Workbook

Quality and Secure Plant and Insect Sample Submission

SART Training Media

Quality and Secure Plant and Insect Sample Submission
Workbook

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Rick Sapp, PhD, Florida SART Technical Writer

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SART Training Media are available for download from the Florida SART web site at www.flsart.org.

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About Florida SART

SART is a multiagency coordination group consisting of governmental and private entities dedicated to all-hazard and disaster preparedness, planning, response and recovery for the animal and agricultural sectors in the state of Florida.

SART operates at the local level through county SART organizations.

SART utilizes the skills and resources of many agencies, organizations and individuals with its multi-agency coordination group structure.

SART supports the county, regional and state emergency management efforts and incident management teams.

SART Mission

Empower Floridians through training and resource coordination to enhance all-hazard disaster response and response for animals and agriculture.

SART Goals

- Promote the active engagement of each county coordinator who is responsible for animal and agricultural issues.
- Provide assistance in the development and writing of county ESF 17 plans.
- Promote the establishment of a county SART to work as a multi-agency coordination group to support emergency management and incident management teams.
- Provide training for all SART and animal and agriculture personnel.
- Identify county resources available for an emergency or disaster.
- Work to comply with the National Incident Management System (NIMS) document.

SUBJECT:	Introduce participants to the proper handling, packing and shipment of diseased or invasive plants and threatening or unusual insects for positive physical security and identification by Florida laboratories.
GOAL:	Participants will understand how to handle, pack and ship plants and insects for best analytical results and why proper handling is necessary.

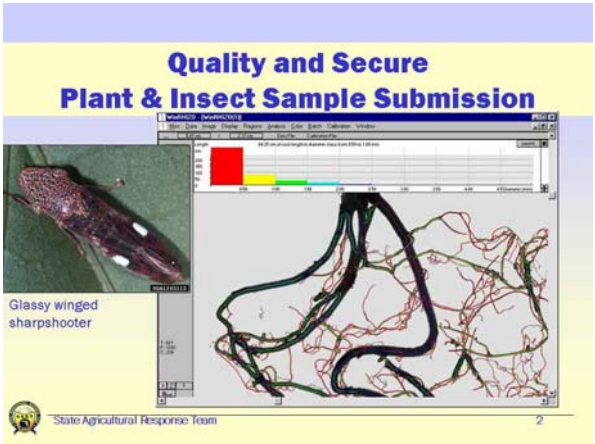
LEARNING OBJECTIVES

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

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

Slides 1-3


STATE AGRICULTURAL RESPONSE TEAM
S. A. R. T.
FLORIDA


Quality and Secure
Plant & Insect Sample Submission
Glassy winged sharpshooter
State Agricultural Response Team
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Quality and Secure
Plant & Insect Sample Submission
Prepared by
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State Agricultural Response Team
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- Florida Fish & Wildlife Conservation Commission
- US Dept. of Interior, US Geological Survey

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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
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Florida SART

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

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Slides 7-9

Security Issues

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

Citrus greening

Mediterranean fruit fly

Passionvine mealybug

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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?

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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

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Slides 10-12

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

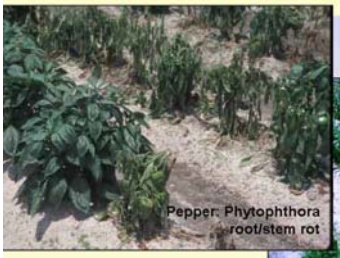
Plant Sample Submission

- Field Distribution
  - 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

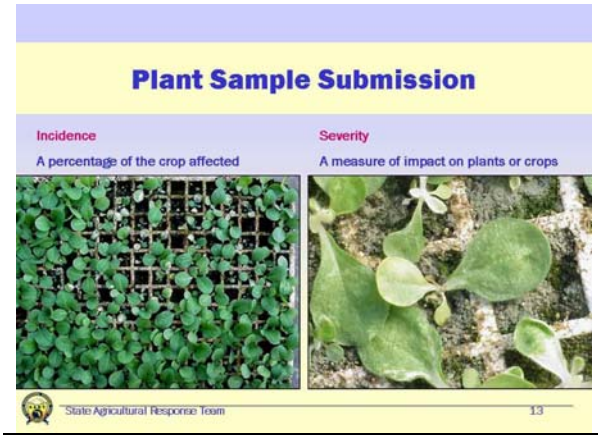
How do you know? Is it chemical injury, nematodes, root disease....



Pepper: Phytophthora root/stem rot

Corn: Stubby root nematode

Slides 13-15


Plant Sample Submission
Incidence
A percentage of the crop affected
Severity
A measure of impact on plants or crops
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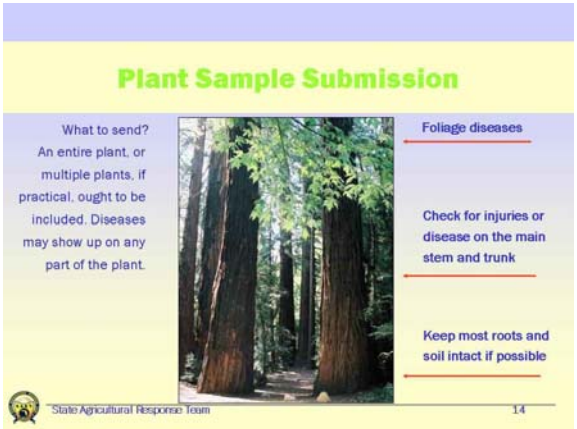
Plant Sample Submission
What to send?
An entire plant, or multiple plants, if practical, ought to be included. Diseases may show up on any part of the plant.
Foliage diseases
Check for injuries or disease on the main stem and trunk
Keep most roots and soil intact if possible
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Plant Sample Submission
Dead plants tell no tales!
Avoid plants that are obviously dead. Select plants that exhibit a range of symptoms, from mild to severe.
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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 more than 600 identified weeds in Florida

Weed Sample Submission

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

Invasive alligator weed near the Archbold Biological Station, Lake Placid, Florida

(Photographs by Jeff Hutchinson)

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.

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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.

Example: Ligule differences

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

Slides 22-24


Sample Quality
Packing and Shipping
PLEASE DO NOT
CRUSH
State Agricultural Response Team
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Sample Quality
Packing and Shipping
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Sample Quality
Packing and Shipping
Real-life packaging and
shipping blunders
State Agricultural Response Team

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Sample Quality
Packing and Shipping
Additional real-life packaging and shipping blunders.
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Sample Quality
Packing and Shipping
Examples of good packaging
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Insect Sample Submission
The Wrong Way
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Insect Sample Submission
The Right Way
Properly packaged mailing tubes protect samples!
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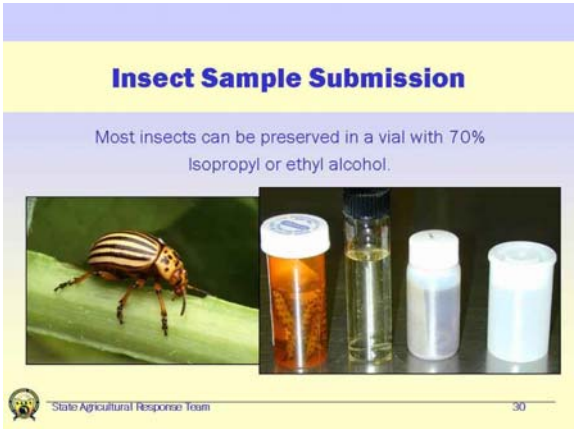
Insect Sample Submission
Most insects can be preserved in a vial with 70% Isopropyl or ethyl alcohol.
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Slides 31-33

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.

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Warning: Do Not Microwave Your Samples!

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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!

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Slides 34-36

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.

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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.

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Insect Sample Submission

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Insect Sample Submission 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

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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

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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

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Where to Submit Your Samples


UNIVERSITY OF FLORIDA Cooperative Extension Service
Institute of Food and Agricultural Sciences

PLANT DISEASE DIAGNOSTIC FORM

State Agricultural Response Team

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Where to Submit Samples For Plant Pathology

Southern Plant Diagnostic Network Regional Laboratory
C/O Florida Extension Plant Disease Clinic, UF
Building 78 Mowry Rd./P.O. Box 110830
Gainesville, FL 32611-0830
Phone: (352) 392-1795/3438
Sample submission forms are available at
http://plantpath.ifas.ufl.edu/pdc/

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 $20.

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) 875-7140
Sample submission forms are available at
http://tmomol.ifas.ufl.edu/pdc.htm

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 $20.

Where to Submit Sample For Plant Pathology

Tropical Research and Education Center
18905 SW 280th St.
Homestead, FL 33031-3314
(305) 246-7001
Sample submission forms are available at
http://trecclinic.ifas.ufl.edu/submissions.htm

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 $20 per sample.

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Where to Submit Sample For Plant Pathology

Florida Extension Plant Diagnostic Clinic
UF, IFAS/SWFREC
2686 State Road 29N
Immokalee, FL 34142-3400
Phone: (239) 658-3400
Sample submission forms are available at
http://www.imok.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 tissue.

Hours are 8 am to 5 pm Monday-Friday (except state holidays) and the charge is $20.

Where to Submit Insect Samples

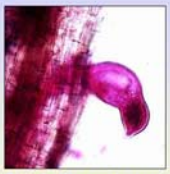
Insect Identification Laboratory
Entomology & Nematology Dept., UF
Bldg. 970 Natural Area Dr./P.O. Box 110820
Gainesville, FL 32611-0620
Phone: (352) 392-1901/1994
For additional information please see
http://edis.ifas.ufl.edu/SR010

Note: A service to Florida residents provided by UF's Institute of Food & Agricultural Sciences. Hours are 8 am to 5 pm Monday-Friday. The normal charge for insect identification is $8, but this fee is normally waived if the sample is delivered in person.

Pheromone-baited flight trap
For the Southern Pine Beetle

Where to Submit Nematode Samples

University of Florida
Nematode Assay Laboratory
Building 78, Mowry Rd./P.O. Box 110830
Gainesville, FL 32611-0830
Phone: (352) 392-1994
Information about the laboratory/links to sample submission forms are available at
http://edis.ifas.ufl.edu/scripts/SR011



Female citrus nematode

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 $20 per sample.

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Where to Submit Sample Plants and Insects
Florida Department of Agriculture & Consumer Services
Division of Plant Industry
1911 SW 34th St./P.O. Box 147100
Gainesville, FL 32614-7100
Phone: (352) 372-3505
http://www.doacs.state.fl.us/pi/enpp/bur-enpp.html/
Suni bug
Lantana
Chinaberry tree
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Additional Plant and Insect Laboratories
Mycology Herbarium, UF, 1453 Fifield Hall/PO Box 110680, Gainesville, FL 32611-0680 Email: jwkimbrough@ufl.edu
Herbarium, UF Herbarium (FLAS), Florida Museum of Natural History, 379 Dickinson Hall/PO Box 110575, Gainesville, FL 32611-0575 (352) 392-1721 Internet www.flmnh.ufl.edu/natsci/herbarium/flasbryo.htm
Lake Alfred Citrus Research and Education Center (specializing in citrus), UF-IFAS, Lake Alfred, FL 33850 (863) 956-1151
Gulf Coast Research and Education Center (specializing in strawberries), 14625 CR 672, Wimauma, FL 33598 (813) 633-4133 Internet http://strawberry.ifas.ufl.edu/
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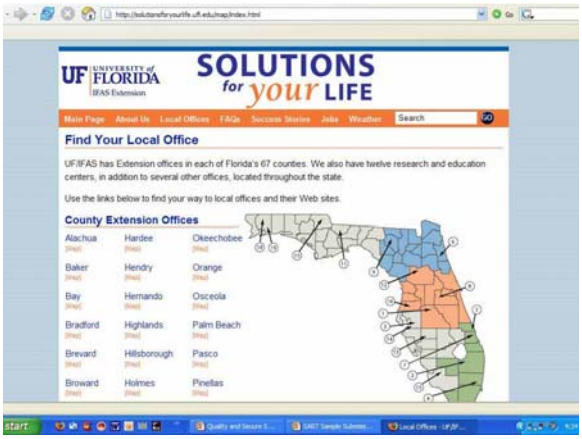
UF UNIVERSITY of FLORIDA
IFAS Extension
SOLUTIONS for your LIFE
Find Your Local Office
UF/IFAS has Extension offices in each of Florida's 67 counties. We also have twelve research and education centers, in addition to several other offices, located throughout the state.
Use the links below to find your way to local offices and their Web sites.
County Extension Offices
Alachua
Baker
Bay
Bradford
Brevard
Broward
Hardee
Hendry
Hernando
Highlands
Hillsborough
Holmes
Okeechobee
Orange
Osceola
Palm Beach
Pasco
Pinellas

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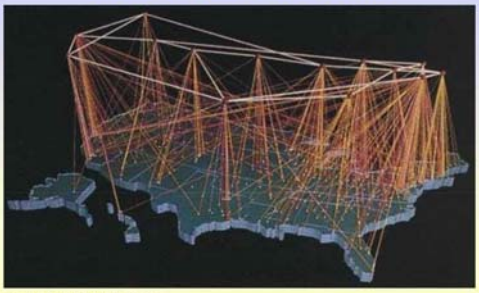
NPDN: National Plant Diagnostic Network



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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"

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Five NPDN Regions

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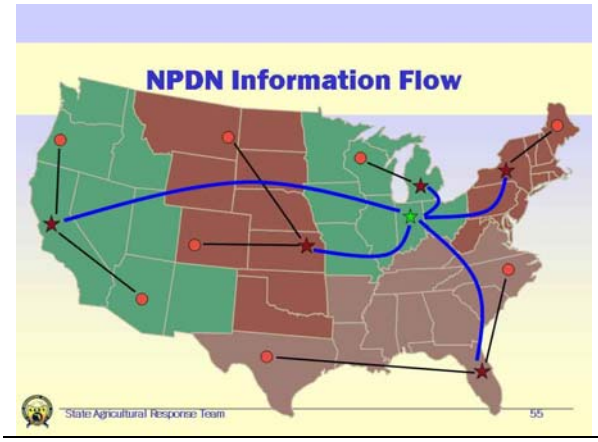
NPDN Information Flow
State Agricultural Response Team
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What is a "First Detector?"
• What is a First Detector?
– Anyone likely to encounter an act or suspected act of bio- or agroterrorism, people alert to possible invasive exotics
• Producer: farmer or rancher
• Agricultural consultant
• County Extension Agent or Forester
• Agents of the State Department of Agriculture & Consumer Services
• Florida Master Gardeners
State Agricultural Response Team
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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
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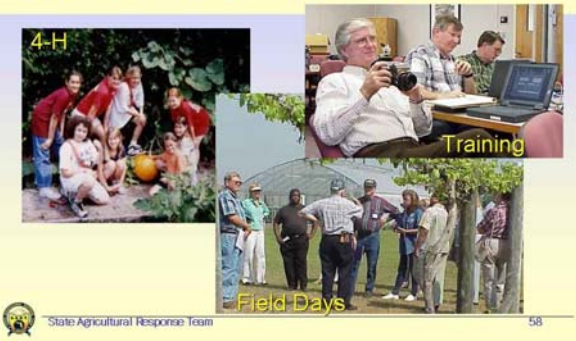
"First Detectors" – Natural Multi-Taskers



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Key Resources

- United States Department of Agriculture (USDA) www.usda.gov
- USDA, Animal and Plant Health Inspection Service, National Center for Import and Export www.aphis.usda.gov/vs/ncie/
- Florida Department of Agriculture and Consumer Services (FDACS) www.doacs.state.fl.us
  - Division of Plant Industry www.doacs.state.fl.us/pi/ and http://www.doacs.state.fl.us/pi/enpp/bur-enpp.html/
  - Division of Animal Industry www.doacs.state.fl.us/ai/
  - Florida State Agricultural Response Team www.flsart.com
- Southern Region Center for Integrated Pest Management www.srpmc.org
- Extension Disaster Education Network www.eden.lsu.edu
- Centers for Disease Control and Prevention www.cdc.gov

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Key Resources

- National Plant Diagnostic Network
  - National www.npdn.org
  - Southern http://spdn.ifas.ufl.edu/
  - Southern Regional Laboratory http://plantpath.ifas.ufl.edu/pdc/
  - Florida http://fpdn.ifas.ufl.edu/
- University of Florida
  - IFAS Extension Service http://solutionsforyourlife.ufl.edu/
  - Nematode Assay Laboratory http://edis.ifas.ufl.edu/scripts/SR011
  - Insect Identification Laboratory http://edis.ifas.ufl.edu/SR010
  - Integrated Pest Management http://ipm.ifas.ufl.edu/applying/pest-id/weeds/index.htm

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Key Resources

- Florida Extension Plant Diagnostic Clinics, UF
  - Quincy http://tmomol.ifas.ufl.edu/pdc.htm
  - Immokalee http://www.imok.ufl.edu/plant/clinic/
  - Homestead http://trecclinic.ifas.ufl.edu/submissions.htm
- Florida Exotic Pest Plant Council www.fleppc.org
- Florida Fish & Wildlife Conservation Commission http://myfwc.com

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

State Agricultural Response Team 62

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 $20 or D. a certified check for $25, please.

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Pre/Post Test (2 of 3)

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

Pre/Post Test (3 of 3)

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 because:
    A. to prevent the spread of dangerous and invasive species
    B. to identify the source for new and possibly dangerous diseases and/or insects
    C. to prevent 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 (1 of 2)

1. False. Never put creatures, live or dead, in a microwave oven.
2. Wrap plant samples in dry paper before shipping. Adding water or wrapping them in wet papers will cause the sample to degrade and allow the growth of molds.
3. True. The Southern Region is headquartered at the University of Florida in Gainesville.
4. The correct answer is C. nothing more than attention to packaging, the correct address and $20.
5. The correct answer is D. all of the above.
6. False. Carefully submit several sample specimen if possible.
7. Two of – Quincy, Gainesville, Immokalee and Homestead.
8. For samples to arrive at a laboratory without remaining in an envelope over the weekend mail early in the week.

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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 un-segmented, 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

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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.
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KEY RESOURCES

This publication and other materials for SART training programs are available on the World Wide Web at www.flsart.org, the Web site of the Florida State Agricultural Response Team. Note: As new modules become available, they will be posted on the Web site.

United States Department of Agriculture (USDA) www.usda.gov
USDA, Animal and Plant Health Inspection Service, National Center for Import and Export www.aphis.usda.gov/vs/ncie/

Florida Department of Agriculture and Consumer Services (FDACS) www.doacs.state.fl.us
FDACS-Division of Plant Industry www.doacs.state.fl.us/pi/
FDACS Division of Animal Industry www.doacs.state.fl.us/ai/

Centers for Disease Control and Prevention www.cdc.gov

Florida State Agricultural Response Team www.flsart.com

Extension Disaster Education Network www.eden.lsu.edu

National Plant Diagnostic Network www.npdn.org
Southern http://spdn.ifas.ufl.edu/
Florida http://fpdn.ifas.ufl.edu/

University of Florida, IFAS Extension Service
http://solutionsforyourlife.ufl.edu/

Integrated Pest Management http://ipm.ufl.edu

Plant Diagnostic Clinic, Quincy http://tmomol.ifas.ufl.edu/pdc.htm
Plant Diagnostic Clinic, Immokalee http://www.imok.ufl.edu/plant/clinic/

Insect Identification Laboratory http://edis.ifas.ufl.edu/SR010

Nematode Assay Laboratory http://edis.ifas.ufl.edu/scripts/SR011

Florida Exotic Pest Plant Council www.fleppc.org

Florida Fish & Wildlife Conservation Commission http://myfwc.com

Southern Region Center for Integrated Pest Management www.sripmc.org