

The 2012 North Carolina Agricultural Chemicals Manual is published by the North Carolina Cooperative Extension Service, College of Agriculture and Life Sciences, N.C. State University, Raleigh, N.C. These recommendations apply only to North Carolina. They may not be appropriate for conditions in other states and may not comply with laws and regulations outside North Carolina. These recommendations are current as of November 2011. Individuals who use agricultural chemicals are responsible for ensuring that the intended use complies with current regulations and conforms to the product label. Be sure to obtain current information about usage regulations and examine a current product label before applying any chemical. For assistance, contact your county Cooperative Extension agent. The use of brand names and any mention or listing of commercial products or services in this document does not imply endorsement by the North Carolina Cooperative Extension Service nor discrimination against similar products or services not mentioned.

**BOOKMARKS**

To jump to a location in this chapter without scrolling through the pages, use the Adobe Acrobat Bookmarks feature. To use Bookmarks, click on the Bookmarks icon on the left side of the page, then click on a Bookmarks entry.

**III — HOW TO SEND SPECIMENS FOR DISEASE, INSECT,  
AND WEED IDENTIFICATION**

How to Send Specimens for Disease, Insect, and Weed Identification ..... 36  
Plant Disease and Insect Clinic (PDIC)..... 36  
What to Sample and How to Ship..... 36  
Disease Sample Submission and Instructions ..... 36  
Insect Identification ..... 37  
Precautions..... 38  
Plant and Weed Identification..... 38  
Soil Testing, Nematode Assay, Plant Tissue Nutrient Testing, Waste Analysis, and Solution Analysis .. 38

## Chapter III — How to Send Specimens

### How to Send Specimens for Disease, Insect, and Weed Identification

#### B. SHEW, Extension Plant Pathology

#### Plant Disease and Insect Clinic (PDIC)

##### Fees for Disease Diagnosis and Insect Identification Samples

##### Turf Sample Fees

- \$100 out-of-state, all turf samples
- \$50 in-state, golf courses
- \$30 in-state, other turf, submitted by individual or business
- \$20 in-state, other turf, submitted by Cooperative Extension Service Agent with online submission form

##### Non-Turf Fees (all others)

- \$75 out-of-state
- \$30 in-state, submitted by individual or business
- \$20 in-state, submitted by Cooperative Extension Service Agent or NCDA&CS specialist with online submission form

Please include check made payable to NCSU with your sample.

##### Contact Information

Hours: 8 a.m. to 4:30 p.m., Monday through Friday

##### Plant Disease/Insect Clinic

State Courier #: 53-61-21

Campus Box 7211, Room 1227 Gardner Hall

100 Derieux Place

North Carolina State University

Raleigh, NC 27695-7211

<http://www.ncsu.edu/plantpath/extension/clinic>.

General Information: 919-515-3619; [shawn\\_butler@ncsu.edu](mailto:shawn_butler@ncsu.edu)

Insects: David Stephan, 919-515-9530;  
[david\\_stephan@ncsu.edu](mailto:david_stephan@ncsu.edu)

Turf: Lee Butler, 919-513-3878, [lee\\_butler@ncsu.edu](mailto:lee_butler@ncsu.edu)

**Sending Samples and Images Directly to the PDIC:** Our database allows users to create an account, create a sample record, and upload sample information and images for diagnosis. Before using the database, please read the help information on the PDIC home page at:  
<http://www.cals.ncsu.edu/plantpath/extension/clinic>.

The database login site is: <https://plantclinic.ces.ncsu.edu/>

When you check in your sample online, you can track sample progress, review past reports and check status of your invoices.

#### What to Sample and How to Ship

Visit our website at

<http://www.cals.ncsu.edu/plantpath/extension/clinic> and go to "How to Submit Samples" for instructions and an illustrated guide.

- *Dead plants tell no tales*—Most plants that are totally dead, dry, or rotten are useless for diagnosis. Collect plants that show a range of the symptoms but are not yet dead.
- *More is better*—We may miss the main concern if you send only one plant. For bedding plants, young vegetables, and field crops, collect several plants with each type of problem.

- *Getting to the root of the problem*—Many disease problems are related to the roots and soil. Submit whole plants, including roots and soil whenever possible. Dig (don't pull) plants up to keep roots intact. For large plants, submit a portion of the root ball.
- *A place for everything*—Keep soil *off* the foliage and *on* the roots. This keeps roots from drying out and the foliage free of secondary organisms. Put the roots and soil in a plastic bag and tie at the main stem. Loosely wrap foliage in newspaper, then pull the bag over the rest of the plant and tie again to keep foliage from drying out. Make sure foliage is not wet when packaging.
- *Details, details*—The more you tell us about the situation on the PDIC form, the better. Please give complete information, including a client name and location, percent affected, and insect collection information (if applicable). List all fertilizer, fungicide, herbicide, and insecticide applications made in the last 30 days. We can get your information to you *faster by e-mail* or fax. Please do not call the clinic to check on samples. We send reports as soon as the diagnosis is ready.
- *Fresher is better*—Mail or deliver samples as soon as possible. On hot days, store samples in a cooler until you can send them. Avoid mailing on Fridays since many plants will rot by Monday morning after a package has been in transit for 3 days. Succulent plants, plants, fruits, vegetables or mushrooms that rot quickly should be sent overnight express.
- *Fragile, handle with care*—Ship all but the most rugged samples in a crush-proof box rather than an envelope.
- *We don't work for peanuts*—Please don't use foam "peanuts" to pad samples. Crumpled newspaper is cheaper, works well, and is easier for us to handle.
- *Noxious weeds*—Send *only* 1 quart of soil with samples from counties regulated under state and/or federal measures to prevent movement of noxious weeds.

#### Disease Sample Submission and Instructions

##### Turf Grasses

1. To diagnose turfgrass problems, we need **at least a 6 inch x 6 inch piece of the turf**, including the root system and soil. If using a golf course cup cutter, please send at least two plugs.
2. Collect samples from the border between healthy and diseased turf, so that two-thirds of the sample is diseased and one-third is healthy.
3. Wrap the soil and roots in two to three layers of aluminum foil to **ensure that no soil leaks out during transit**.
4. **DO NOT store or transport the samples in plastic bags**. Instead, place the samples in a cardboard box, and stuff it with newspaper or other packing material to hold the samples in place.
5. Download and print the Turfgrass Sample Submission form from the clinic Web site <http://www.ces.ncsu.edu/depts/ent/clinic/Submit/TurfForm.pdf>.

- Please fill out the sample submission form completely, and describe the symptoms you are observing as accurately as possible. All of the information requested on the form is needed to make an accurate diagnosis.
- List all fertilizer, fungicide, herbicide, and insecticide applications made in the last 30 days.** Also, list any major cultural practices (aerification, topdressing, etc.) conducted in the last 30 days. These practices have a major impact on disease and insect development, and provide valuable clues that will help us make an accurate diagnosis.

**Field, Garden or Landscape: Small Shrubs, Perennials, Annuals, Small Grains, Most Field Crops, and Vegetable Plants**

- Select plants with a range of symptoms but not dead plants.
- Dig (do not pull) up several whole plants, leaving roots/soil intact.**
- Wrap soil and roots in plastic bag, tie at main stem.
- Package and ship as described in general guidelines above.

**Mushrooms, Fruits, and Vegetables**

- Wrap in dry newspaper then place in a plastic bag. Ship overnight in a strong box with dry newspaper padding.

**Small Plants in Greenhouse or Nursery**

- Send 2 to 4 entire plants. Leave in the pot if possible. For very large plants, remove most of the media and enclose root system with remaining media in a plastic bag.
- For seedlings, send at least half the flat. Newspaper padding can help keep soil off leaves.
- Label each bag with your code if they represent different types of samples (Good, Bad or A, B, C, etc.)
- Package and ship as described in the general guidelines above.

**Large Shrubs and Small Trees**

- Dig a generous shovel full of the small, fine roots.
- Seal these in a plastic bag along with 1 quart of soil.
- In a separate plastic bag, include several branches showing symptoms. For diebacks, we need stem sections where live wood changes to dead wood.
- For plants that are clearly dying, please also send the bottom 8 to 10 inches of the main trunk (cut below soil line if possible).

**Large Trees**

Decline of large trees cannot be diagnosed by a clinic sample alone. However, with a good sample we can often identify leaf spots, vascular wilts, wood decays, and cankers.

- Cankers, swellings, diebacks**—Cut several affected branches to include several inches of healthy wood attached below the canker or dieback. Package in a plastic bag.
- Vascular wilt diseases**—Find a wilting or dying but NOT dead branch, peel back the bark and look for dark tan, black, or greenish streaks in the sapwood. Send several branches with these symptoms.
- Leaf spots**—Send several small branches with leaves attached. Seal loosely in a plastic bag. NO EXTRA WATER please.

- Wood rots**—These can be identified ONLY by the presence of mushrooms, conks, or other fungal fruiting structures. Wrap mushrooms or conks loosely in several layers of newspaper and place in a crush-proof box for shipment. No plastic bags. For fleshy mushrooms that rot quickly, please ship overnight. Badly decayed samples are useless for identification.

**Harvested Root Crops (Sweetpotato, Potato, Onion, etc.)**

- Collect 6 to 8 roots/tubers showing the symptoms of concern.
- Wrap each in newspaper separately or place in individual paper bags (NO PLASTIC PLEASE).
- Package and ship in crush-proof box with lots of newspaper padding.**

**Houseplants or Interiorscape Plants**

These plants typically have very few disease problems due to the dry interior air. Most problems are related to improper moisture, temperature, nutrition, or light conditions. Please screen houseplants for these problems and avoid sending such samples to the clinic. When a disease or insect problem is suspected on a valuable specimen plant:

- Send the whole plant if practical.
- For plants too large to send please send at least 2 cups of soil along with a generous handful of the smaller roots.
- Cut several stems showing the symptoms of concern.
- Package and ship as described in the general guidelines.

**Insect Identification**

- Most insects**—Roaches, termites, bugs, beetles, flies, wasps, ants, maggots, spiders, etc. should be sent in 70 percent alcohol.
- Mites, scales, aphids, and thrips**—Send in alive on some of the affected foliage/stems, collected as you would a plant specimen. Place in a plastic bag when collected.
- Butterflies and moths**—Send in killed (ethyl acetate is good), packaged lightly in tissue paper in a crush-proof box.
- Caterpillars**—Send in alive on some of the host plant in a plastic bag.
- Grubs**—Send in alive in a pint or two of soil enclosed in a plastic bag.

When in doubt, put specimens in 70 percent alcohol. Collect several specimens if possible. Send insect specimens to the Plant Disease and Insect Clinic at the address given above.

**Important:** Data submitted with insects must be complete and accurate. When filling out the clinic forms, please see that the following information is provided with the specimen. These four items are extremely important:

- Date specimen collected**—Date actually found, not date received by agent or other second party.
- Town and county where specimen was collected**—Location where the insect was actually found, which may not be the agent's or property owner's address. If not found within a town, give nearest town and distance and direction from it.
- Name of collector**—Name the specific person who actually captured or collected the insect. The agent or other second party should not be listed as the collector.

## Chapter III — How to Send Specimens

- *Where were the specimens or on what were they feeding when collected?*—If a plant, specifically name the host plant, e.g., oak, tobacco, marigold, etc. If not on a plant, name spot they were found, e.g., windowsill, closet, in a box of dog food, etc.

**Never send in insect specimens without the minimal information above.** Such specimens are useless for our records and the museum, and time is wasted trying to obtain data. *Do not* wrap insects in tissue or cellophane and then put in envelope. *Do not* stick them to paper with tape. *Do not* place them in an empty vial or overcrowd them as they will decay, or get broken, or both. *During our busy season, insects that arrive badly damaged and/or without data will be worked on last when time permits. Never* leave any sample in the sun or a closed car for even a few minutes; “cooked” samples may be impossible to diagnose.

### Precautions

Some identifications and diagnoses require extensive studies and are based on the material and information submitted. Time devoted to individual specimens must necessarily be limited, and the samples usually represent only a small percentage of the crop or problem. Reports reflect considered opinion and best judgment but may not always be statements of absolute fact nor define the major problems affecting the crop or site.

### Plant and Weed Identification

General plant identification services are provided by the Herbarium. Weed identification services (turfgrass weeds, cropland, and non-cropland), are provided by the Department

of Crop Science. All forms can be found at:  
<http://www.cals.ncsu.edu/plantbiology/ncsc/identification.htm>.

A complete plant or a specimen containing leaves, stem, roots, and flowers or fruit is absolutely necessary to get a definite identification. Please prepare specimens properly and pack well. It is impossible to identify a plant when only a leaf or stem is sent. Crushed specimens from poor packing or specimens that are rotted from being tightly packed when green are especially hard to identify.

### Soil Testing, Nematode Assay, Plant Tissue Nutrient Testing, Waste Analysis, and Solution Analysis

Information and forms are available in each county Cooperative Extension center, by calling the NCDA&CS labs, and on the Web at

<http://www.agr.state.nc.us/agronomi/index.htm>.

For a list of fees for various NCDA&CS services, see <http://www.ncagr.com/agronomi/fees.htm>.

NCDA&CS Agronomic Division,  
Dr. Colleen M. Hudak-Wise, Director

Mailing Address:

1040 Mail Service Center, Raleigh NC 27699-1040

Physical Address:

4300 Reedy Creek Rd., Raleigh NC 27607-6465

Phone: 919-733-2655; FAX: 919-733-2837