

Collecting and Submitting Plant Specimens for Disease Identification and Diagnosis through the NMSU Plant Diagnostic Clinic

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Accurate and timely plant disease identification and diagnosis begins with the grower, producer, and/or crop advisor. They are most often the first to notice that something is not “normal” with their plants and collect plant specimens for submission to their local county extension agent or directly to the New Mexico State University Plant Diagnostic Clinic. The clinic is designed to provide professional plant diagnostic services for New Mexico stakeholders and around the region. However, for the clinic to provide an accurate and timely diagnosis, it is imperative that the right type of plant material be submitted correctly. This publication is designed to aid growers and advisors with plant sample collection and submission for disease diagnosis.

COLLECTING HELPFUL INFORMATION PRIOR TO SAMPLE SUBMISSION

The Extension Plant Pathologist or Diagnostician are usually not in the field collecting the samples, therefore, any background information about the plant, its growing environment, and the initial symptoms can be extremely helpful. Factors required for accurate identification can be found on the NMSU Plant Diagnostic Clinic website: <https://plantclinic.nmsu.edu/submission.html> under the submission form tab. This important information includes:

1. What type of plant is the host? The common name is acceptable and should include the variety or cultivar preferred, if known. When the plant clinic receives a small piece of a plant or a bare branch, it is difficult to identify the

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pest or disease, and additional time must be spent to first obtain the identification of the plant.

2. How old is the affected plant? Plants and trees have a “shelf life” that depends on the care they receive, as well as whether they are planted correctly and in the appropriate growing environment. Additionally, seedlings and young plants are often more susceptible to diseases than those that are more mature and have had time to establish a more robust root system.
3. What are the symptoms displayed, or what is not “normal” with the plant? Try to provide a detailed description of what is wrong with the plant, such as dieback, leaf spots, wilt, or stem and root rot. This requires an extensive examination of the entire plant, including the stem and roots (if possible). Noting animal, insect or mechanical damage can also aid in the diagnosis.
4. When did the symptoms occur and how much of the plant(s) is affected? This is important because most plant pathogens gradually impair the host plant’s normal function. Whereas abiotic (non-living) issues—such as weather damage, mechanical damage, or pesticide toxicity—may appear suddenly, seemingly overnight. Additionally, information such as how much of the plant is affected by the symptoms can help point the plant clinic to where they need to be checking for a pathogen. Is one branch or leaves on that branch affected, or is the whole plant affected? It may also help to note if one specific part of the plant is affected while others seem normal (e.g. leaves, flowers, fruit, etc.). Is the top or bottom of the plant showing symptoms? Is more than one plant affected? If so, are other types of plants affected similarly? Typically, plant pathogens do not affect multiple genera of plants within the same growing area and therefore abiotic factors such as irrigation and growing area should be considered.
5. Finally, any additional information that helps us paint a picture of either the growing area, plant care within that area, or a significant weather event that could potentially impact the host plant should be noted on the form. Accurate irrigation practices are especially helpful, as well as fertilization schedule and type, drought and/or heat stress, heavy rainfall, extreme sunlight exposure, and whether the plants are grown indoors, in greenhouses, or outdoors. High quality, in-focus pictures showing the plant symptoms as well as the growing environment can be very helpful in the assessment. They can be emailed or printed and submitted with the sample.

COLLECTING THE CORRECT SAMPLE FOR DISEASE DIAGNOSIS

For the Plant Diagnostic Clinic to provide an accurate and timely diagnosis, both a fresh and correct type of plant sample is needed. Use the following general guidelines for collecting the correct type of sample and packaging it for shipment to the NMSU Plant Diagnostic Clinic:

1. If practical and possible, collect the whole plant, seedling (including roots), or even multiple plants showing symptoms when there are enough plantings available (Figures 1 and 2). When collecting roots, do not pull plants from the ground but rather dig entire root systems up to keep roots intact, which can be helpful when diagnosing root diseases. The plant can be placed between very lightly damp paper towels or newspaper. Keep the roots and any intact soil separate from the stems and foliage. Do not wash the roots, as washing can remove pathogens or diseased roots, and wet roots can spoil plants when shipping. Wrap the roots in newspaper or carefully place them in a plastic bag to catch any soil loosened during transit. Placing the roots in a paper or plastic bag with a tight rubber band can prevent cross-contamination.
2. When it is impractical to send in an entire plant, try to collect multiple individual parts of the plant that include any symptomatic tissue and represent the ‘abnormal’ state of the plant for submission. Do not collect and submit plant parts or tissue that are completely dead, as the pathogen responsible for damage is not alive or active in these tissues and could result in a misdiagnosis. Additionally, secondary organisms may be present and feeding on the dead or dying tissue which may mask the primary pathogen and compound the diagnostics.
3. The correct way to submit plant tissues with disease symptoms is to collect the margin area of the disease, where the symptomatic (dead) tissue meets the healthy tissue. This is where the active pathogen will be located. If branches are collected, follow the symptomatic or dead tissue until live, healthy tissue is found and collect that section. If larger sections of bark or branches are sampled, it is advised to cut samples into smaller subsections and wrap them in newspaper or paper towels.
4. When submitting samples that contain leaf spots or foliage issues (Figure 3), collect several leaves displaying these symptoms and place them between paper towels, newspaper, or place them in a plastic bag. Often, a single small piece of leaf tissue is sent to the plant clinic that completely dries out during transit and is likely unusable for diagnostic work.

5. Fruits, vegetables or nuts submitted for diagnosis need to be sampled at the first sign of infection and sent to the plant clinic as quickly as possible, preferably overnight, to avoid spoiled or decayed samples (Figure 4). The samples should be patted dry with paper towels, then wrapped in newspaper or fresh paper towels and placed in plastic bags for transit.
6. For turfgrass samples, plugs of the impacted grass with the whole root system should be dug up, not pulled and any intact soil should be left with the sample (Figure 5). Samples should be collected from the margin where the symptomatic area meets the healthy turf area. Both should be included in the sample for accurate diagnosis. The turf should be wrapped in dry paper towels or newspapers and placed in a plastic bag.



Figure 3. Pine tree with foliage symptoms.



Figure 1. Sample of a whole plant.



Figure 4. Pistachio nuts sampled after initial infection.



Figure 2. Sample of multiple cotton seedlings with roots.



Figure 5. Turfgrass sample with roots and intact soil.

SHIPPING YOUR SAMPLE TO THE PLANT DIAGNOSTIC CLINIC

Shipping to the NMSU Plant Diagnostic Clinic for disease diagnosis can occur in one of two ways. The first and preferred method is to visit your local county extension agent's office. You can find your local agent office here: <https://aces.nmsu.edu/county/>. The county agent/office can provide sampling instruction and help make sure all pertinent information about the plant and the growing conditions is included with the sample. The extension agent can also provide guidance on how to properly label the packages and can ship the samples directly to the plant diagnostic clinic in a timely manner. Prior to sample collection, please be sure to contact your agent to help you with this process.

The second method is to directly mail the samples to the clinic; this requires the sample is kept cool and moist prior to shipping. Avoid collecting samples and letting them heat up and dry out as that will affect the ability to recover any primary pathogens in the plant clinic. Mail the samples as soon as possible following their collection and packaging. It is important that samples be mailed in a sturdy cardboard container to avoid being crushed or damaged during transit. It is also important to mail samples early in the week (Monday-Wednesday) to avoid delivery over the weekend or during federal holidays when the university is closed which can result in shipping delays and degradation of samples. While overnight delivery is the best and preferred option, two-day delivery is also acceptable when samples are wrapped and packed well. They should arrive during normal business hours for the clinic and can be stored appropriately for diagnostics.

Address all samples/packages to the following address:

NMSU Plant Diagnostic Clinic
945 College Avenue
Skeen Hall, Room N140, MSC 3AE
Las Cruces, NM 88003-8003

This guide provides best practices for sampling and submission of plant material for disease diagnosis. Additional questions about sampling or shipping can be emailed to Dr. Phillip Lujan, Extension Plant Pathologist, at pl11@nmsu.edu. Remember that proper diagnosis begins with you! Submitting good-quality specimens accompanied by complete and accurate information and high-quality pictures is the first step in accurately identifying and solving the problem affecting your plants in a timely manner. Your satisfaction and success may depend on it!



Phillip Lujan is the NMSU Extension Plant Pathologist. He received his B.S. and M.S. in Agricultural Biology with a minor in Molecular Biology, and Ph.D. in Plant and Environmental Sciences with an emphasis in Plant Pathology at New Mexico State University. As the Extension Plant Pathologist, Dr. Phillip Lujan's primary interest and responsibility is in the area of plant pathology and disease diagnostics for all New Mexico cropping and landscape systems. He also provides statewide extension programming with a focus on plant health and the use of integrated pest management strategies.

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