INSECTS

Lisa Ames, Extension Entomologist

An important function of University of Georgia's Extension entomologists is identifying insect and mite specimens submitted by Cooperative Extension agents. By properly preparing, preserving, and packaging a specimen, the chances that a specialist can provide a prompt and useful identification will be greatly increased. Below you will find some useful tips for accomplishing this.

Most small specimens can be placed in a vial containing preservative like rubbing alcohol. For very small or delicate insects especially, it is helpful to collect and submit multiple specimens of each pest for identification. Multiple specimens can be placed in the same vial.

Insects may be unidentifiable after being crushed or becoming decayed. Large insects may need to be killed in a killing jar or by freezing before being placed in a vial or small container of preservative. All vials and containers of preservative should be mailed in a mailing box with with sufficient padding to prevent breakage.

Sticky traps should be folded into tent shape (if they are of that type), or if flat, the trap glue should be covered with plastic wrap before the traps are boxed and mailed. Extra padding is not recommended for glue traps, so use the smallest box that can accommodate them.

Moths and butterflies generally do not travel well. In many cases it is easier to take good photographs of them to submit for identification.

Mites, thrips, and scale insects should be sent as you would diseased plants because they are easily damaged when handled and their characteristic appearance on the plant is often crucial to identification. Taking clear photographs of the samples before packaging them is also helpful in case the sample deteriorates during mailing. The photos can then show what the sample looked like previously.

If possible, small caterpillars, grubs, and maggots should be sent live in a sealed paper bag with some of the host material. Host material should not be wet. Some insects - like older fly maggots - are best reared into adults before shipping. A petri dish with paper on the bottom works as a temporary refuge. Maggots should pupate and then complete development within days. Adult flies can then be mailed as above. If not sent alive, turf grubs should be frozen and placed in alcohol. All other soft bodied insects, ticks, mites, and spiders should be placed in a vial with preservative before shipping the sample.

Including as much relevant information as possible with a sample generally helps to speed up the identification process. Whenever appropriate, please provide the information requested on the sample form found in the link here: extension.uga.edu/content/dam/extension/programs-and-services/structural-pest-management/documents/HomeownerSampleSubmissionForm.pdf

SHIPPING INSECT SPECIMENS

Address package to the appropriate clinic and/or specialists. All home and garden samples submitted from homeowners should be submitted to the UGA Homeowner Insect and Weed Diagnostic Laboratory, 210 Cowart Building, Department of Entomology, UGA Griffin Campus, 1109 Experiment Street, Griffin, GA 30223-1797. For all other sample types, please see below.

Extension Entomology
Cowart Bldg., Department of Entomology
University of Georgia, Griffin Campus
1109 Experiment Street
Griffin, GA 30223-1797
Attn: Daniel Suiter for Warehouse, institutional, and structural.
Attn: Shimat Joseph for commercial ornamental, turf, and nursery.
Attn: Eric Schoeller for greenhouse and related.
Attn: David Buntin for small grains.

Extension Entomology
Entomology Department
136 Cedar Street
Building C, Rm 418
Athens, GA 30602
Attn: Jamie Ellis for Apiculture. Attn: Ash Sial for small fruits.
Attn: Brett Blaauw for tree fruits. Attn: Elmer Gray for medical.
Attn: Nancy Hinkle for pets, poultry, and livestock.

Extension Entomology
Entomology Department
2360 Rainwater Rd.
Tifton, GA 31793
Row crop samples, Invasive species (Attn: Joe Laforest)

SUBMITTING SAMPLES TO THE UGA PLANT DISEASE CLINICS

Laxmi Pandey, Plant Disease Diagnostician

The UGA Plant Disease Clinics provide diagnostic support for county Extension personnel and the residents of Georgia. Our services include analysis for plant disease or disorders as well as suggesting appropriate management strategies. Our clients include Extension educators, growers, retailers, arborists, golf courses, researchers, and homeowners. The Plant Disease Clinics work closely with the UGA Cooperative Extension county offices.

Contact your county office for assistance with your plant disease problem at **extension.uga.edu/about/county**. If the county Extension office personnel cannot provide an answer to the disease problem, they will often submit the sample to the appropriate plant disease clinic. All samples sent to the clinics must be submitted through the county Extension offices.

INSTRUCTIONS FOR SUBMITTING SAMPLES:

The UGA Plant Disease Clinics use the PClinic online system to track both physical and digital disease submissions. PClinic is used by the clinics to track when samples are sent and when they arrive. Specialists use this system to return diagnoses and recommendations to county offices.

Fill out completely a PLANT DISEASE SUBMISSION FORM, either the commercial or homeowner form, for each specimen. The information on these forms is a valuable tool in the diagnostic process. Forms and more information can be found on the clinic website at **plantpath.caes.uga.edu/extension/clinic**.html. The county Extension office should have copies of these forms. Make sure the sample is appropriately packaged and include the form with the sample in the box. Do not place the form in the plastic bag with the sample. Place in a separate envelope in the box.

TAKING GOOD IMAGES FOR THE PCLINIC SYSTEM:

Images can be submitted as a digital submission through the PClinic system or in a separate email with or without physical samples. Diseases and disorders are often influenced by conditions in the surrounding site. For dieback issues on woody plants, for example, taking images is often vital since entire plants cannot be submitted.

Image submissions should include both close-ups of the problem and the entire plant, including surrounding conditions. Images alone may not provide enough information for confirmation of a disease and a follow-up physical sample may be needed, but images can be an important part of the diagnostic process.

PREPARATION OF SAMPLES FOR SUBMISSION:

The ability to correctly diagnose plant diseases or disorders is only as good as the quality of the sample and the information provided on the disease submission sheet. Diagnosis of a sample that was improperly collected, packed, and/or shipped and arrives in poor shape is usually very difficult and often impossible. Place diseased specimens in a plastic bag. DO NOT ADD ANY MOISTURE. Place a DRY paper towel in the plastic bag to absorb any excess moisture. Fleshy fruit and vegetables should be wrapped separately in paper towels. If whole plants are shipped, seal root balls in a plastic bag to keep the roots moist and prevent contamination of the foliage. Mushrooms should be wrapped in newspaper and shipped overnight in a box; avoid using plastic bags. KEEP ALL SPECIMENS COOL. DO NOT ALLOW SPECIMENS TO DRY OUT.

PLANT SYMPTOMS AND SPECIMEN SELECTION:

Wilting, yellowing, or general decline of foliage often indicates a problem with the roots or the lower stems. If practical, send the entire plant (leaves, stems, roots). Collect plants or plant parts that have early disease symptoms. Dig up carefully. DO NOT PULL UP—many roots will be lost. If whole plants cannot be submitted, images of the plants can be useful for diagnosing die-back issues.

Twig and Branch Blights and Cankers. Select specimens that show recent infection. Include healthy tissues connected to diseased tissues. The problem cannot be diagnosed from entirely dead samples.

Foliage Diseases (spots, blights). Select leaves that have early or recent infections. Leaves still attached in groups are better than a few individual leaves. Marginal leaf burn symptoms can indicate a lack of water uptake, environmental stress or chemical injury, or in some cases bacterial scorch disease.

Turf. Remove a 6–12" square section of turf from the edge of the problem area so that the sample shows a range of disease symptoms. Include the intact roots with the underlying soil. Place in a plastic bag and seal. Dried-out turf is very difficult to diagnose.

Fruit and Fleshy Plant Organs. Diseases of these structures require special attention. Never select a specimen that is exhibiting advanced stages of decay or disease. Select fresh specimens that exhibit early symptoms.

SHIPPING SAMPLES:

The county Extension office will ship the samples to the clinic. A $25 fee will be charged for disease diagnosis of any Georgia samples not approved by the county Extension office of sample origin. If possible, ship specimens Monday, Tuesday, or Wednesday. Samples shipped on Thursdays and Fridays may not arrive at the Plant Disease Clinic until the following week resulting in possible specimen degradation and difficulty with diagnosis. Specimens may be sent by regular mail (may be slow), delivery service such as FedEx or UPS, or by state courier. Samples that break down quickly should be shipped by express mail. Weekend deliveries are not accepted.

Place the specimen in a refrigerator over the weekend if necessary. Place prepared specimen in an appropriately sized box.

THERE IS A $10 PROCESSING CHARGE FOR ALL PHYSICAL HOMEOWNER SAMPLES. PLEASE SEND A CHECK PAYABLE TO "PLANT DISEASE CLINIC" ALONG WITH THE SAMPLE.

PLANT DISEASE CLINICS AT THE UNIVERSITY OF GEORGIA

SAMPLE TYPE	DIAGNOSTICIAN	CONTACT ADDRESS
Commercial ornamentals (nursery, greenhouse, landscapes, cut flowers), forestry, Christmas trees, legume and grass forages, wood rots, certain fruits (apples, peaches, strawberries, grapes), ornamental landscapes, turf, small grains, all homeowner, all controlled-environment agriculture (CEA), community gardens	Daniela Gutierrez Yanez 706.542.2571 or 706.542.8987 **Daniela.GutierrezYanez@uga.edu**	Athens Plant Disease Clinic UGA—Plant Pathology Dept. 2105 Miller Plant Sciences Bldg. 120 Carlton St. Athens, GA 30602-7274
Commercial vegetables (including transplants), commercial row crops (cotton, soybean, peanut, corn), tobacco, pecan, Southern Georgia fruits (blueberry, blackberry, pomegranate, citrus, kiwi, olives, mayhaw)	Laxmi Pandey 229.386.7495 Fax 229.386.7415 **laxmi.pandey@uga.edu**	UGA—Plant Pathology Dept. Tifton Plant Disease Clinic Room 116, 4604 Research Way Tifton, GA 31793
All samples for nematode analysis (check with nematode lab for instructions and fees)	Ganpati Jagdale 706.542.9144 Fax 706.542.5957 **gbjagdal@uga.edu**	UGA—Plant Pathology Dept. Extension Nematode Laboratory 2350 College Station Road Athens, GA 30602-4356

NEMATODES

Bob Kemerait, Extension Plant Pathologist

I. WHY SAMPLE

Nematodes can parasitize virtually all crops and ornamental plants and can cause significant economic damage by reducing both yield and quality. Properly taken samples from small field units can reduce production costs by allowing the grower to eliminate nematode control practices where they are not needed and implement control practices where they are needed. Improper sampling or handling of samples can lead to poor recommendations and economic losses that could have been avoided.

II. WHEN TO SAMPLE

The timing of collection of nematode samples is important because nematode populations fluctuate throughout the year. Nematodes may be undetectable during the winter and early spring but increase to very high levels before harvest; following harvest, population levels may decline precipitously. Sampling when population densities are high decreases the risk of failing to detect a damaging species. The best time to collect samples is when living roots are present and nematode populations are high. For most crops, this is generally near harvest.

The optimum time to take samples for nematode assay from various Georgia crops are given below:

From roughly December through March, most Georgia soils are too cold to support active root growth of warm-season crops and nematode populations exist primarily as eggs. Unfortunately, typical laboratory assays do not detect nematode eggs, so samples collected in the winter frequently fail to detect nematodes when there are actually many nematode eggs present. Failure to detect a species does not necessarily mean that it is not present because the species may be present at low levels that the random sample missed or it may be present only as eggs, which the assay cannot detect. Because of these limitations, samples should not be collected during the winter. Soil moisture should be about right for good seed germination when nematode samples are taken.

III. HOW TO SAMPLE

It is very important that the soil sample be truly representative of the area sampled. The only way to ensure this is to collect the sample from many spots around the field rather than from only 1 or 2 spots. Even if a small problem area is being

CROP	WHEN TO SAMPLE	COMMON NEMATODES
Cotton	September, October, November or until frost/cold weather	Root-Knot, Columbia Lance, Reniform, Sting
Field Corn	At harvest and prior to frost/cold weather	Root-Knot, Stubby-Root, Sting
Fruit Orchards (except peaches)	September, October	Root-Knot
Peaches	September, October (for root-knot) February, March, April (for ring)	Root-Knot, Ring
Peanuts	September, October, November or until frost/cold weather	Root-Knot, Sting
Soybeans	September (Group IV) October (Groups V, VI) November (Group VII) or until frost/cold weather	Root-Knot, Columbia Lance, Reniform, Soybean Cyst
Tobacco	July	Root-Knot
Turfgrass Warm season Cold season	 June, July, August September, October, April	Root-Knot, Lance, Sting, Ring
Vegetables	August, September	Root-Knot

sampled, soil should still be collected from multiple spots within the area being sampled. Ideally, one soil sample should be taken for every 4–5 acres, but practically, 1 sample may have to represent a much larger area of a field. The sample may represent a section that has homogeneous soil type and conditions and is farmed uniformly. The shape of a field may influence the number of acres that a sample represents. If a very large area is sampled, high-population areas will be diluted by low-population areas so that areas with nematode problems will be more difficult to identify.

Take 20–30 soil cores from random locations throughout the field. One sample should not represent more than 20 acres. If a problem area is being sampled, collect soil from the margin of the affected area. Collect soil to a depth of 8 inches (20 cm) in the root zone of living plants. Sampling depth may be different with certain crops, such as turf. Thoroughly mix the collected soil and put about 1 pint of soil into a plastic bag. **Do not take samples from extremely dry soil. DO NOT ALLOW SAMPLES TO GET HOT OR DRY!** Storing samples in an insulated cooler protects them well. Allowing samples to sit in direct sunlight or in a hot vehicle for even a short time can kill the nematodes in the sample. Nematodes must be alive for the extraction procedure to work. Killing the nematodes in the sample may result in failure to detect nematodes. Send samples early in the week so that they do not spend the weekend in transit.

IV. SHIPPING SOIL SAMPLES FOR NEMATODE ASSAY:

All samples for nematode assay must be submitted through your local county Extension office. Your county Extension office will send the samples to the Extension Nematology Laboratory, 2350 College Station Road, The University of Georgia, Athens, GA 30602. The results of the assay will be returned to you through your county Extension office. Samples for problem diagnostics submitted through the county Extension office of sample origin will be analyzed at no charge. Samples for purposes other than problem diagnostics submitted through the county Extension office of sample origin will be charged $15 per sample. All other samples, including samples submitted from out of state NOT submitted through the county Extension office of sample origin, will be charged $25 per sample.

V. SUMMARY OF HOW TO COLLECT AND SUBMIT A SOIL SAMPLE FOR A NEMATODE ASSAY

1. Collect a soil sample for nematode assay.
    a. Take 20–30 soil cores from random locations throughout a field. If a problem area is being sampled, collect soil from the margin of the affected area.
    b. Collect soil to a depth of 8" (20 cm) in the root zone of living plants. Sampling depth may be different with certain crops, such as turf.
    c. Thoroughly mix the collected soil and put about 1 pint of soil into a plastic bag. Seal tightly.
    d. Keep samples cool. Do not allow samples to dry out.
2. Fill out a "NEMATODE ASSAY FORM" for each sample. Supply all information requested. You MUST list present, past, and future crops to assist in identifying nematode problems and making management recommendations. Also list variety grown. Variety information is critical for soybeans and tobacco.
3. Carefully label plastic bags on the outside with a permanent marker.
4. Your county Extension office will send the sample to the Extension Nematology Laboratory in Athens. The results of the assay and recommendations will be returned to you through your county Extension office. Keep a record of which nematodes are found in which fields.

WEEDS

Benjamin Pritchard —Turfgrass Weeds Specialist

Correct identification may be required to ensure the proper choice of control methods. Weed specimens may be identified for you by this procedure:

1. Collect a representative specimen, preferably with flowers and fruit, but definitely with leaves, stem, and roots.
2. Place specimen between sheets of newspaper and mail in a padded envelope. DO NOT send specimens wrapped in wet paper towels and sealed in plastic bags. (Aquatic plants may be shipped in moist paper towels in a zip lock bag.)
3. Send a letter with at least this information:
   a. Associated desirable plants, type of turfgrass, or crop.
   b. Degree of infestation and size of the weed.
   c. If control suggestions are required.

SHIPPING WEED SPECIMENS FOR IDENTIFICATION

Send the specimen to the weed scientist who has responsibilities for weed control on the site or crop where the weed was found:

Dr. Benjamin Pritchard
Turfgrass Research & Education Building
1109 Experiment Street
UGA-Griffin Campus Griffin, GA 30223-1797
Responsibilities: Turfgrass, Roadsides, and Aquatic Weeds

Dr. Stanley Culpepper
Horticulture Bldg.
P.O. Box 748 Tifton, GA 31793
Responsibilities: Cotton, Vegetables, Small Grains, Pecans

Dr. Eric Prostko
Horticulture Bldg.
P.O. Box 748 Tifton, GA 31793
Responsibilities: Corn, Sorghum, Peanuts, Soybeans, Canola

Dr. Lisa Baxter
Plant Science Bldg.
P.O. Box 748 Tifton, GA 31793
Responsibilities: Forages

Mr. Wayne Mitchem
Mountain Horticultural Crops Research & Extension Center
455 Research Drive
Fanning Bridge Road Mills River, NC 28759
Responsibilities: Apples, Peaches, Grapes, Muscadines, Pecans

Dr. Mark Czarnota
Horticulture
1109 Experiment Street
UGA-Griffin Campus Griffin, GA 30223-1797
Responsibilities: Blueberries, Christmas Trees, Ornamentals

Lisa Ames
UGA Homeowner Insect and Weed Diagnostic Laboratory 210 Cowart Bldg.
UGA-Griffin Campus 1109 Experiment Street
Griffin, GA 30223-1797
Responsibilities: Home Gardens, Home Lawns

FISH KILL DIAGNOSTICS

James Shelton and Wesley Gerrin, Fisheries

GUIDELINES FOR FISH DIAGNOSTIC SERVICES

This section provides guidelines for submitting samples of fish tissue for diagnostic services to confirm diseases, parasites, insecticides, or other chemicals. Guidelines are also provided for water quality and algae sample submission in fish kill cases where disease is not suspected.

A. Diseases and Parasites in Fish Tissue

Fish tissue samples for disease or parasite confirmation can be submitted to the University of Georgia Veterinary Diagnostic Laboratory, which has locations in Athens and Tifton.

- Diagnostic labs do not accept live fish, but fish should be euthanized as close to submission as possible for the best results.
- Fish that are already deceased should be submitted in plastic bags without water.
- If samples are being shipped, they should be packed in insulated shipping containers with ice packs. Samples should never be frozen and should be as fresh as possible.
- If more than one specimen is available, 1-2 specimens may be submitted in 10% formalin along with the fresh specimen. A cut should be made in the abdominal cavity to facilitate formalin penetration.
- Samples should either be dropped off in person or shipped by the fastest means possible.

Athens Veterinary Diagnostic Lab
College of Veterinary Medicine
DW Brooks Drive Room 501
Athens, GA 30602
(706) 542-5568

Tifton Veterinary Diagnostic Lab
43 Brighton Road
Tifton, GA 31793
(229) 386-3340

WATER CHEMISTRY

Water chemistry samples can be submitted to the University of Georgia Agricultural and Environmental Services Laboratory (AESL) located in Athens. The AESL has several water tests that can help determine potential causes of fish stress.

Common Water Quality Tests

- Fishpond general water quality (**W34C**): Includes a variety of chemical constituents. Tests alkalinity and hardness and calculates lime requirement.
  - Requires a 125 mL plastic container.
- Pond water quality and algal testing kit (**W34D**): Includes the same chemical tests as W34C, with an additional analysis for harmful algae. If toxin-producing algae are present, an algal toxin test is performed.
  - Kits contain 3 plastic bottles with one bottle containing Lugol solution.
- Priority pollutants (**W41**): Includes common heavy metals that could be harmful in high concentrations.

Proper Sampling Techniques

- Samples should be collected from multiple locations in the pond and combined into one sample.
- Samples should be collected at least 6 inches below the water surface and at least 1 foot above the bottom.
- Samples should not be contaminated with sediment or plant material.

Contact the AESL or your local county extension agent for further information about collecting and submitting samples or for assistance with interpretation of results.

Agricultural and Environmental Services Lab
2400 College Station Road
Athens, GA 30602
706-542-5350

VERTEBRATES

Michel Kohl, Wildlife Specialist

Hand carry or mail specimen to Michel Kohl, Wildlife Specialist, Warnell School of Forestry and Natural Resources, The University of Georgia, Athens, Georgia. Telephone Number (706) 389-0404; email **michel.kohl@uga.edu**.

LIVE SPECIMENS

Live organisms may be held for several days pending identification and later released. The key is to provide air, moisture, water, and, sometimes, food. Keep from direct sun, excessive heat, and freezing temperatures. All wildlife can carry potentially harmful diseases and care should be taken when handling live animals. Most, including snakes, are protected by law. A permit from the Georgia Department of Natural Resources is required before collecting nearly all specimens.

Snakes and Lizards

Place in a bag of tight-weave cloth or container with a tight-fitting, perforated lid. Include a handful of damp leaves or moss. Keep at room temperature and out of the sun. Specimens can survive without food for a week or more. Place snakes in a container with water for a few hours every few days. Spray water in container with lizards; they will lap water drops.

Frogs, Toads, and Salamanders

Place in a cloth bag with plenty of damp leaves or moss. Sprinkle bag with water as necessary to keep moist.

Aquatic Salamanders and Tadpoles

Care for as live fish.

DEAD SPECIMENS

Rodents and Other Small Vertebrates

Small mammals taken from traps should be frozen. Other dead vertebrates, such as reptiles and amphibians, should be preserved in Ethanol. Seventy to eighty percent (70–80%) alcohol will also do as a preservative. Inject body cavity or pierce in several places. Place in plastic bottle with a tight-fitting lid. Pack jar in mailing tube or well-made cardboard box. Contact package service or postal service prior to shipping specimens.

Dry animal parts, such as skulls or pieces of skin, can be placed in mailing tubes. Pack with crumpled paper. Accurate identification is easier with whole specimens in good condition. Skulls (cleaned and free of insects or tissue) are best for identification of mammals.

DIGITAL PHOTOS

Digital photography often provides enough information for an identification. You can photograph many kinds of small animals—alive and dead. You can easily photograph harmless snakes, frogs, turtles, lizards, etc. Use a setting that will show pattern. Use adequate light and a neutral background. Include some form of scale (e.g., tape measure). Take several pictures from various angles. For snakes and lizards, photograph head, face, belly, and back, showing all lines or patterns. Mail or email the photo to the wildlife specialist.

PESTICIDES, FUMIGANTS, TOXICANTS

Use of poisons may be restricted to licensed pesticide applicators only. Always consult the label of a current product for expiration data and legal restrictions on use and application. Always conform to pesticide labels but use caution if working with older formulations or products—the EPA registration may have expired. Current information on pests and pesticide products can be found by searching EPA websites, state registration websites, other online sources or contacting your county Extension agent. Additional information on pesticides use can be found at **kellysolutions.com/ga/searchbypest.asp**.