Quality and Secure Plant & Insect Sample Submission

Training Guide

SART Training Media
Quality and Secure Plant & Insect Sample Submission
Training Guide

*Prepared in 2007 by:*
Amanda Hodges, PhD
Southern Plant Diagnostic Network
University of Florida, Gainesville

Rick Sapp, PhD
Florida SART Technical Writer

*Updated in 2018 by:*
Amanda Hodges, PhD
Associate Extension Scientist & DPM Director
University of Florida, Gainesville

Rick Sapp, PhD
Florida Department of Agriculture and Consumer Services
Florida SART Technical Writer

Craig Frey
DPM Candidate
University of Florida, Gainesville

Copyright by Florida Department of Agriculture and Consumer Services

Published February 2007

**SART Training Media** are available for download from the Florida SART Web site <www.flsart.org>. 
About Florida SART

- SART is a multi-agency coordination group.
- SART is made up of over 25 partner agencies (state, federal and non-governmental organizations).
- SART provides preparedness and response resources for Emergency Support Function 17 [(ESF 17) Animal and Agricultural Issues].
- SART statutory authority
  - State Emergency Management Act (Section 252.3569, Florida Statutes)

SART Mission

Empower Floridians through training and resource coordination to enhance all-hazard disaster planning and response for animal and agricultural issues.

SART Goals

- Support the county, regional and state emergency management efforts and incident management teams.
- Identify county resources available for animal and/or agricultural issues.
- Promote the cooperation and exchange of information of interested state, county and civic agencies.
Specific Learning Objectives

At the end of this training module, participants will be able to:

- Explain why security is an issue with plant and insect submission
- Identify issues in handling and shipping samples
- Clarify some of the most common packaging errors and explain proper shipment techniques for plants and for insects
- Discuss the NPDN, National Plant Diagnostic Network, and its role in identifying and evaluating plant and insect submissions
- Identify key resources that participants can easily access for additional information and assistance
Resources

The following are sources of additional information about the subjects mentioned in this introduction.

United States Department of Agriculture (USDA)
www.usda.gov

USDA, Animal and Plant Health Inspection Service, National Center for Import and Export
https://www.aphis.usda.gov/aphis/ourfocus/importexport

Florida Department of Agriculture and Consumer Services (FDACS)
https://www.freshfromflorida.com/

Division of Plant Industry
https://www.freshfromflorida.com/Divisions-Offices/Plant-Industry

Division of Animal Industry
https://www.freshfromflorida.com/Divisions-Offices/Animal-Industry

Florida State Agricultural Response Team
https://flsart.org/

Southern Region Center for Integrated Pest Management
http://www.sripmc.org/

Extension Disaster Education Network
https://eden.lsu.edu/

Centers for Disease Control and Prevention
https://www.cdc.gov/
Resources, continued

National Plant Diagnostic Network:
National
https://www.npdn.org/
Southern
https://www.npdn.org/spdn
Southern Regional Laboratory
https://plantpath.ifas.ufl.edu/extension/plant-diagnostic-center/
Florida
http://fpdn.ifas.ufl.edu/

University of Florida
IFAS Extension Service
http://sfyl.ifas.ufl.edu/
Nematode Assay Laboratory
http://nematology.ifas.ufl.edu/assaylab/
Insect Identification Laboratory
http://entnemdept.ufl.edu/insectid/
Center for Aquatic and Invasive Plants
http://plants.ifas.ufl.edu/plant-directory/
Integrated Pest Management
http://ipm.ifas.ufl.edu/
Florida First Detector
http://www.ffirstdetector.org/

Florida Extension Plant Diagnostic Clinics, UF
Quincy
https://nfrec.ifas.ufl.edu/plant-disease-diagnostic-clinic/
Wimauma
https://gcrec.ifas.ufl.edu/plant-clinic/
Homestead
https://trec.ifas.ufl.edu/plantdiagnosticclinic/
Florida Exotic Pest Plant Council
https://www.fleppc.org/
Florida Fish & Wildlife Conservation Commission
http://myfwc.com/
Quality and Secure Plant & Insect Sample Submission

Appendix A - Training Slides

SART Training Media
Quality and Secure
Plant & Insect Sample Submission

Prepared by

Amanda Hodges, PhD
Associate Extension Scientist and DPM Director, University of Florida

Rick Sapp, PhD
Florida Department of Agriculture and Consumer Services
Florida SART Technical Writer

Craig Frey
DPM Candidate, University of Florida
Acknowledgements

- University of Florida, Institute of Food & Agricultural Sciences (IFAS)
- At the University of Florida: Carrie Harmon, Lyle Buss, Richard Cullen (retired) and Eileen Buss (retired)
- At FDACS-DPI: Susan Halbert
- Various partners affiliated with the National Plant Diagnostic Network (NPDN), Southern Plant Diagnostic Network (SPDN), and Florida First Detector
- Washington Dept. of Agriculture; University of California, Agriculture & Natural Resources; Mississippi State University Extension Service
- Tom Chester, Jane Strong - http://tchester.org/plants/site/happy_botanist.html
- Additional photo credits: Mark Garland (DOACS-DPI), Ray Carruthers, Scott Bauer and Gail Wixler (USDA-ARS), Case Medlin, Glenn Nice
- Florida Fish & Wildlife Conservation Commission

Learning Objectives

1. Explain why security is an issue with plant and insect submission
2. Identify issues in handling and shipping samples
3. Clarify some of the most common packaging errors and explain proper shipment techniques for plants and for insects
4. Discuss the NPDN, National Plant Diagnostic Network, and its role in identifying and evaluating plant and insect submissions
5. Identify key resources that participants can easily access for additional information and assistance

Florida SART

- Multi-agency coordination
  - Governmental and private
  - All-hazard preparation, response and recovery
  - Animal and agricultural
Security Issues

1. Prevent spread of exotic or disease pathogen
2. Identify source to aid quick and positive response
3. Prevent contamination of sample

Plant Sample Submission

So, you woke up and found this bizarre plant growing in your pasture or on the patio. Now what?
A. Call the police
B. Make sure the pets are safe
C. Blame the pesky neighbor
D. Submit a sample for diagnosis ... but how do I package it?

Plant Sample Submission

The Four Basics

- The accuracy of a disease diagnosis or insect ID can only be as good as the sample and information provided
- Sample must be representative of symptoms and severity in the field and must contain the right material
- Samples must be fresh and in good condition
- Rapid delivery may be critical
Plant Sample Submission

A Few Considerations

- Communication: early contact with diagnostic laboratories and regulatory officials
- Confidentiality
- Accuracy of source data/information
- Maintaining accountability: an unbroken “chain of custody”
- Delivery details: where, how, when

Plant Sample Submission

- Sample Collection
  - Look for patterns in the field
  - Record site conditions (soil type, drainage, recent weather)
  - Time and date of occurrence
  - Incidence vs. Severity

Soybean rust

Plant Sample Submission

How do you know? Is it chemical injury, nematodes, root disease….

Pepper: Phytophthora root/stem rot

Corn: Stubby root nematode
Plant Sample Submission

<table>
<thead>
<tr>
<th>Incidence</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>A percentage of the crop affected</td>
<td>A measure of impact on plants or crops</td>
</tr>
</tbody>
</table>

- **What to send?**
  - An entire plant, or multiple plants, if practical, ought to be included. Diseases may show up on any part of the plant.

- **Foliation diseases**
  - Check for injuries or disease on the main stem and trunk

- **Keep most roots and soil intact if possible**

**Dead plants tell no tales!**

Avoid plants that are obviously dead. Select plants that exhibit a range of symptoms, from mild to severe.
Weed Sample Submission

- A weed is:
  - Any plant that crowds out a cultivated plant
  - The generic term for a plant that is growing where it is not wanted
  - An uninvited and usually unattractive plant that surfaces in a garden
  - Any plant that interferes with management objectives
  - There are about 1,400 weeds in Florida

Weed Sample Submission

- Collect intact specimens
- Preserve and package sample properly
- Send suspected exotics by Next Day delivery

Weed Sample Submission

Make sure to include all parts of the plant, including stems, roots if possible, whole leaves attached to the stem, and any flowers, fruits, or seeds.
**Weed Sample Submission**

Collect multiple samples of all plant parts, if possible. Not all plant may be at the same stage of growth or reproduction. Identify leaf blade, sheath, node, collar, and ligule characteristics of grasses... and leaf type, margin, shape, attachment, and arrangement for broadleaves.

**Weed Sample Submission**

- Digital photos can be extremely useful if they are close-ups and very clear.
- Be specific about collection information. The more accurate information you give, the better. Correct and timely information results in faster, more precise diagnosis.
- Where was the sample found, for instance: greenhouse, residence, nursery, parkland, woodland, pasture, row crop or other site?

**Sample Quality Packing and Shipping**

- Select a strong crush-proof box and tape all seams
- Keep soil on the roots
- Do not add extra water
- Wrap in dry paper then double bag in plastic
- Disinfest the exterior of the bags
Sample Quality
Packing and Shipping

Additional real-life packaging and shipping blunders.

Sample Quality
Packing and Shipping

Examples of good packaging.

Appendix A: Slides 25-27
Insect Sample Submission

The Wrong Way

[Images of错误的昆虫样本提交方式]

The Right Way

Properly packaged mailing tubes protect samples!

[Images of正确包装的昆虫样本]

Most insects can be preserved in a vial with 70% Isopropyl or ethyl alcohol.

[Images of昆虫样本装在瓶子里]
Insect Sample Submission

Caterpillars should be placed in boiling water for one minute prior to preservation. Live caterpillars may be taken to the local county extension office for digital diagnosis or shipment from that office. Any caterpillar collected live should be shipped in a crush-proof container.

Warning
Do Not Microwave Your Samples!

Insect Sample Submission

Scale insects, mealybugs and other tiny arthropods may be submitted in plastic bags. Wrap specimen in dry paper towel before placing in bag. Double-bag suspected exotics!
Insect Sample Submission

Collect multiple samples of all available life stages, because biologists may need a specific life stage for positive identification. Sometimes, both male and female specimen are required for positive Identification. If it is a new or rare arthropod, more samples (more than one) may be needed.

Insect Sample Submission

If the insect pest infestation is totally unknown, collect plant samples to aid identification. Include flowers, fruits, leaves and roots. The same method can be used to identify weed specimens.

Insect Sample Submission

Plant samples can be preserved indefinitely by drying and pressing in newspapers.
Insect Sample Submission

Digital photos of infestation and damage assist rapid identification. You can help further by describing the extent of the infestation, the specific location(s) and what appears to be the cause.

- Piercing/Sucking
- Stem-boring
- Leaf-mining
- Skeletonizing

Essential Guidelines

- Be specific about your collection information
- Study and then state the location on the host plant: roots, stems, buds, leaves, flowers, etc.
- Note where the insect was found: field crops, in a greenhouse, residence, general landscape, etc.
- Give an educated estimate of the degree of infestation
- Don’t forget to give the name and contact information for the person who collected the sample
**Insect Sample Submission**

**More ... Essential Guidelines**

- Collect multiple samples of all life stages, if possible
- Collect intact specimens, not just body parts
- Collect portions of the infested plant and briefly describe the damage and the extent of damage exhibited
- Submit quality digital photos of damage if possible
- Preserve and ship appropriately for the type specimen
- For suspected exotics, notify the specialists and ship by Next Day delivery
- Include complete and accurate collection data
- Double bag specimens containing suspected exotic species

**Insect Sample Submission**

**Things NOT To Do**

- Do not crush specimens in tissue or plastic wrap, or tape them to paper
- Do not overcrowd them (whether they are dead or alive)
- Do not send them without complete and accurate information

**Where to Submit Your Samples**

Appendix A: Slides 40-42
Where to Submit Samples
For Plant Pathology

Southern Plant Diagnostic Network Regional Laboratory
C/O Florida Extension Plant Diagnostic Center, UF
2570 Hull Rd, Building 1291
Gainesville, FL 32611-0830
Phone: (352) 392-1795  Fax: (352) 392-3438
Email: pdc@ifas.ufl.edu
Sample submission forms are available at
https://plantpath.ifas.ufl.edu/extension/plant-diagnostic-center/

Note: The Florida Extension Plant Disease Clinic is a service provided to any Florida resident by IFAS, UF, in conjunction with the Cooperative Extension Service. The Clinic is open from 8 am to 5 pm Monday-Friday except for state holidays. The cost to submit a sample is $40 for standard submissions.

Where to Submit Samples
For Plant Pathology

Florida Extension Plant Diagnostic Clinic
University of Florida, IFAS/NFREC
155 Research Rd.
Quincy, FL 32351
Phone: (850) 875-7100
Sample submission forms are available at

Note: The Clinic is a facility of NFREC and the Dept. of Plant Pathology, UF, designed to provide plant disease and insect diagnostic services to Florida residents. It promotes an "identify the problem before taking any control action" attitude and is open from 8 am to 5 pm Monday-Friday except for state holidays. The cost to submit a sample is $30 to $50.

Where to Submit Sample
For Plant Pathology

Tropical Research and Education Center
18905 SW 280th St.
Homestead, FL 33031-3314
Phone: (786) 217-9274
Email: trec-pdc@ifas.ufl.edu
Sample submission forms are available at
https://trec.ifas.ufl.edu/plantdiagnosticclinic/submissions-and-contact/

The Center provides plant disease diagnostics for plant diseases. Services include analysis of plant material for bacterial, fungal, viral and nematode pathogens as well as suggesting appropriate control measures when available. The cost is $40 per sample.
**Where to Submit Sample For Plant Pathology**

Florida Extension Plant Diagnostic Clinic  
UF, IFAS/GCREC  
14625 C.R. 672  
Wimauma, FL 33598  
Phone: (813) 633-4131  
Sample submission forms are available at [https://gcrec.ifas.ufl.edu/plant-clinic/](https://gcrec.ifas.ufl.edu/plant-clinic/)

FEPDC is a service provided by the Plant Pathology Department of IFAS, UF in conjunction with the Cooperative Extension Service. The goal is to determine if the plant dysfunction involves an infectious causal agent, by associating causal agents with symptomatic plant issue. Hours are 8 am to 5 pm Monday-Friday except state holidays and the charge is $40.

**Metaleuca quinquenervia**

---

**Where to Submit Insect Samples**

Insect Identification Laboratory  
UF/IFAS, Entomology & Nematology Department  
Bldg. 970 Natural Area Dr. / P.O. Box 110620  
Gainesville, FL 32611-0620  
Phone: (352) 273-3933  
Fax: (352) 392-5660  
Sample submission forms are available at [http://edis.ifas.ufl.edu/pdffiles/SR/SR02200.pdf](http://edis.ifas.ufl.edu/pdffiles/SR/SR02200.pdf)

A service to Florida residents provided by UF’s Institute of Food & Agricultural Sciences. Hours are 8 am to 5 pm Monday-Friday. The fee for insect identification is $8.

**Pheromone-baited flight trap for the Southern Pine Beetle**

---

**Where to Submit Nematode Samples**

Nematode Assay Laboratory  
UF/IFAS, Entomology and Nematology Department  
1881 Natural Area Drive, Bldg. 970  
Gainesville, FL 32611-0820  
Phone: (352) 392-1994  
Fax: (352) 392-0190  
E-mail: nemalab@ifas.ufl.edu  
Sample submission forms are available at [http://nematology.ifas.ufl.edu/assaylab/Forms.html](http://nematology.ifas.ufl.edu/assaylab/Forms.html)

**Note:** The Nematode Assay Laboratory determines the types and numbers of plant-parasitic nematodes in soil and plant samples. Based on this information a diagnosis will be made. Hours are 8 am to 5 pm Monday-Friday. The charge is $25 per sample.
Where to Submit Sample Plants and Insects

Florida Department of Agriculture & Consumer Services
Division of Plant Industry
1911 SW 34th St.
Gainesville, FL 32608-7100
Phone: (352) 395-4600
Sample forms: http://forms.freshfromflorida.com/08400.pdf

Additional Plant and Insect Laboratories

- UF Herbarium (FLAS), Department of Plant Pathology, 2527 Fifield Hall/PO Box 110180, Gainesville, FL 32611-0180 (352) 273-2837
  https://www.floridamuseum.ufl.edu/herbarium/flasfung.htm
- UF Citrus Research and Education Center (specializing in citrus), 700 Experiment Station Rd. Lake Alfred, FL 33850 (863) 956-1151
  https://crec.ifas.ufl.edu/
- UF Southwest Florida Research & Education Center
  2685 State Rd 29 North, Immokalee, Florida 34142 (239) 658-3400
  https://swfrec.ifas.ufl.edu/

Where to find County Extension Offices

Appendix A: Slides 49-51
The NPDN Mission: Enhance national agricultural security by quickly detecting introduced pests and pathogens.

The NPDN Role

- Enhanced security of America’s agricultural sector from a biosecurity event or unintentional introduction.
- How is this accomplished?
  - Coordinated national diagnostic laboratories
  - Rapid communication and response system
  - Database analysis for event detection
  - Education and training of “first detectors”

Five NPDN Regions

- WPDN: University of California, Davis
  Includes US Pacific Trust Territories
- GPDN: Kansas State University
- SPDN: University of Florida
  Includes Puerto Rico
  And US Virgin Islands
- NCPDN: Michigan State University
- NEPDN: Cornell University

NPDN Database, CERIS
Purdue University
What is a “First Detector?”

- What is a First Detector?
  - Anyone likely to encounter an act or suspected act of bio- or agroterrorism
    - Producer: farmer or rancher
    - Agricultural consultant
    - County Extension Agent or Forester
    - Agents of the State Department of Agriculture & Consumer Services
    - Florida Master Gardeners

What does a “First Detector” do?

- Training, certificate of completion and national registry
- Surveillance
  - Be alert to the odd or different
  - Change in attitude from business as usual to potentially important
  - May be contacted if an incident in their area
“First Detectors” – Natural Multi-Taskers

Key Resources

- United States Department of Agriculture (USDA)  [www.usda.gov](http://www.usda.gov)
- Florida Department of Agriculture and Consumer Services (FDACS)  [https://www.freshfromflorida.com/](https://www.freshfromflorida.com/)
- Florida State Agricultural Response Team  [https://flsart.org/](https://flsart.org/)
- Extension Disaster Education Network  [https://eden.lsu.edu/](https://eden.lsu.edu/)
- Centers for Disease Control and Prevention  [https://www.cdc.gov/](https://www.cdc.gov/)

Key Resources

- National Plant Diagnostic Network
  - National  [https://www.npdn.org/](https://www.npdn.org/)
  - Southern  [https://www.npdn.org/spdn](https://www.npdn.org/spdn)
  - Southern Regional Laboratory  [https://plantpath.ifas.ufl.edu/extension/plant-diagnostic-center/](https://plantpath.ifas.ufl.edu/extension/plant-diagnostic-center/)
- Florida  [http://fpdn.ifas.ufl.edu/](http://fpdn.ifas.ufl.edu/)

- University of Florida
  - IFAS Extension Service  [http://sfyl.ifas.ufl.edu/](http://sfyl.ifas.ufl.edu/)
  - Nematode Assay Laboratory  [http://nematology.ifas.ufl.edu/assaylab/](http://nematology.ifas.ufl.edu/assaylab/)
  - Insect Identification Laboratory  [http://entnemdept.ufl.edu/insectid/](http://entnemdept.ufl.edu/insectid/)
  - Center for Aquatic and Invasive Plants  [http://plants.ifas.ufl.edu/plant-directory/](http://plants.ifas.ufl.edu/plant-directory/)
  - Integrated Pest Management  [http://ipm.ifas.ufl.edu/](http://ipm.ifas.ufl.edu/)

Appendix A: Slides 58-60
Key Resources

- Florida Extension Plant Diagnostic Clinics, UF
  - Quincy https://nfrec.ifas.ufl.edu/plant-disease-diagnostic-clinic/
  - Wimauma https://gcrec.ifas.ufl.edu/plant-clinic/
  - Homestead https://trec.ifas.ufl.edu/plantdiagnosticclinic/
- Florida Exotic Pest Plant Council https://www.fleppc.org/
- Florida Fish & Wildlife Conservation Commission http://myfwc.com/

Working Together To Protect Florida’s Agriculture & Way of Life

Thank You!

Now, Test Your Knowledge and Awareness (1 of 3)

1. (True/False) The best way to prepare a caterpillar sample for diagnosis is to immerse it in water and then microwave it on a light setting for 60 seconds.
2. (Fill in the blank) Always wrap a plant sample in a _____ (wet or dry) paper towel before bagging it for mailing or shipment.
3. (True/False) The role of the NPDN is to facilitate enhanced security of America’s agricultural sector from a biosecurity event and, if possible, the unintentional introduction of a harmful plant, animal or insect species.
4. (Fill in the blank) A plant sample to be sent to a laboratory for diagnosis first requires _____, A. your county agent’s approval, B. call for an authorization number before sending, C. nothing more than attention to packaging, the correct address and payment, or D. a certified check for $50, please.
5. The following information will help plant and/or insect scientists make a proper identification or analysis:
   A. the date and address where collected
   B. your evaluation of the extent and seriousness of infestation
   C. details about parts of the plant affected and the symptoms
   D. all of the above.

6. (True/False) Because of variations within a population, submit only one sample as more than one can become confusing.

7. Name two towns in Florida where samples can be submitted for testing and diagnosis.

8. (Select the best answer) For samples to arrive in a timely manner, samples should be mailed:
   A. early in the week to avoid weekend layovers at the post office
   B. late in the week is fine - the post office expedites samples

9. (True/False) Samples arriving from sites in Florida that are two days or less mailing time from their destination can be sealed in plastic bags for shipping.

10. Security is an issue with plant and insect submissions for:
    A. preventing the spread of dangerous and invasive species
    B. identifying the source for new and possibly dangerous diseases and/or insects
    C. preventing contamination of samples (and thus increase the chance of a correct diagnosis)
    D. all of the above.

11. BONUS: Unusual nematodes should only be handled with latex gloves and driven live to the prestigious Frog/Toad Identification Center at Florida State University in this north Florida city: _____.
Test Answer Key

9. True
10. Security is an issue with plant and insect sample submission for all of the above reasons.
Bonus: Nematode samples should be submitted to the Nematode Assay Laboratory at the University of Florida in Gainesville.

Glossary

- National Plant Diagnostic Network (NPDN): A national organization whose mission is to enhance national agricultural security by quickly detecting introduced pests and pathogens.
- Nematode: Any of several worms of the phylum Nematoda, having unsegmented, cylindrical bodies, often narrowing at each end, and including parasitic forms such as the hookworm and pinworm. Also called roundworm.
- SART: The Florida State Agricultural Response Team. A multi-agency coordinating group consisting of governmental and private entities dedicated to all-hazard disaster preparedness, planning, response and recovery for the animal and agriculture sectors in Florida.
- Weed: Generic term for a plant that is growing where it is not wanted.

Reporting Suspicious Plants and Insects/Diseases Cases

Protect Florida Agriculture.
Report suspicious animal disease cases to the Office of the State Veterinarian.
All calls are confidential and toll free.
Daytime (8 am – 5 pm) 1-877-815-0034
(1-850-410-0900)
Or to Office of Bio & Food Security Preparedness
1-850-410-6757
Or 24/7 to Agriculture Law Enforcement
1-800-342-5869
Or SPDN Hub Laboratory (Gainesville)
1-352-392-1795
Quality and Secure Plant & Insect Sample Submission

This concludes our presentation on “Quality and Secure Plant and Insect Sample Submission.”
Thank you for attending and participating.