Lesson Plan

Quality and Secure Plant and Insect Sample Submission

SART Training Media

Quality and Secure Plant and Insect Sample Submission
Lesson Plan

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Published February 2007

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.

INTRODUCTION

This lesson plan and workbook are designed to be a part of the SART Training Module for *Quality and Secure Plant and Insect Sample Submission*. This lesson plan gives the instructor direction for the educational portion of the workshop. The mechanics of planning, organizing and publicizing the entire training event are covered in the companion piece, *Toolkit for Planning a Community-Based SART Training Event*. For information on obtaining this publication, please refer to the resource section.

The lesson plan is structured to provide participants with the skills and understanding necessary to handle and submit plant and insect samples to Florida laboratories in a manner that will ensure their physical security with the greatest possible likelihood of successful identification and analysis.

A PowerPoint Presentation has been created to accompany this lesson. Throughout the lesson, boxed references are placed in the left margin to indicate that PowerPoint slides are available to help illustrate the points being made.

Approximately 50 minutes should be allocated for this lesson on proper preparation and submission of plant samples.

SESSION OUTLINE

PART 1: BEGINNING THE WORKSHOP	5 minutes
PART 2: PLANT SAMPLE SUBMISSION	10 minutes
PART 3: INSECT SAMPLE SUBMISSION	10 minutes
PART 4: WHERE TO SUBMIT SAMPLES	5 minutes
PART 5: THE NATIONAL PLANT DIAGNOSTIC NETWORK	5 minutes
PART 6: HIGHLIGHT AND KEY RESOURCES	5 minutes
PART 7: SUMMARY & WRAP-UP	10 minutes
Total	50 minutes

SPECIFIC 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

LEARNING ENVIRONMENT AND LEARNING AIDS

To complete this lesson plan, you will need:

PowerPoint Presentation: *Quality and Secure Plant and Insect Sample Submission.* Optional: a companion publication titled *Quality and Secure Plant and Insect Sample Submission*. Also Optional: a *Participant Workbook* is available with the PowerPoint slides and resource information.
A companion publication (T-1) *Toolkit for Implementing a Community-Based SART Training Event* is available to help you organize, plan and present an entire SART training event with multiple training modules.
(See the Resources section at the end of this publication to find out more about any of these materials.)

To conduct this training unit, you will need:

A means to show the PowerPoint Presentation: a computer with a projector
(Note: Master black and white copies of the slides are included at the end of this manual if you prefer to use an overhead projector.)
Sufficient seating for all participants

Each participant will need:

A pen or pencil
Participant workbook or paper for notes

BEFORE THE WORKSHOP

On the day of the workshop, check that equipment needed is in place. Double-check that the electronic media works properly with the equipment you have. Also, make certain that any materials such as paper, workbooks and pens/pencils are available in sufficient numbers for all participants.

PART 1: BEGINNING THE WORKSHOP

Time: 5 minutes

Focus: Explain the purpose of the workshop – Introduce concepts of proper sample submission of plants and insects for diagnosis

Once all participants have taken their seats and have settled down, welcome them to the workshop *Quality and Secure Plant and Insect Sample Submission*. Thank them for attending and congratulate them on taking the time to learn about these extremely important procedures. Remind them that the best way to prevent, respond to and/or recover from an emergency situation is to have a foundation of knowledge about available resources.

During this introduction, you may choose to distribute the Pre-Test included in the Resources section of this manual. The Pre-Test is a good way to determine the knowledge your audience currently possesses about submitting plant samples in Florida. Make sure to communicate to the participants that their Pre-Test answers, right or wrong, are only meant to guide them through this learning experience. (Note: By design, the Pre-Test and Post-Test are the same.)

This lesson plan can be used with agricultural and non-agricultural audiences. 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; and identify key resources that participants can easily access for additional information and assistance.

Remind attendees that the reason they are attending the workshop (and the training event if applicable) is because they realize the value of the earliest possible identification and diagnosis of plant diseases and insect pests. This understanding is the basis for developing and

implementing an emergency or disaster plan. They will carry the results of the workshop and training event with them everywhere.

This introduction should not exceed five minutes unless the Pre-Test is to be completed, in which case another few minutes may be required. This is a time when the participants are getting comfortable with the workshop they have decided to attend, their surroundings and you as the presenter. Simultaneously, you are becoming comfortable with the participants, the material you are presenting, and with being a presenter.

Slides 1-6

Pay attention to time as participants will want to learn what you have to present AND will want to depart on time. If you find that you are nervous when you start, understand that this is a natural response to public speaking. These "nerves" can make people ramble, talk faster or talk slower than normal, or even forget the time altogether. Nevertheless, even if participants enjoy what you are presenting, they will appreciate your discipline when the workshop ends on time.

PART 2: PLANT SAMPLE SUBMISSION

Time: 10 minutes

Focus: Discuss issues in quality and secure plant sample submission from basic security to proper packaging

A Word About Security

Florida is now home to hundreds of invasive and destructive plant, animal and insect species. Thus, although you thought it might only apply to the subject of agroterrorism, security is also an issue with plant and insect submissions.

The Florida Exotic Pest Plant Council tracks invasive plants in the Sunshine State. Among the many non-native plants that have found a home in Florida and are creating environmental havoc are the air potato, water hyacinth, Australian pine, kudzu and melaleuca.

Slide 7

The Florida Fish & Wildlife Conservation Commission tracks and combats exotic animal invasions. Many of these exotics are now considered permanent residents and have established and thriving populations: the armadillo, rhesus monkey, and Nile monitor, for instance. And if you do not believe there are hundreds of species of exotic insects in Florida, think of the Mexican red-rump tarantula

colony near Fort Pierce, now considered established, or the windshield of your automobile during the next "love-bug" season.

Thus, if you discover something unusual in the way of plant or insect, security of your sample is an issue for at least three reasons:

- to prevent the spread of dangerous invasive species should your sample contain something of agricultural or scientific interest, and should the package become damaged and open during shipment,

- to identify the specific source area for a new and possibly dangerous plant pathogen and/or insect, and thus give inspectors and response teams the greatest possible opportunity to eradicate it, and

- to prevent contamination of your sample (and thus increase the chance of correct analysis or diagnosis).

First, The Administrative Basics

Here are guidelines provided by the Florida Extension Plant Disease Clinic at the University of Florida (Plant Pathology Department document #RF-SR007).

To help everyone with complete, accurate and timely service, the FEPDC has developed a few policies. They are:

1. Plant samples should originate within the geographical boundaries of the State of Florida or be accompanied by appropriate USDA/FDACS plant importation permits.

2. Plant samples must be adequate in quality and quantity (see below) and be accompanied by a completed "Plant Disease Diagnostic Form" or equivalent information. Diagnostic forms are available at all county extension offices, directly from FEPDC locations, or on the Internet.

3. There is a $20.00 charge (make remittances to "Plant Disease Clinic") to process plant samples for plant disease determinations at all locations in Florida's diagnostic network. Some specialized tests and services to confirm certain diagnoses are more expensive and may require a fee beyond the base fee; staff will consult with you if this is necessary. If the specific pathogen cannot be identified with in-house diagnostic tools, at the client's request, it will be sent to a private or state lab for further testing. Work at a private or state lab may incur additional costs.

4. Samples can be submitted personally or through the mail or using a delivery service. If you use the diagnostic service more than five times per month, you can arrange for monthly invoicing. Samples can also be delivered to county extension offices as this allows extension staff to provide on-site problem diagnosis for common plant diseases.

5. As each sample is received, it is given a number and recorded. Samples are routinely processed on a "first come--first served" basis. Depending upon the nature of the problem, some diagnostic techniques take longer than others.

6. Plant disease determinations and associated control options will be mailed or FAXed back to you. The results of your samples are also electronically mailed or faxed to the county staff in the county of sample origin to keep them informed of plant diseases in their county.

Sample Quality and Quantity

Slides 8-15

Many of the pathogens that cause plant diseases have the ability to exist as both disease-causing microbes and as saprophytes on plants or in soil. The recovery of a particular pathogen does not always implicate disease.

Your sample quality may determine whether the diagnosing staff can interpret the presence of a pathogen in a sample as being disease-related. The local county agent should be cognizant of other variables that may cause plant dysfunctions that mimic or even interact with plant disease. These agricultural professionals are often in the best position to make a diagnosis.

Samples that exhibit early symptom development and have plant parts that are still partially alive (green) offer the best quality samples for accurate plant disease diagnosis.

Samples that are totally necrotic, dry and long dead, are not adequate for an accurate diagnosis. Dead tissue is essentially a food source for many saprophytic microbes, hence determining the primary pathogen is often impossible. The best samples represent early stages of disease development (i.e. before the plant part is totally necrotic or, in scientific terms, “mush”).

Samples should be packaged and shipped such that the plant symptoms remain relatively unchanged when they arrive at the laboratory. A completed data form packaged separately from plant tissue and soil should accompany samples.

Many times, the accuracy of a sample analysis relies on a variety of diagnostic techniques. For example, a leaf spot on geranium could be processed with the following techniques:

1. Visual examination to decide on parasitic vs. non-parasitic involvement.

2. Low and high power microscopic examination to check for pathogen signs, such as a bacterial flow or fungal spores. This requires a minimum of three to four spots on three to four leaves.

3. Placement of several leaves in a high humidity chamber to stimulate reproduction of a suspected pathogen. This uses three to eight leaves depending on leaf size and lesion frequency.

4. Culturing leaf spots on two or more general or selective growth media for pathogen identification. Ten to twelve leaf spots from three to six leaves are used to replicate these culturing tests.

5. Streak macerated tissue onto two or more general bacteriological media. At least three leaves and three leaf spots are used for this procedure.

These techniques require lots of tissue. This geranium sample would require at least a dozen leaves with multiple leaf spots present. If a two-leaf sample is received, two or more of the above techniques cannot be performed because there is not enough tissue. As technique selections decrease, so does scientific accuracy. So if your disease problem is important enough to be submitted, it should be accompanied with enough tissue for clinic staff to assess it adequately. Remember, the accuracy of the diagnosis is directly correlated with obtaining an adequate quantity and quality of the sample.

Most samples are processed within seven days, but some must be subjected to more time-consuming procedures so their "turn-around time" may be longer.

A Note About Weeds

Slides 16-20

A “weed” is a plant that grows where you do not want it. A camellia in a bed of roses could be a weed. Weeds cause farmers and ranchers millions of dollars a year. According to IFAS Extension’s Integrated Pest Management, the most important tool in effective weed management is proper weed identification. Early identification of weeds present increases management options.

Writing for the University of Florida, David Hall, Vernon Vandiver and Jason Ferrell note that weed growth of both native and exotic vegetation can severely decrease the commercial, recreational and aesthetic value of crops, landscapes and waterways. In certain situations, however, some degree of weed growth may be desirable. Control measures are needed only when an overabundance of one or several of the 600 Florida weeds begins to affect economic use.

"Our environment is a complex and dynamic system," they write, "that is subject to a myriad of pressures. This is particularly true of Florida, which has undergone tremendous demographic growth in the last decade. With the continuously increasing demand for Florida's resources, it is essential that weeds be managed in the most prudent fashion. Because of Florida's geographical setting and meteorological conditions, much of the state supports an extensive growth of weeds, many of which are not found in other parts of the United States."

General Packaging Guidelines

Slides 21-26

1. Take your samples before applying pesticides; otherwise the ability to recover disease pathogens may be limited. Submit generous amounts of plant material representing a range of symptoms.

2. Don't add water or pack a sample that is wet or in wet paper.

3. After your samples are collected keep them refrigerated until submitted. After collecting good samples, don't ruin them by allowing them to bake in the sun or on the back seat of a car prior to submission.

4. Don't mix samples in the same submission bag. Moisture from root samples will contribute to the decay of foliage if they are mixed together.

5. Plant disease identification procedures do not utilize soil. Excess soil can be hand shaken from root systems, but do leave enough soil to keep the roots at field moisture levels.

6. Please mark sample packages with a "Warning" if there are thorns or spines.

7. All samples must be accompanied with a completed "Plant Disease Diagnostic Form." These are available at all county extension offices or on-line. Give complete information on the form and keep the form separate from the sample. Complete a separate form for each sample and plant problem. Include any pertinent information under the

remarks area of the form. The more information available the more likely a problem can be associated with possible causes.

8. Note recent pesticide history on the form accompanying the sample.

9. Samples arriving from sites in Florida that are two days or less mailing time from a clinic can be sealed in plastic bags for shipping.

10. Samples arriving from distances greater than two days mailing time from a clinic should be packed tightly in a box with dry paper. Do not seal in plastic because of the likelihood of sample deterioration during the mailing period … and don't add moisture.

11. Mail samples early in the week to avoid the weekend layover in the post office.

12. For emergency samples or anything you suspect might be a dangerous exotic, use overnight courier services or overnight mail.

PART 3: INSECT SAMPLE SUBMISSION

Time: 10 minutes

Focus: Discuss issues in quality and secure insect sample submission from basic security to proper packaging

Slides 27-41

According to P.F. Ruppert a member of the Entomology and Nematology Department of the University of Florida, a primary goal of the Insect Identification Laboratory is to identify insects promptly so that management recommendations can be made with little delay.

Because there are thousands of species of insects – some beneficial and some detrimental – in Florida a large number of them are difficult to identify by species even under optimal conditions. Nevertheless, it is very important to correctly identify an insect before an effective recommendation for control, if needed, can be made.

Collecting Insects

If a few simple rules involving collecting and shipping insects are followed, more accurate and rapid diagnosis of an existing insect problem can be made.

- Try to collect several specimens in different stages of development. Some identification keys we use are for adults, while other are for immature bugs.

- Insects submitted whole are more useful than when submitted in segments.

Packing Insects

Insects should be killed before shipping as shipping live bugs (arthropods) can create some interesting situations and render your sample worthless. Live caterpillars often pupate during shipment and beetles may eat their way out of the shipping container.

Send all mature and immature insects (except butterflies and moths) in a glass vial or bottle containing ethyl or isopropyl (rubbing) alcohol. The vial or bottle must be properly padded in a mailing tube or other container to prevent breaking. Make sure that the cap for the vial is well secured so the alcohol doesn't leak from within the vial during shipping. Send butterflies or moths dry in pill boxes or a similar container with tissue paper to prevent the specimen from being broken.

It is often easier to identify an insect by seeing the damage it is doing to foliage, twig, fruit or other plant parts. If foliage or tender twigs are sent, they should be placed in a plastic bag and sealed. During the summer months, add a paper towel with the plant material when mailing specimens in a plastic bag. It absorbs excess moisture and helps prevent the plants from decaying and molds forming en route. Thus, plant material will remain moist and will arrive in a condition that enables analysis. Mailing leaves in paper envelopes results in their drying out so that insect damage is difficult to determine.

Some Do's and Don'ts

- Do fill out an Insect Identification Form and submit it with the sample.

- Do give complete information about the specimen and the host. Your Identification Form should be filled out as completely as possible. It is important to know where the specimen was collected and on what host or plant, if it is from a commercial grower or homeowner, under what conditions, the number involved and the nature of the injury. Additional information is always welcome and often serves as the main criterion for selection for the proper control measure

- Do order Identification Forms, vials and mailing tubes when needed. For each sample submitted thereafter, a replacement kit will be sent back to your county.

- Do ship specimens in proper container, alcohol, pill box, etc.

- Do indicate in writing what chemicals or treatments, if any, were used on the affected plant.

- Do indicate what information you would like to receive (identification only, control information, etc.)

- Don't send specimens loose in an envelope. Don't send live specimens.

PART 4: WHERE TO SUBMIT SAMPLES

Time: 5 minutes

Focus: Explain where properly prepared samples should be submitted

Slides 42-46

Now you know there is no rocket science class required to handle or ship plant and insect samples properly. Good common-sense practices are about all that is required. Just imagine yourself at the other end of the mailing – opening a package in a laboratory and preparing to study what is inside and you will be fine. Or if you have any questions at all, give the labs a call before you pack a sample.

You have a number of options for mailing or shipping your sample. Here are four for **plants** that exhibit some disease pathogen or unusual symptom:

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

2. 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] 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.

3. 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.

4. Florida Extension Plant Diagnostic Clinic, University of Florida, 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/] The FEPDC is a service to Florida residents 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, e.g. fungus, bacterium or virus, by associating causal agents with symptomatic plant tissue. Hours are 8 am to 5 pm Monday-Friday except for state holidays. The cost to submit a sample is $20.

Now, here are two options for **insect** samples:

Slides 47-48

1. Insect Identification Laboratory (Lyle Buss), University of Florida, Entomology & Nematology Dept., Bldg. 970 Natural Area Dr./P.O. Box 110620, Gainesville, FL 32611-0620 Phone: (352) 392-1901 ext. 190 [Please see http://edis.ifas.ufl.edu/SR010 for additional information] A service to Florida residents provided by the University of Florida'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.

2. University of Florida, Nematode Assay Laboratory (William Crow or Frank Woods), Building 78 Mowry Rd./P.O. Box 110830, Gainesville, FL 32611-0830 Phone: (352) 392-1994 Email: nemalab@mail.ifas.ufl.edu [Information about the laboratory and links to sample submission forms available at http://edis.ifas.ufl.edu/scripts/SR011] 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.

Slide 49

Finally, here is an address where **any samples** properly packaged could be directed:

Florida Department of Agriculture and Consumer Services – Division of Plant Industry, P.O. Box 147100, Gainesville, FL 32614-7100 Phone: (352) 372-3505 [http://www.doacs.state.fl.us/pi/enpp/bur-enpp.html/] Personnel of the Bureau of Entomology, Nematology & Plant Pathology, process samples both from inspectors and Florida citizens. During the last decade the risk of introducing exotic pests and diseases has significantly increased because of international travel and the commercial movement of exotic pests.

To ensure correct identification the Bureau maintains a library of more than 13,000 books and periodicals, and the Florida State Collection of Arthropods, a collection of more than eight million specimens including a phytoparasitic nematode collection, a herbarium with more than 7,900 plants and 1,465 vials of seeds, a plant pathology collection, a biological control laboratory, a fruit fly identification laboratory, and an advanced diagnostics laboratory.

Here are additional sample submission laboratories:

Slides 50-51

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/

Where to go to fine the address and telephone numbers of your county extension service: http://solutionsforyourlife.ufl.edu/map/index.html

PART 5: A NOTE ABOUT THE NATIONAL PLANT DIAGNOSTIC NETWORK (NPDN)

Time: 10 minutes

Focus: Introduce the National Plant Diagnostic Network and the southern sector headquartered at the University of Florida, Gainesville

Slides 52-55

The Animal & Plant Disease and Pest Surveillance & Detection Network was established by the United States Secretary of Agriculture. In June, 2002 he charged the Cooperative State Research, Education, and Extension Service (CSREES) with developing a network linking plant and animal disease diagnostic facilities across the country. The outcome, the National Plant Diagnostic Network (NPDN), focuses on the plant disease and pest aspect of that program. The network is a collective of Land Grant University plant disease and pest diagnostic facilities across the United States.

The mission of the NPDN is to enhance national agricultural security by quickly detecting introduced pests and pathogens:

- Through a functional nationwide network of public agricultural institutions.
- They have a cohesive system to quickly detect deliberately introduced, high consequence, biological pests and pathogens into our agricultural and natural ecosystems.
- They provide a means for quick identification with protocols for immediate reporting to appropriate responders and decision makers.

The network allows Land Grant University diagnosticians and faculty, state regulatory personnel, and first detectors to efficiently communicate information, images, and methods of detection throughout the system in a timely manner. Lead universities are designated as Regional Centers to represent five regions across the country. Regional Centers are located at Cornell University (Northeast region), Michigan State University (North Central region), Kansas State University (Great Plains region), University of Florida at Gainesville (Southern region), and University of California at Davis (Western region).

The National Plant Diagnostic Network database (DERIS) located at Purdue University is the central repository for archiving data collected from the regions.

First Detectors

Slides 56-58

The establishment of the network provides the means necessary for ensuring all participating Land Grant University diagnostic facilities are alerted of possible outbreaks and/or introductions and are technologically equipped to rapidly detect and identify pests and pathogens. This is accomplished by establishing an effective communication network between regional expertise, developing harmonized reporting protocols with the national diagnostic network participants and cataloging pest and disease occurrences to be included in a national database.

The Florida Plant Diagnostic Network is establishing a base of volunteer “First Detector” participants to enhance monitoring the introduction of pests or unusual pest outbreaks. First detectors are an integral and terribly important part of the system and include: growers (farmers and ranchers), Cooperative Extension Service personnel, crop consultants and pesticide applicators, commercial chemical and seed representatives and Florida Master Gardeners.

Correct identification of unusual situations, plant conditions and pests, both animal and vegetable, are crucial and very difficult. Thus, a good working knowledge of some area of agricultural is a strong requirement for training and receiving the certificate of completion. Because they are agriculturalists, first detectors realize that taking the NPDN training means that, in an state of heightened awareness and understanding that international terrorists are sworn to strike the United States in any manner possible, it is no longer “business as usual.” Attitudes change because first detectors may be called upon if there is an agroterrorist incident in their geographic area or in their particular area of expertise.

First detectors are natural multi-taskers. They are the men and women of American agriculture who serve their country in the finest traditions of free citizens. They serve because they can help and it is the right thing to do.

PART 6: KEY RESOURCES

Time: 5 minutes

Focus: Identify key resources participants can easily access for additional information

Slides 59-61

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

PART 7: SUMMARY AND WRAP-UP

Time: 5-10 minutes

Focus: Review the learning objectives and encourage a commitment to SART

You and your audience have had a stimulating and practical 50 minutes, but it is almost over. Prior to answering any audience questions or comments, provide a summary to the participants of what they just learned:

Slide 62

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

Thank the audience for their attention and participation. Congratulate them for their commitment to the SART endeavor and on their desire to understand the potential for and the consequences of agroterrorism and bioterrorism in Florida and how the state and its citizens are preparing for prevention and response.

At this point, you may elect to have the participants take the Post-Test provided in the Resources section of this manual. Remember to review the answers to the test questions after all participants complete the test.

A content-specific Evaluation is provided in the Resources section of the manual. The generic Evaluation available in the *Toolkit for Planning*

a Community-Based SART Training Event can be utilized as well. As the presenter, you should decide which evaluation best meets the needs of your situation. Please have participants complete an evaluation at the conclusion of this module. Encourage participants to be as honest and forthright as possible as it helps you, the presenter, make adjustments as necessary for future presentations, which in turn benefits future participants.

PARTICIPANT EVALUATION

Quality and Secure Plant and Insect Sample Submission

Please circle the number that best expresses your opinions about the following statements.

		Fully Disagree	Disagree	Neutral	Agree	Fully Agree
1.	The training unit's format is appropriate.	1	2	3	4	5
2.	The information presented is useful to me.	1	2	3	4	5
3.	The time it took to complete this module is acceptable.	1	2	3	4	5
4.	I understand the idea connecting "sample security" and sending a weed to one of the Florida labs.	1	2	3	4	5
5.	I could now pack a plant or an insect and ship it to a laboratory with confidence that it will arrive intact and in good shape for analysis.	1	2	3	4	5
6.	I now know what a "nematode" is and understand the definition of a "weed."	1	2	3	4	5
7.	The role of the National Plant Diagnostic Network has been explained, as is its role in training "first detectors."	1	2	3	4	5
8.	I understand where to send plant and insect samples for analysis.	1	2	3	4	5
9.	Available up-to-date resources were clearly outlined.	1	2	3	4	5

We welcome your comments about this program:

Please use the back of this sheet for any further comments.

Thank you for your time.

PRE-TEST/POST-TEST

Slides 63-65

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.

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 three towns in Florida where samples can be submitted.

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 because:
A. to prevent the spread of dangerous or invasive species,
B. to identify the source for new, potentially dangerous diseases or insects,
C. to prevent contamination of samples (and thus increase the chance of a correct diagnosis),
D. all of the above.

11. **Bonus Question**: 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. False. Never put creatures, live or dead, in a microwave oven.

Slides 66-67

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. Quincy, Gainesville and Immokalee.

8. For samples to arrive at a laboratory without remaining in an envelope over the weekend mail early in the week.

9. True

10. Security is an issue with plant and insect sample submission for all of the above reasons.

Bonus Question/Answer: Nematode samples should be submitted to the Nematode Assay Laboratory at the University of Florida in Gainesville.

GLOSSARY

Slide 68

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*.

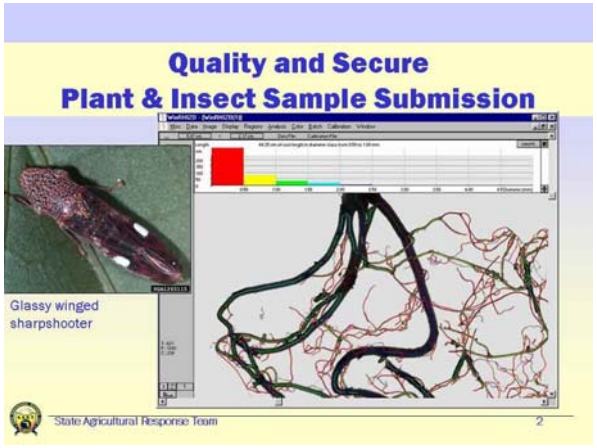
Slides 69-70

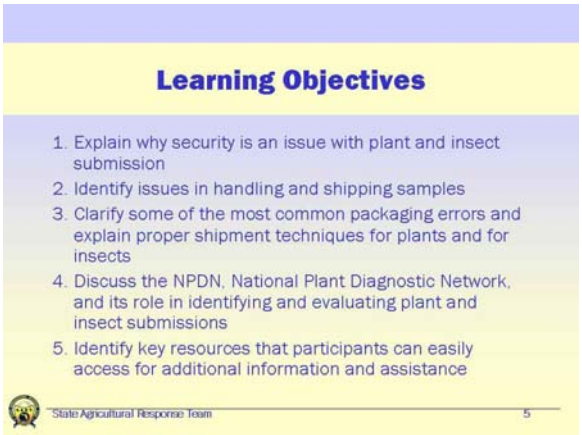
SART: The Florida State Agricultural Response Team. A multi-agency coordinating group consisting of governmental and private entities dedicated to all-hazard disaster preparedness, planning, response and recovery for the animal and agriculture sectors in Florida.

Weed: Generic term for a plant that is growing where it is not wanted.

PowerPoint Slides

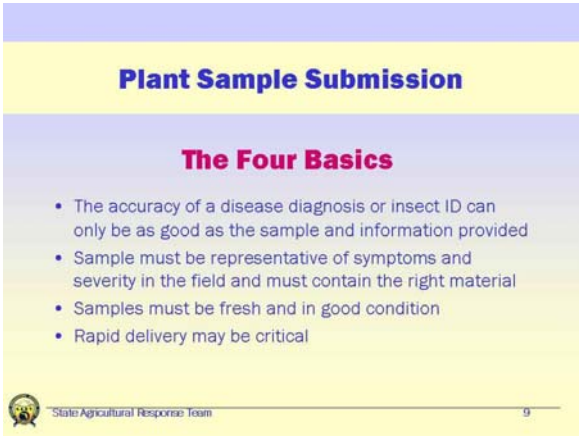
Slides 1-6

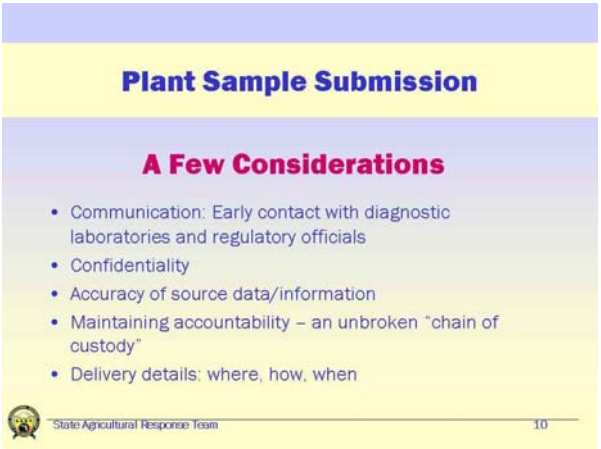


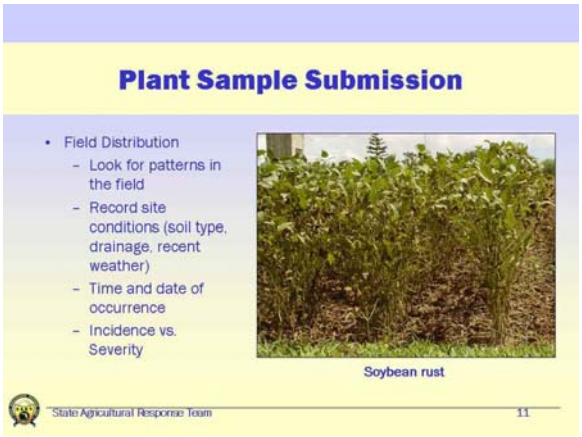


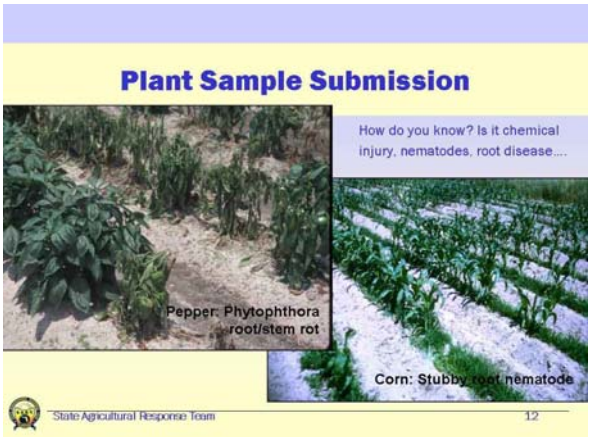
PowerPoint Slides

Slides 7-12









PowerPoint Slides

Slides 13-18

Plant Sample Submission

Incidence

A percentage of the crop affected

Severity

A measure of impact on plants or crops

State Agricultural Response Team 13

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

State Agricultural Response Team 14

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.

State Agricultural Response Team 15

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

State Agricultural Response Team 16

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)

State Agricultural Response Team 17

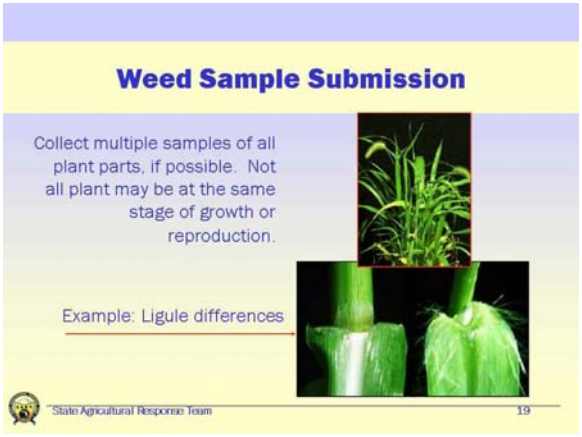
Weed Sample Submission

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.

State Agricultural Response Team 18

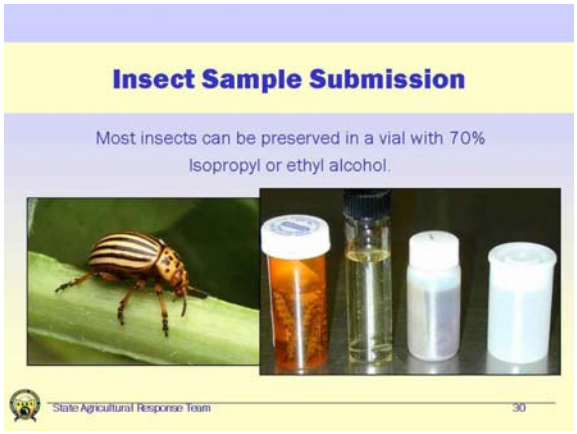
PowerPoint Slides

Slides 19-24



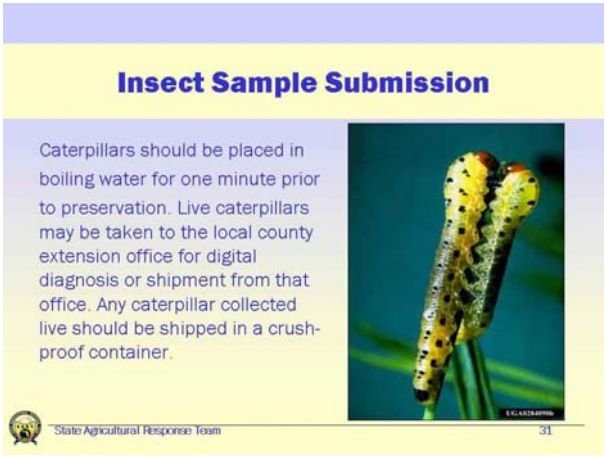
PowerPoint Slides

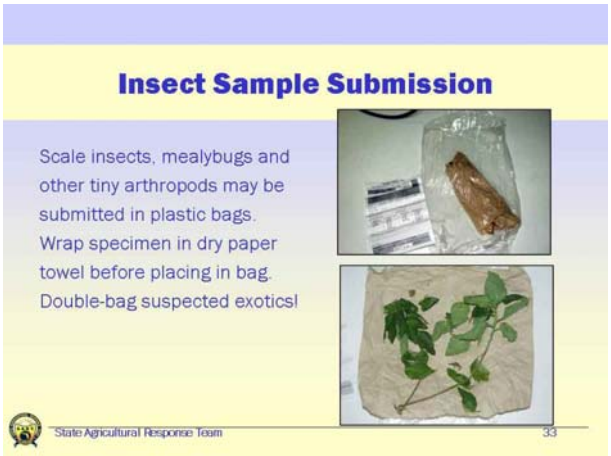
Slides 25-30

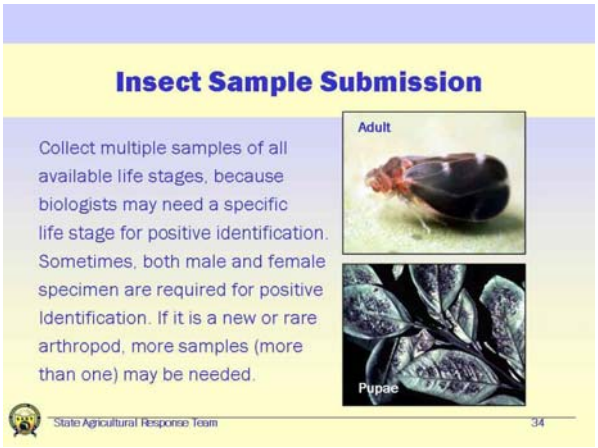


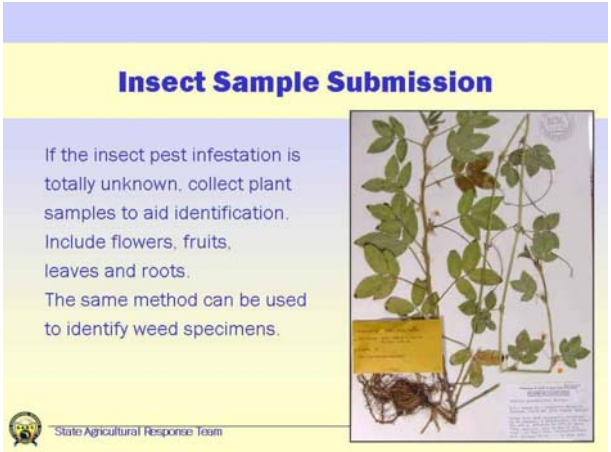
PowerPoint Slides

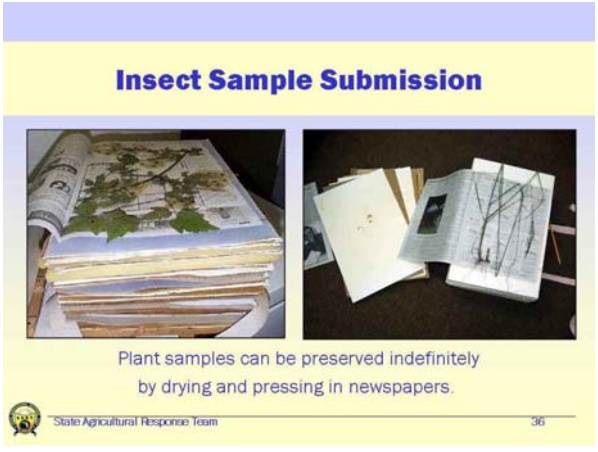
Slides 31-36











PowerPoint Slides

Slides 37-42

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.

State Agricultural Response Team 37

Insect Sample Submission

State Agricultural Response Team 38

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

State Agricultural Response Team 39

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

State Agricultural Response Team 40

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

State Agricultural Response Team 41

Where to Submit Your Samples

State Agricultural Response Team

PowerPoint Slides

Slides 43-48

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.

State Agricultural Response Team 43

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.

State Agricultural Response Team 44

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.

State Agricultural Response Team 45

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.

State Agricultural Response Team 46

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

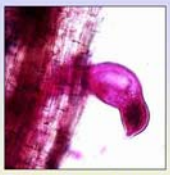
Note: A service to Florida residents provided by UF's Institute of Food & Agricultural Sciences. Hours are 8 am to 5 pm Monday-Friday. The normal charge for insect identification is $8, but this fee is normally waived if the sample is delivered in person.

Pheromone-baited flight trap
For the Southern Pine Beetle

State Agricultural Response Team 47

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.

State Agricultural Response Team 48

PowerPoint Slides

Slides 49-54

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

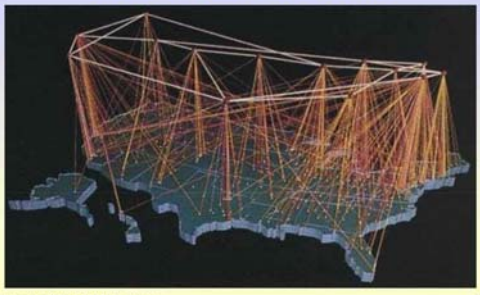
State Agricultural Response Team 49

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/

State Agricultural Response Team 50

NPDN: National Plant Diagnostic Network



State Agricultural Response Team 52

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"

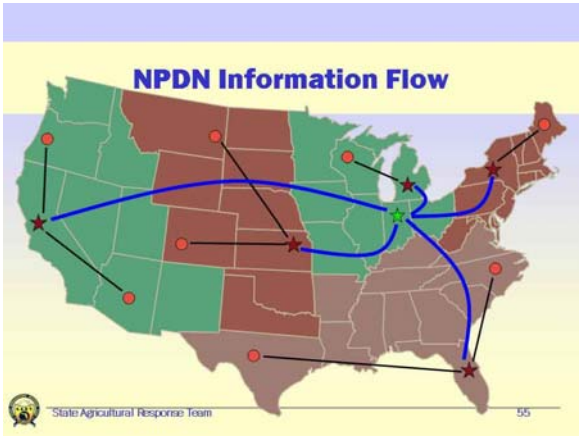
State Agricultural Response Team 53

Five NPDN Regions

State Agricultural Response Team 54

PowerPoint Slides

Slides 55-60



PowerPoint Slides

Slides 61-66

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

State Agricultural Response Team 61

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.

State Agricultural Response Team 63

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

State Agricultural Response Team 64

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: _____.

State Agricultural Response Team 65

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.

State Agricultural Response Team 66

PowerPoint Slides

Slides 67-72

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.

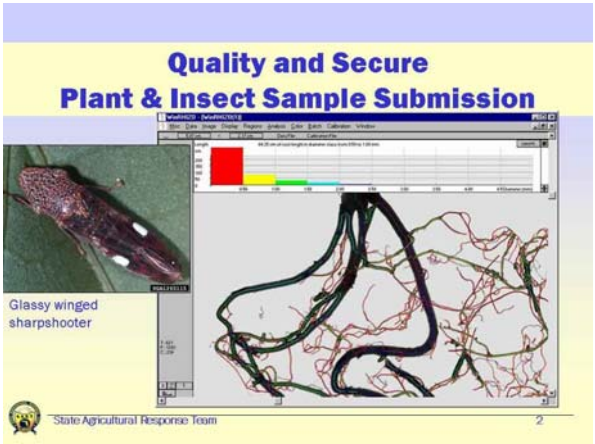
PowerPoint Slides
Handout Pages

The *Quality and Secure Plant and Insect Sample Submission* PowerPoint slides are reproduced on the following pages at reduced size with space for participant notes.

They are also included in the participant workbook for *Quality and Secure Plant and Insect Sample Submission*, which is available on the SART web site at www.flsart.org.

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
2


Quality and Secure
Plant & Insect Sample Submission
Prepared by
Amanda Hodges, PhD
Southern Plant Diagnostic Network, University of Florida
Funded by Cooperative State Research, Extension and Education Service (CSREES), USDA
Rick Sapp, PhD
Florida Department of Agriculture and Consumer Services
Florida SART Technical Writer
State Agricultural Response Team
3

Slides 4-6

Acknowledgements

- University of Florida, Institute of Food & Agricultural Sciences (IFAS)
- At the University of Florida: Carrie Harmon, Lyle Buss, Richard Cullen and Eileen Buss
- At FDACS-DPI: Susan Halbert
- At North Carolina State University: Tom Creswell, David Stephan and Gerald Holmes. At Kansas State University Jim Stack. At University of North Dakota R. Winstead and Adolph Northern. At University of California Carla Thomas. At University of Texas Philip Varghese (Fluid Mechanics).
- 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 Wisler (USDA-ARS), Case Medlin, Glenn Nice
- Florida Fish & Wildlife Conservation Commission
- US Dept. of Interior, US Geological Survey

State Agricultural Response Team 4

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

State Agricultural Response Team 5

Florida SART

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

State Agricultural Response Team 6

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

State Agricultural Response Team 7

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?

State Agricultural Response Team 8

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

State Agricultural Response Team 9

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

State Agricultural Response Team 10

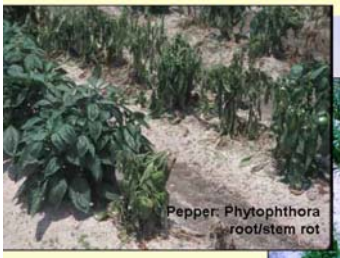
Plant Sample Submission

- 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

State Agricultural Response Team 11

Plant Sample Submission



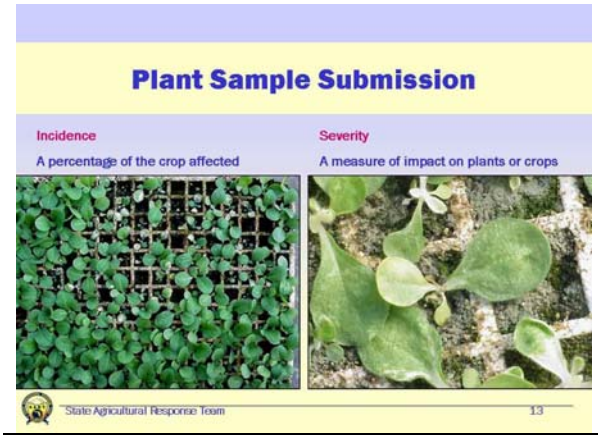
Pepper: Phytophthora root/stem rot

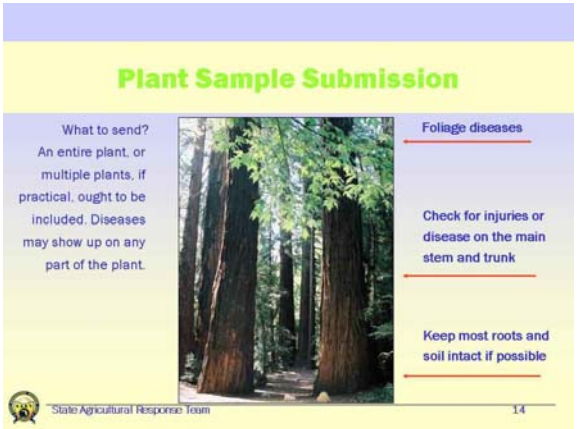
How do you know? Is it chemical injury, nematodes, root disease....

Corn: Stubby root nematode

State Agricultural Response Team 12

Slides 13-15


Plant Sample Submission
Incidence
A percentage of the crop affected
Severity
A measure of impact on plants or crops
State Agricultural Response Team
13


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
State Agricultural Response Team
14


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.
State Agricultural Response Team
15

Slides 16-18

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

State Agricultural Response Team 16

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)

State Agricultural Response Team 17

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.

State Agricultural Response Team 18

Slides 19-21

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

State Agricultural Response Team 19

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?

State Agricultural Response Team 20

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

State Agricultural Response Team 21

Slides 22-24


Sample Quality
Packing and Shipping
PLEASE DO NOT
CRUSH
State Agricultural Response Team
22


Sample Quality
Packing and Shipping
State Agricultural Response Team
23


Sample Quality
Packing and Shipping
Real-life packaging and
shipping blunders
State Agricultural Response Team

Slides 25-27

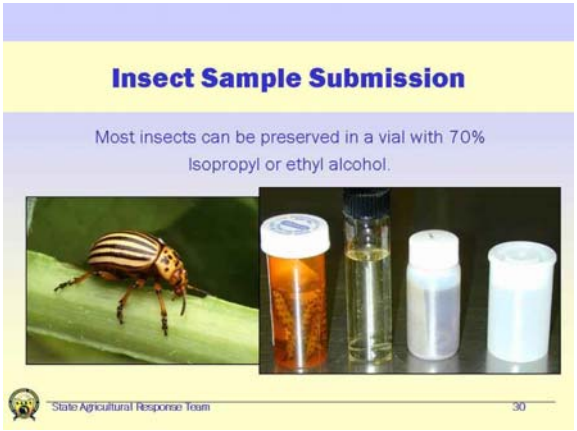

Sample Quality
Packing and Shipping
Additional real-life packaging and shipping blunders.
State Agricultural Response Team
25


Sample Quality
Packing and Shipping
Examples of good packaging
State Agricultural Response Team
26

Slides 28-30


Insect Sample Submission
The Wrong Way
State Agricultural Response Team
28


Insect Sample Submission
The Right Way
Properly packaged mailing tubes protect samples!
State Agricultural Response Team
29


Insect Sample Submission
Most insects can be preserved in a vial with 70% Isopropyl or ethyl alcohol.
State Agricultural Response Team
30

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.

State Agricultural Response Team 31

Warning: Do Not Microwave Your Samples!

State Agricultural Response Team 32

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!

State Agricultural Response Team 33

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.

State Agricultural Response Team 34

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.

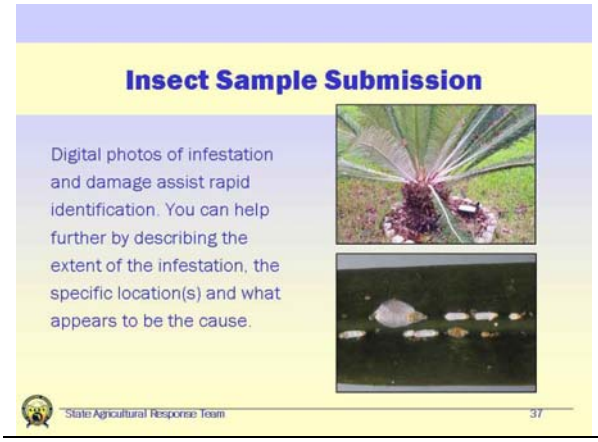
State Agricultural Response Team

Insect Sample Submission

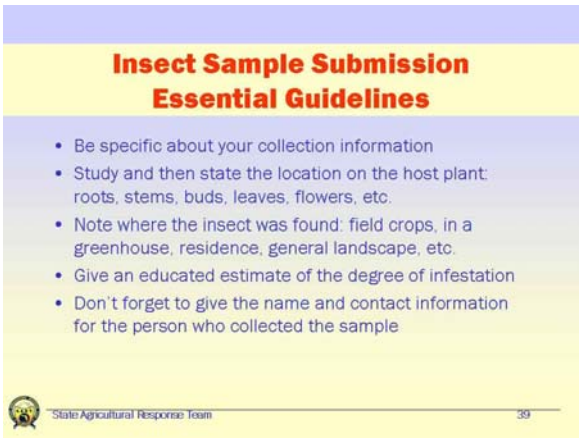
Plant samples can be preserved indefinitely by drying and pressing in newspapers.

State Agricultural Response Team 36

Slides 37-39


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.
State Agricultural Response Team
37


Insect Sample Submission
Piercing/Sucking
Boring
Leaf-mining
Skeletonizing
State Agricultural Response Team
38


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
State Agricultural Response Team
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Slides 40-42

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

State Agricultural Response Team 40

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

State Agricultural Response Team 41

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

Slides 43-45

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.

Slides 46-48

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.

State Agricultural Response Team 46

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

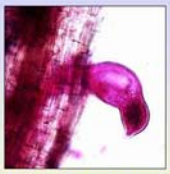
Note: A service to Florida residents provided by UF's Institute of Food & Agricultural Sciences. Hours are 8 am to 5 pm Monday-Friday. The normal charge for insect identification is $8, but this fee is normally waived if the sample is delivered in person.

Pheromone-baited flight trap
For the Southern Pine Beetle

State Agricultural Response Team 47

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

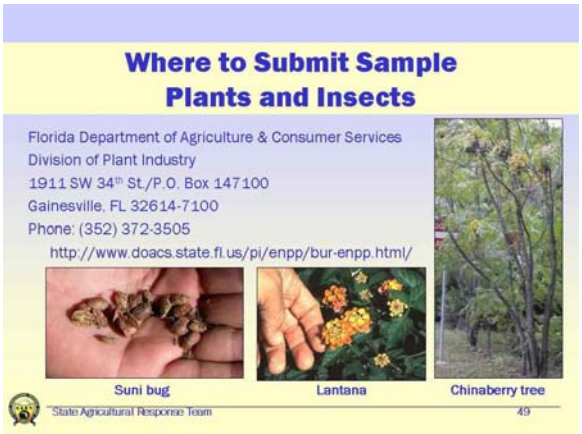


Female citrus nematode

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.

State Agricultural Response Team 48

Slides 49-51


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
State Agricultural Response Team
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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/
State Agricultural Response Team
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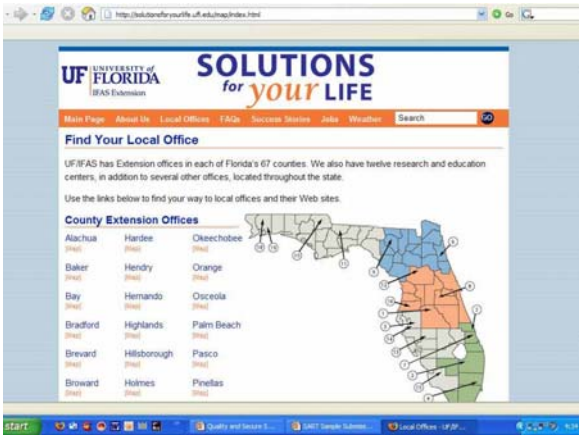
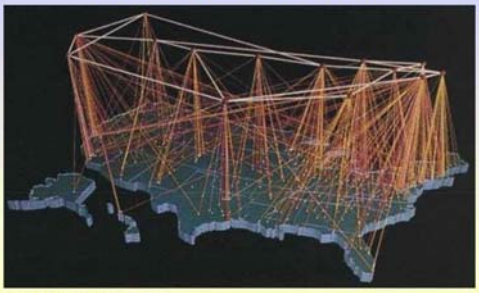

UF UNIVERSITY of FLORIDA
IFAS Extension
SOLUTIONS for your LIFE
Find Your Local Office
UF/IFAS has Extension offices in each of Florida's 67 counties. We also have twelve research and education centers, in addition to several other offices, located throughout the state.
Use the links below to find your 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

Slides 52-54

NPDN: National Plant Diagnostic Network



State Agricultural Response Team 52

The NPDN Role

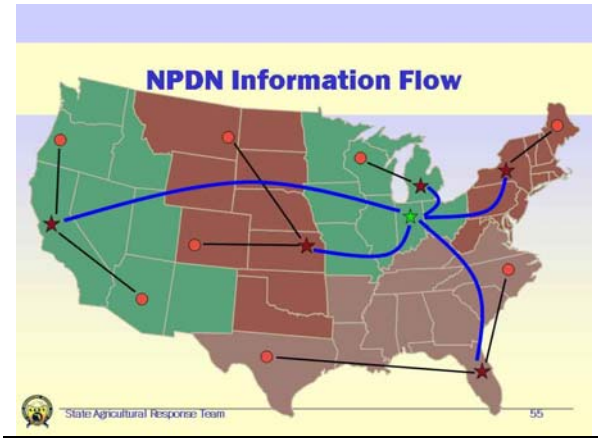
- Enhanced security of America's agricultural sector from a biosecurity event or unintentional introduction.
- How is this accomplished?
  - Coordinated national diagnostic laboratories
  - Rapid communication and response system
  - Database analysis for event detection
  - Education and training of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

State Agricultural Response Team 53

Five NPDN Regions

State Agricultural Response Team 54

Slides 55-57


NPDN Information Flow
State Agricultural Response Team
55


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
State Agricultural Response Team
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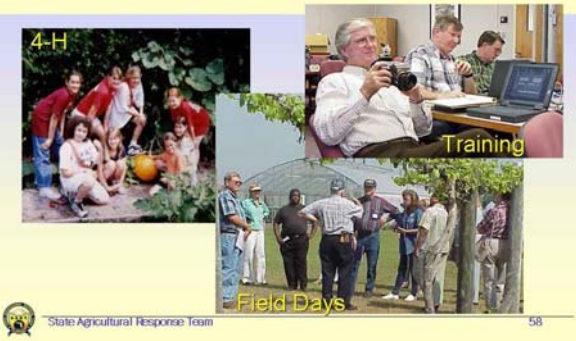
Slides 58-60

"First Detectors" – Natural Multi-Taskers



State Agricultural Response Team 58

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

State Agricultural Response Team 59

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

State Agricultural Response Team 60

Slides 61-63

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

State Agricultural Response Team 61

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.

State Agricultural Response Team 63

Slides 64-66

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

State Agricultural Response Team 64

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: _____.

State Agricultural Response Team 65

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.

State Agricultural Response Team 66

Slides 67-69

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

Slide 70


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.
State Agricultural Response Team
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PowerPoint Slides
Full Size

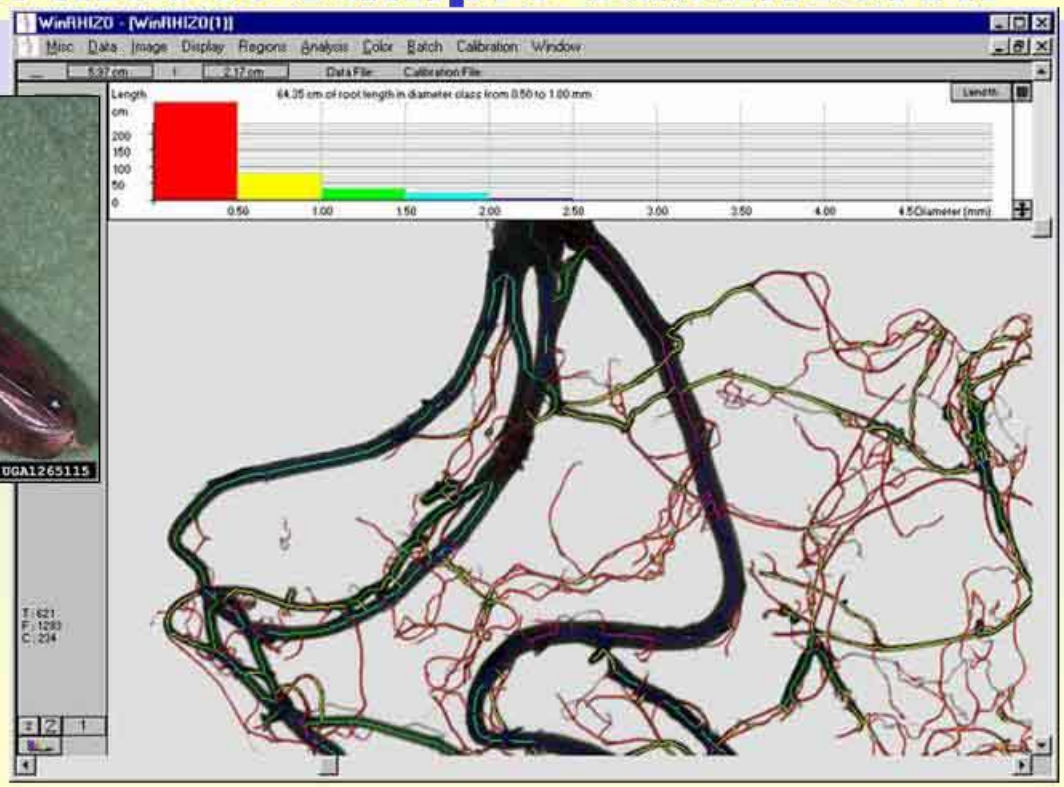
The PowerPoint slides for *Quality and Secure Plant and Insect Sample Submission* are reproduced full-size on the following pages. You can use these pages as display or photocopy them onto plastic overhead sheets for use with an overhead projector.

Color versions of these slides can be downloaded from the SART web site at www.flsart.org.


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

Quality and Secure
Plant & Insect Sample Submission

Glassy winged sharpshooter



Quality and Secure Plant & Insect Sample Submission

Prepared by

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Southern Plant Diagnostic Network, University of Florida
Funded by Cooperative State Research, Extension and Education Service (CSREES), USDA
Rick Sapp, PhD
Florida Department of Agriculture and Consumer Services
Florida SART Technical Writer

Acknowledgements

- University of Florida, Institute of Food & Agricultural Sciences (IFAS)
- At the University of Florida: Carrie Harmon, Lyle Buss, Richard Cullen and Eileen Buss
- At FDACS-DPI: Susan Halbert
- At North Carolina State University: Tom Creswell, David Stephan and Gerald Holmes. At Kansas State University Jim Stack. At University of North Dakota R. Winstead and Adolph Northern. At University of California Carla Thomas. At University of Texas Philip Varghese (Fluid Mechanics).
- 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 Wisler (USDA-ARS), Case Medlin, Glenn Nice
- Florida Fish & Wildlife Conservation Commission
- US Dept. of Interior, US Geological Survey

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

Citrus greening

Mediterranean fruit fly

Passionvine mealybug

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

- 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….

Plant Sample Submission

Incidence

A percentage of the crop affected

Severity

A measure of impact on plants or crops

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

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.

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

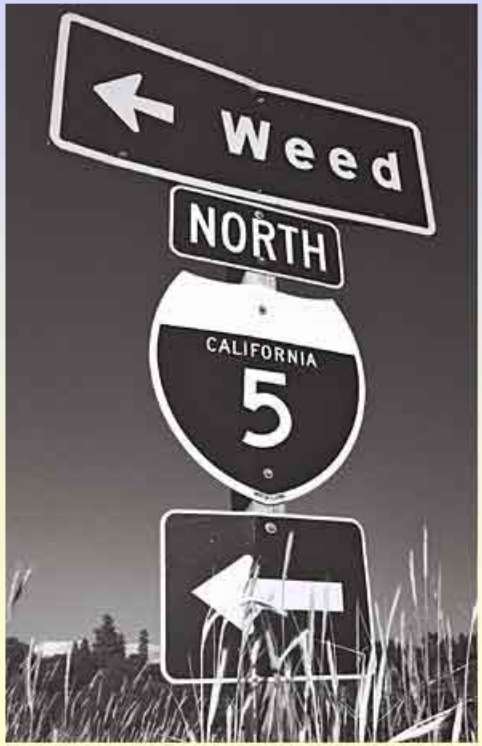
- Collect intact specimens
- Preserve and package sample properly
- Send suspected exotics by Next Day delivery

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.



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

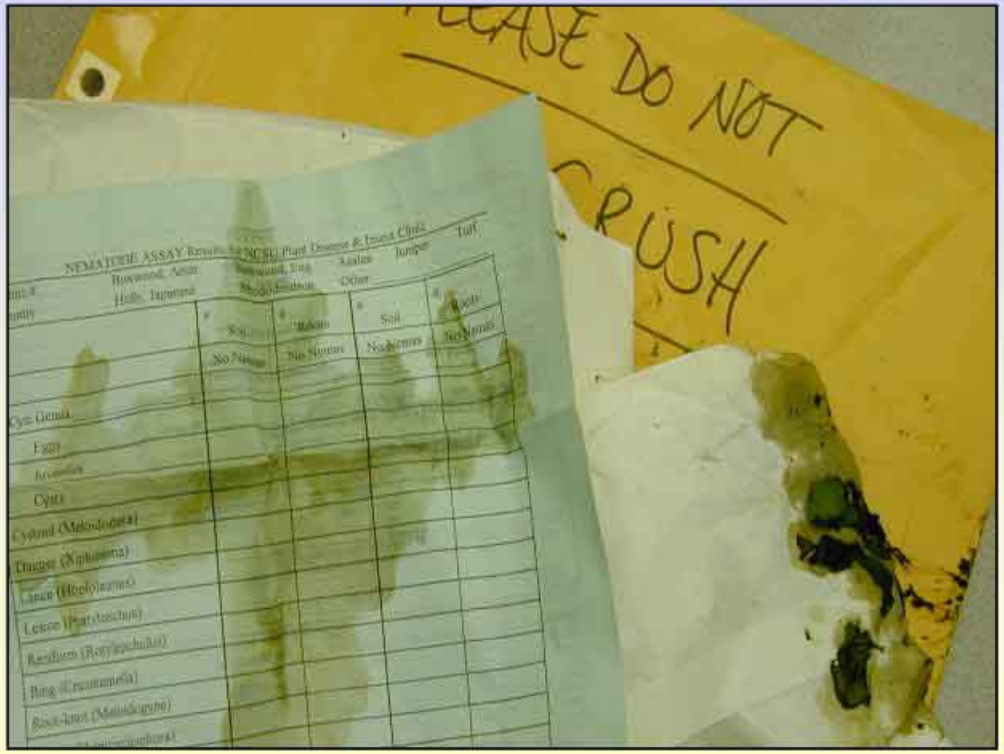
- Digital photos can be extremely useful if they are close-ups and very clear.
- Be specific about collection information. The more accurate information you give, the better. Correct and timely information results in faster, more precise diagnosis.
- Where was the sample found, for instance: greenhouse,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

Sample Quality
Packing and Shipping

Sample Quality
Packing and Shipping



Sample Quality
Packing and Shipping

Real-life packaging and shipping blunders

State Agricultural Response Team

Sample Quality
Packing and Shipping

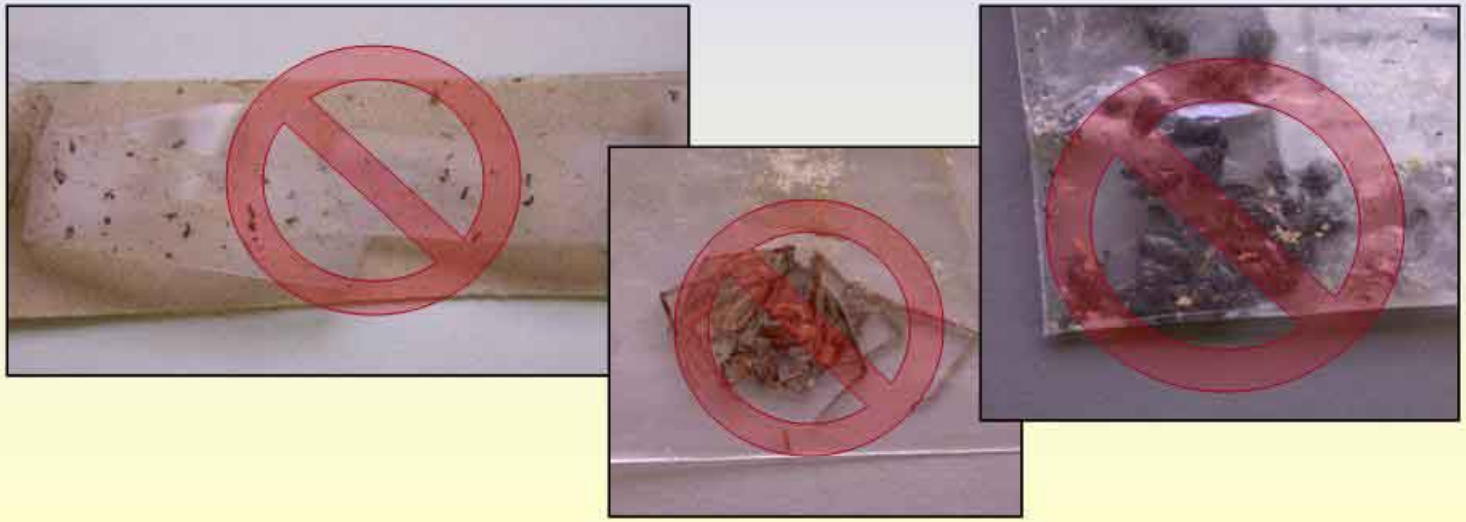
Additional real-life packaging and shipping blunders.

Sample Quality
Packing and Shipping

Examples of good packaging

Insect Sample Submission

The Wrong Way



Insect Sample Submission

The Right Way

Properly packaged mailing tubes protect samples!

Insect Sample Submission

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

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!
State Agricultural Response Team
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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!

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.

Insect Sample Submission

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

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

State Agricultural Response Team

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

Florida Extension Plant Disease Clinic
Building 78, Mowry Road
P.O. Box 110830, University of Florida
Gainesville, Florida 32611-0830
Phone: (352)392-1795 Fax: (352)392-3438

PLANT DISEASE DIAGNOSTIC FORM

Please Print - Fill-in **ALL** relevant data; maintain office copy; submit original copy with specimen. See reverse side for submission instructions.

DATE____/____/____

Grower address
Name _____
Company _____
Address _____
City/Zip _____
County _____
Phone No. (___) _____
FAX No. (___) _____

Submitted by (if different)
_____
_____
_____
_____
FAX/MAIL Results To: Grower G Submitter G
(___) _____
(___) _____

G Commercial Grower G Consultant G Home Grower G Research **$20.00 PER SAMPLE**

PLANT AND VARIETY _____

General Plant Appearance: G wilted G spotted G yellowed G abnormal growth G stunted G mosaic G other _____

Part(s) of Plant Affected and Symptom(s) Expressed

G ROOTS: G apparently normal G poor growth G discolored G rotted G stubby G galls or swelling G other _____
G TRUNK, G STEM or G BRANCH: G galls or swellings G cankers G discolored internally G dieback G rotted G abnormal pattern or number G wilted G other _____
G LEAVES: G spotted G blighted G yellowed G mosaic G wilted G galls or swelling G rotted G other _____
G FLOWERS or G FRUIT: G spotted G blighted G rotted G discolored G mosaic G distorted G other _____
G OTHER (specify) _____

Type Planting:
GField GGrove/orchard
GInterior GLandscape
GForest GNursery
GGarden GGreenhouse
GOther _____

Prevalence:
GEntire Planting
GLocalized area
GScattered area

Symptoms Appeared: (In Past)
GDays ____
GWeeks ____
GMonths ____

Recently Applied Chemicals:
Fertilizer _____
Pesticide _____
_____

EMAIL ADDRESS

COUNTY AGENT SIGNATURE (optional)

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.

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.

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/

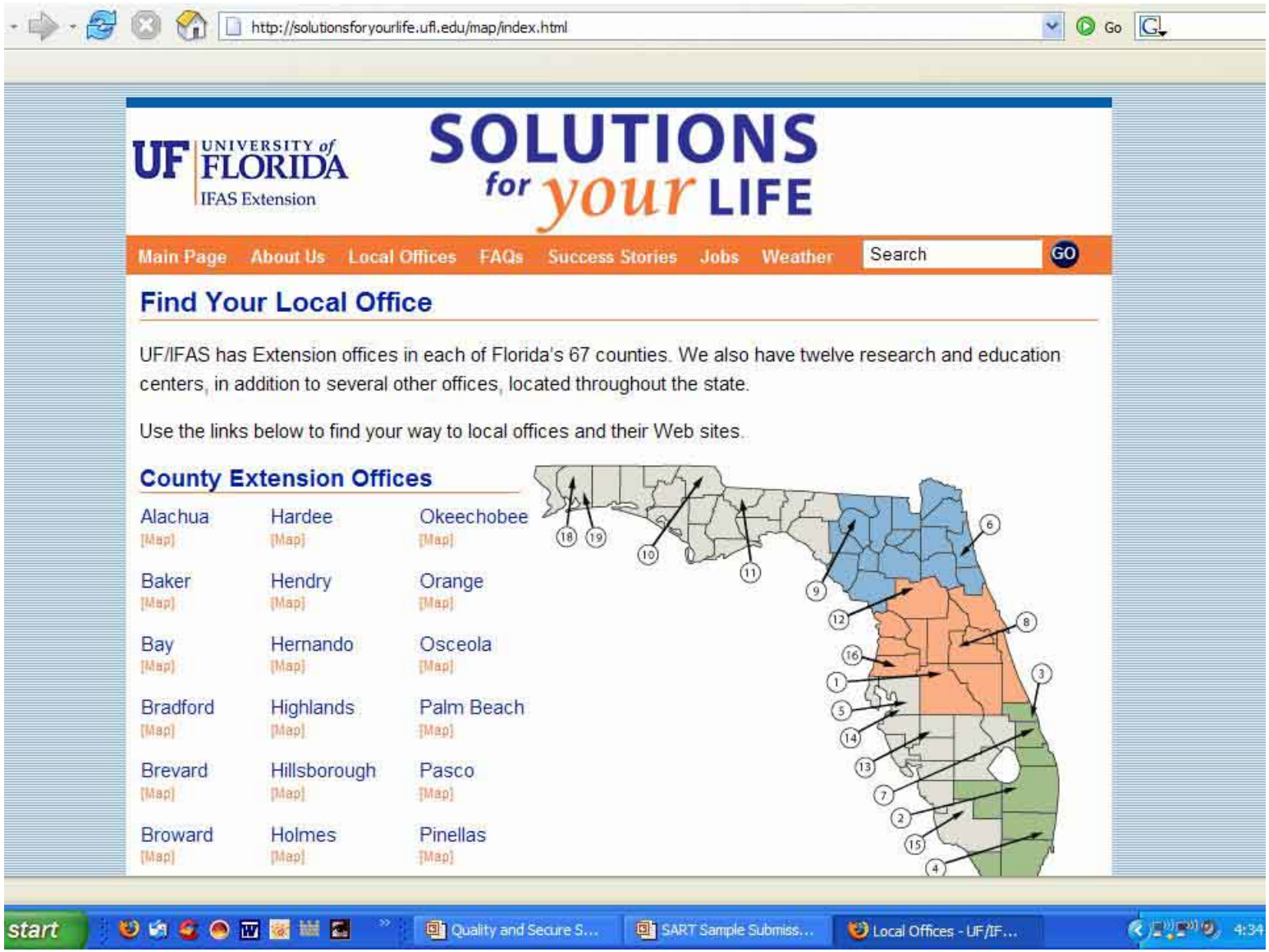
Suni bug

Lantana

Chinaberry tree

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/


http://solutionsforyourlife.ufl.edu/map/index.html
Go
UF UNIVERSITY of FLORIDA
IFAS Extension
SOLUTIONS for your LIFE
Main Page
About Us
Local Offices
FAQs
Success Stories
Jobs
Weather
Search
GO
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 [Map]
Baker [Map]
Bay [Map]
Bradford [Map]
Brevard [Map]
Broward [Map]
Hardee [Map]
Hendry [Map]
Hernando [Map]
Highlands [Map]
Hillsborough [Map]
Holmes [Map]
Okeechobee [Map]
Orange [Map]
Osceola [Map]
Palm Beach [Map]
Pasco [Map]
Pinellas [Map]
start
Quality and Secure S...
SART Sample Submiss...
Local Offices - UF/IF...
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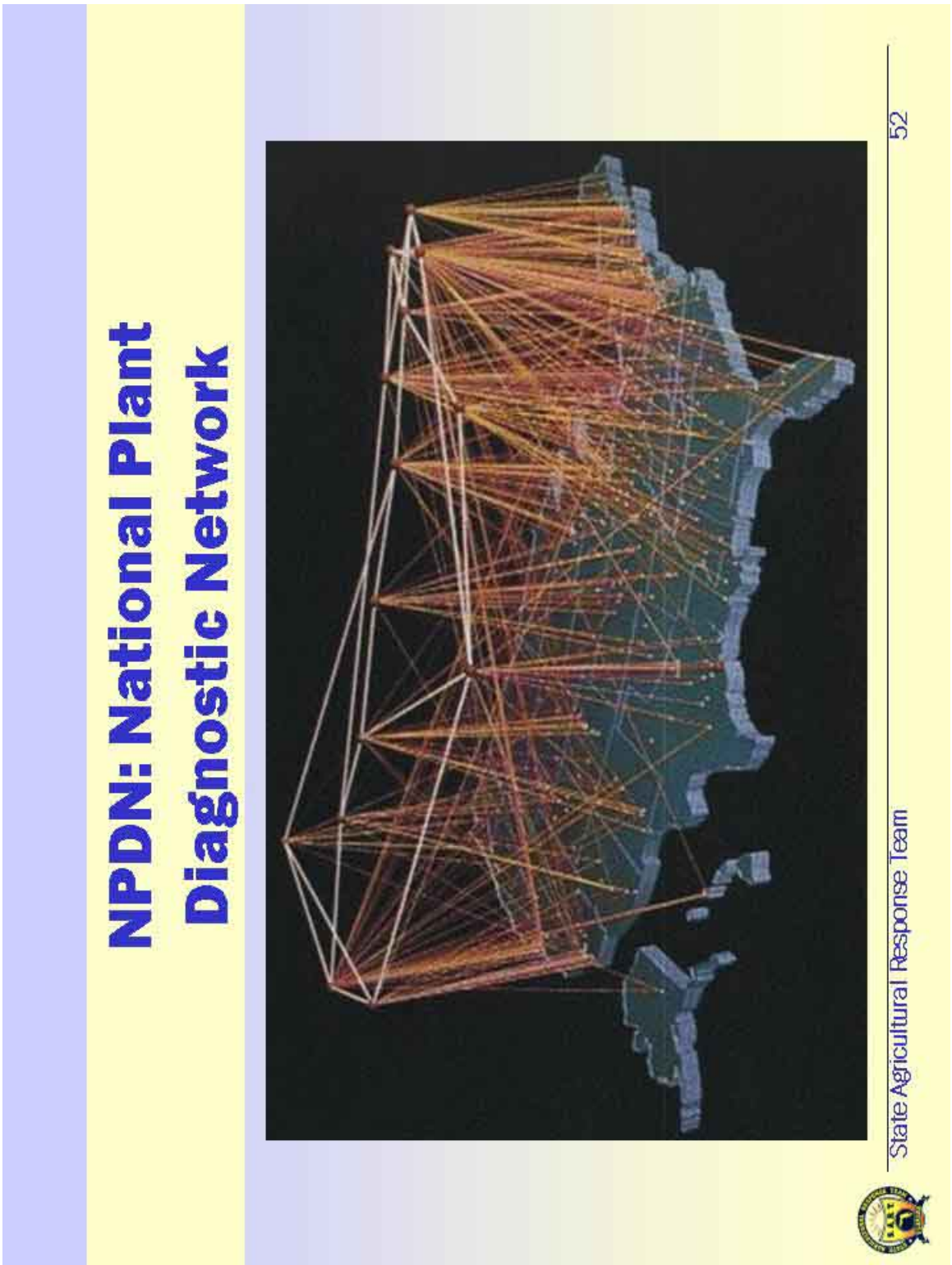
NPDN: National Plant Diagnostic Network
State Agricultural Response Team
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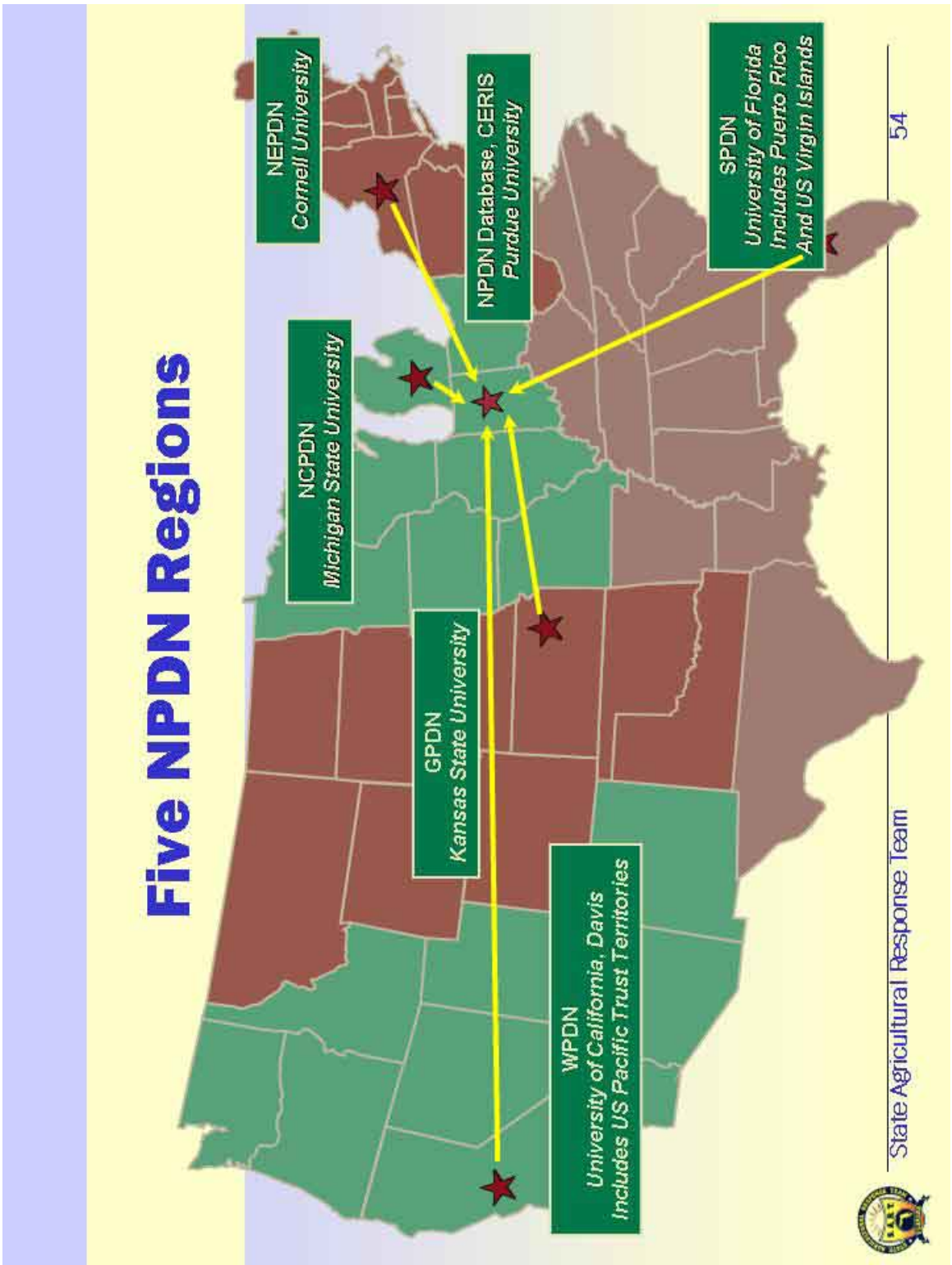
The NPDN Role

- 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"


Five NPDN Regions
NEPDN
Cornell University
NPDN Database, CERIS
Purdue University
SPDN
University of Florida
Includes Puerto Rico
And US Virgin Islands
NCPDN
Michigan State University
GPDN
Kansas State University
WPDN
University of California, Davis
Includes US Pacific Trust Territories
State Agricultural Response Team
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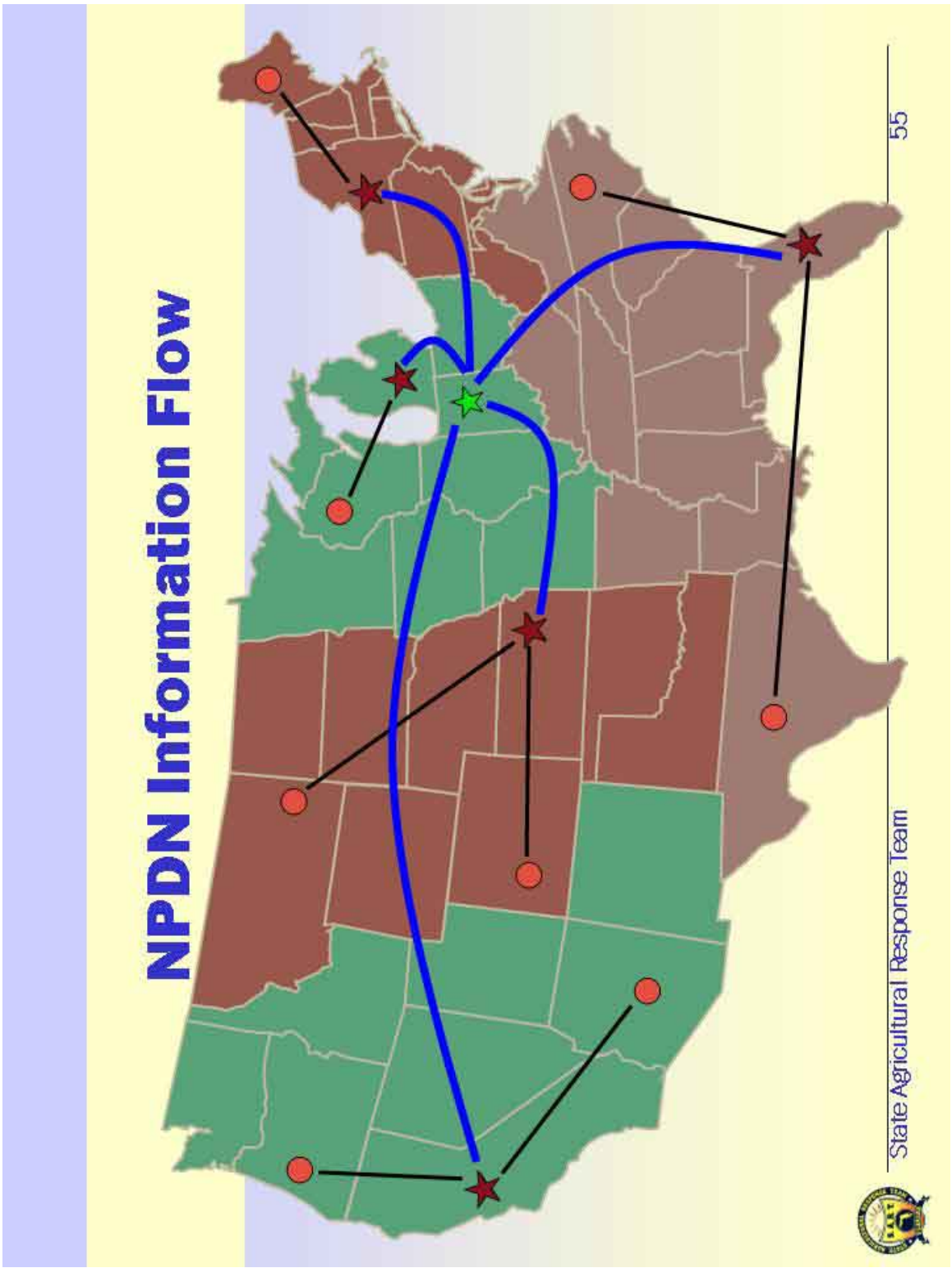

NPDN Information Flow
55
State Agricultural Response Team

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

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
- 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

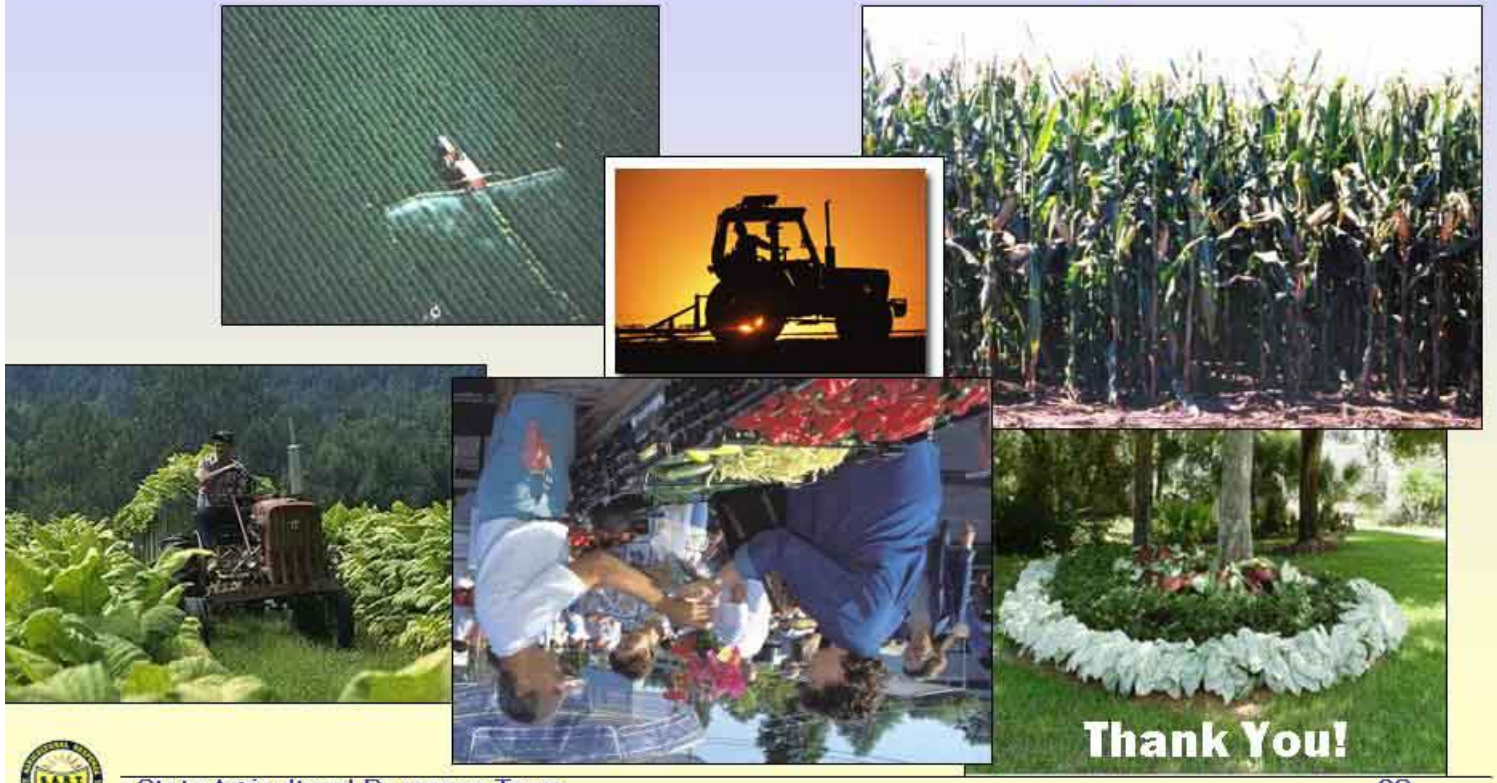
Key Resources

- 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

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

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



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.

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.

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

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.