Intra-agency – Plant Inspection of Commercial Nursery
- Inter-agency – USDA Agricultural Research Service controlled import research; USDA APHIS Plant Inspection Station for the Miami imports
- Summit #2 – West, Spring 2023
- Intra-agency – Plant Inspection of Commercial Hemp Cultivation and Aquatic Nurseries
- Inter-agency – US Department of Homeland Security Customs and Border Protection (US DHS CBP) Maritime Port and Passenger Cargo Inspections
- Summit #3 – Northeast, Fall 2023
- Intra-agency – Division of Aquaculture inspections for commercial and research facilities; Plant Inspection at an Agricultural Inspection Station for truck cargo
- Inter-agency – FWC Wildlife Investigator inspections at FedEx, air cargo, and frozen packing houses
- Summit #4 – North Central, Spring 2024
- Intra-agency – Citrus Budwood Registration for controlled import research, diagnostics, and production; Cooperative Agricultural Pest Survey (CAPS) Program for cotton pest identification and surveying; Methods Development and Biological Control for research; Botany Section noxious weed and herbarium collection
- OCEAN (Online Commerce for Exotic Arthropods and Nurseries) Surfing
- In April 2023, the USDA awarded funding for a PPA7721 Grant for OCEAN Surfing. It was awarded a second year of funding in the spring of 2024.

This project's primary goal is to promote effective enforcement of FDACS-DPI pest and disease regulations on interstate plant shipments by monitoring internet sites and related events, thereby proactively limiting potential violations. Domestic internet sales and the distribution of plant material remain largely unregulated, thus remaining one of the most vulnerable pathways for the introduction of regulated plants and exotic invertebrates. With increased access to and dependence on web-based shopping platforms, continued compliance and success of the project can only be obtained through educating the consumers who purchase regulated organisms in addition to the vendors.

This allowed for the creation of a new OPS Regulatory Specialist III position that dedicates their time to investigating internet plant sales, plant products, and exotic arthropod sales. Alongside others in the Permit Section and the Bureau of Plant and Apiary Inspection, this position focuses on communicating up-to-date information and motivating online vendors to comply with plant regulations and permit requirements. They will work in coordination with other positions at the Division to generate educational material that can be disseminated online, through the FDACS website and social media, as well as through other printed outlets for use during in-person tradeshows and conventions where internet vendors may promote their products.

Service

Nematology

- **Courtesy Professor at the Entomology & Nematology Department, Institute of Food and Agricultural Sciences, University of Florida.**
  Janete A. Brito, Research Scientist
- **Member of the Regulatory Committee of the Society of Nematologists - SON**
  Janete A. Brito, Research Scientist
- **Member of the Education Committee of the Society of Nematologists- SON**
  Silvia Vau, Biological Administrator II
- **Treasurer of the Organization of Nematologists of Tropical America – ONTA**
  Renato Inserra, Research Scientist
- **Business manager, and symposium chair/organizer of the Organization of Nematologists of Tropical America – ONTA**
  Janete A. Brito, Research Scientist
- **Member of the advisory board of FIDMe Project (Distribution, host, identification, and management strategies to control *Meloidogyne enterolobii*)**
  Janete A. Brito, Research Scientist
- **Member on the project *Meloidogyne enterolobii* on sweet potato for the National Plant Disease Recovery Plan**
  Janete A. Brito, Research Scientist
- **Vice-president of the Brazilian Society of Nematology/ Organization of Nematologists of Tropical America joint meeting**
  Janete A. Brito, Research Scientist

Plant Pathology

Internal/Interagency

- Citrus Black Spot Science Panel
  H. Urbina, J. McVay
- Permit Review Committee
  J. Hansen, T. Smith, J. McVay
- Citrus Research and Field Trials (CRAFT)
  H. Urbina

External

- American Phytopathological Society
  J. McVay, Member
- Florida Phytopathological Society
  H. Urbina, President
- Institutional Biosafety Committee, University of Florida
  J. McVay, Community Voting Member

Appendix D

DPI Publications

2022	
FDACS-P-01987	Exotic Fruit Fly Safeguarding Guidelines
FDACS-P-01986	PUBLIC NOTICE: Oriental Fruit Fly Infestation in St. Petersburg area
FDACS-P-01988	Giant African Land Snail Eradication Program
FDACS-P-01989	Giant African Land Snail Eradication Program - Notice - Access Request
FDACS-P-01995	Air Potato Vine Biological Control
FDACS-P-01665	Pest Alert: Papilio demoleus, Lime Swallowtail, on Key West, FL
FDACS-P-00124	Tri-Ology, Volume 61, Number 3
FDACS-P-01998	Agricultural Inspection Stations, 12/2022
FDACS-P-02164	K9 Inspection Parcel Insert, 12/2022
2023	
FDACS-P-00124	Tri-Ology, Volume 61, Number 4
FDACS-P-00124	Tri-Ology, Volume 62, Number 1
FDACS-P-00124	Tri-Ology, Volume 62, Number 2
FDACS-P-00313	Employees Must Wash Hands Before Leaving
FDACS-P-00315	Division of Plant Industry Brochure
FDACS-P-01527	Pest Alert: Lepidosaphes laterochitinosa (Green), A New Mussel Scale Intercepted in a Florida Nursery
FDACS-P-01951	Pest Alert: Citrus leprosis
FDACS-P-01988	GALS Overview Doorhanger - In Quarantine
FDACS-P-01997	Lime Swallowtail: Citrus Pest Doorhanger
FDACS-P-01998	Agricultural Inspection Stations
FDACS-P-02164	K9 Inspection Parcel Insert
FDACS-P-02186	Harvesting Saw Palmetto Berries in Florida
FDACS-P-02187	Honey Bee Diagnostics Laboratory
FDACS-P-02187	Honey Bee Diagnostics Laboratory
FDACS-P-02191	Chinese Tallowtree Biological Control
FDACS-P-02193	Guidelines for the Containment of Water Spinach (*Ipomea aquatica*) in the state of Florida
FDACS-P-02194	GALS Eradication Program - Landscapers Help Stop the Spread
FDACS-P-02194	GALS Landscaper Outreach
FDACS-P-02195	Pest Alert Lissachiatina fulica (Bowdich), Giant African Land Snail (Achatinidae)
FDACS-P-02196	Pest Alert Pseudaulacaspis coloisuvae Williams and Watson, and armored scale intercepted on orchids
FDACS-P-02198	Pest Alert: Yellow Legged Hornet
FDACS-P-02199	Arthropod Regulations in Florida
FDACS-P-02200	Giant African Land Snail Eradication Program Treatment Status Change (doorhanger)

2022	
FDACS-P-02201	Differentiating Florida Native Wasps from Yellow-Legged Hornet: A Comparison Guide
FDACS-P-02202	Updates to Lettuce Mosaic Suppressive Area
FDACS-P-02203	Circular: An Initial List of Arthropods on Hemp in Florida
FDACS-P-02205	Citrus Black Spot Quarantine Update
2024	
FDACS-P-00124	Tri-Ology, Volume 62, Number 3
FDACS-P-00186	Florida Wildflowers Coloring Book
FDACS-P-01726	Pest Alert: Cotton Seed Bug, Oxycarenus hyalinipennis (Costa): A Serious Pest of Cotton That Has Become Established in the Caribbean Basin
FDACS-P-01965	Florida Snail Identification Sheet