

How to Collect and Send Plant Specimens for Disease Diagnosis

Revised by Phillip Lujan¹

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Consumer and
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New Mexico State University
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Successful plant disease diagnosis is a team effort. Proper diagnosis begins with the submission of a good-quality specimen accompanied by accurate and complete information. It is difficult, if not impossible, to determine the cause of death from a single leaf, dried or old specimen, or (especially) a dead plant. Healthy plants from the same area are also helpful to a diagnostician. It is also important to include the margin of the disease (where healthy and diseased tissue come together) in the sample, especially with stem and branch disorders (Figure 1).



Figure 1 . Example of margin of disease.

GUIDELINES FOR SUBMITTING SPECIMENS TO THE PLANT DIAGNOSTIC CLINIC FOR DIAGNOSIS

NMSU's Plant Diagnostic Clinic provides plant diagnostic services for the state of New Mexico. Please read and follow these instructions before submitting specimens. Visit <https://aces.nmsu.edu/ces/plantclinic/> for more information. Please read and follow these instructions before submitting specimens.

Collecting

1. Provide as much information regarding the specimen as possible. Fill out a "Plant Specimen Submission Form" (Figure 2).

- a. **Identify the plant material** (variety), approximate age of the plant or planting date, and acreage (when applicable), and indicate the number or percentage of plants affected.
- b. **Describe the symptoms you are seeing on the plant within the field.** Be as descriptive as possible. Indicate when the symptoms first started and whether or not the symptoms are continuing to develop or spread on the plant itself or to other nearby plants.

¹Program Manager, Department of Extension Plant Sciences, New Mexico State University.

NM STATE

PLANT SPECIMEN SUBMISSION FORM
New Mexico State University – Plant Diagnostic Clinic

*****Diagnostic Lab Use Only - Do Not Write In Box*****

Sample No. _____ Date Sample Received: _____

PLEASE REMEMBER... Successful plant disease diagnosis is a **team** effort. Proper diagnosis begins with the submission of a good-quality specimen accompanied by accurate and complete information. Please follow these guidelines and submit the best sample possible (If the sample is insufficient for diagnosis, you will be asked to submit a new sample). Additional information and submission guidelines can be found at: <http://plantclinic.nmsu.edu>.

If you have any questions, please call before submitting your sample (575-646-1621 or 575-646-1965).

COLLECTION:

- DO NOT send dry or dead material.
- Collect several samples showing various stages of symptom expression. When the whole plant can't be collected, select sample from the margin of the diseased area. Include a healthy plant if possible.
- Send a representative sample from **all parts** of the plant. Dig plants out of the soil (**DO NOT PULL**). **DO NOT** wash roots. Gently shake excess soil from roots.
- For turfgrass, select a 2-4" sample (including at least 2" of soil) from the margin of the diseased area.
- Wrap sample in dry paper towel or newspaper and place in a paper or plastic bag. Do not use plastic if there is a lot of moisture associated with the sample. Never add moisture to any sample.
- Submit a completed Plant Specimen Submission Form. Processing of the sample may be delayed for specimens received without the proper form or if information provided is insufficient.

PACKING:

- Keep sample cool prior to shipment.
- Pack the sample carefully in a sturdy box or padded envelope. Be sure not to crush specimens.
- Mail immediately (**overnight delivery is recommended**). Avoid mailing over weekends and holidays.

Please be advised, if pests of regulatory significance are identified on submitted samples, we are required to notify the New Mexico Department of Agriculture.

ADDRESS PACKAGE TO:
New Mexico State University
Attn: Plant Diagnostic Clinic
Box 30003, MSC 3AE
Las Cruces, NM 88003

For Overnight UPS or Fed Ex:
New Mexico State University
Attn: Plant Diagnostic Clinic
945 College Avenue
Skeen Hall Room W242
Las Cruces, NM 88003

PLEASE FILL OUT THE FOLLOWING:
Grower/Homeowner (Name, Address, Phone No.) _____ Submitted by: (If different from grower) _____

E-Mail Address: _____

Level of Diagnostic Services Requested (If no box is checked, diagnosis will be completed as needed):

☐ Basic evaluation (\$25.00 non-commercial, \$40.00 commercial, \$50.00 commercial turfgrass)

☐ Extension or University submitted – no fee. ☐ 50% surcharge for out-of-state samples

NMSU-PDC-Form-012-001 Approved by: Jason M French Quality Manager Effective Date: 07/12/16 version 1.3

VARIETY (genus and species, and/or common name of plant) _____

AGE OF THE PLANT: _____ **PLANTING DATE:** _____

SYMPTOMS (mark all that apply):

Plant parts affected: ☐ roots/crowns ☐ stems/branches ☐ leaves ☐ fruit ☐ whole plant

Symptoms: ☐ spots ☐ tipburn ☐ distortion ☐ mosaic/mottle ☐ chlorosis ☐ necrosis ☐ rot

☐ mildew ☐ blisters ☐ defoliation ☐ wilt ☐ dieback ☐ blight ☐ stunting ☐ canker ☐ galls

Description (be as specific as possible, describe the whole plant - remember the clinician is only seeing the specimen submitted). _____

When did symptoms first appear: _____

Are the symptoms (mark one): ☐ spreading or ☐ localized

Symptom development (mark one): ☐ gradual or ☐ sudden

Distribution of diseased plants (mark one): ☐ scattered ☐ clustered ☐ in a row or pattern

Number or percent of plant(s) infected _____

SOIL TYPE (mark all that apply):

☐ Sand ☐ Silt ☐ Clay ☐ Well drained ☐ Poorly drained ☐ Heavy ☐ Light

GROWING CONDITIONS (mark all that apply): ☐ Indoors ☐ Greenhouse ☐ Home Garden ☐ Lawn

☐ Landscape ☐ Organic Garden ☐ Commercial Field ☐ Other _____

WEATHER CONDITIONS (immediately prior to and during development of symptoms) (mark all that apply):

☐ Wet ☐ Dry ☐ Humid ☐ Windy ☐ Dusty ☐ Hail

Temperature (°F) _____ Other Conditions _____

IRRIGATION HISTORY: (Mark all that apply):

☐ Furrow ☐ Flood ☐ Drip ☐ Sprinkler ☐ Hand

How often? _____ How much water is applied? _____

FERTILIZATION HISTORY: (type, nutrient ratio, amount applied, and frequency of application) _____

CHEMICALS APPLIED (chemical name, method and frequency of application and amount applied) _____

CROPPING HISTORY (for agricultural fields or home gardens):

Rotation (previous 3 years) _____

Past Problems (in field) _____

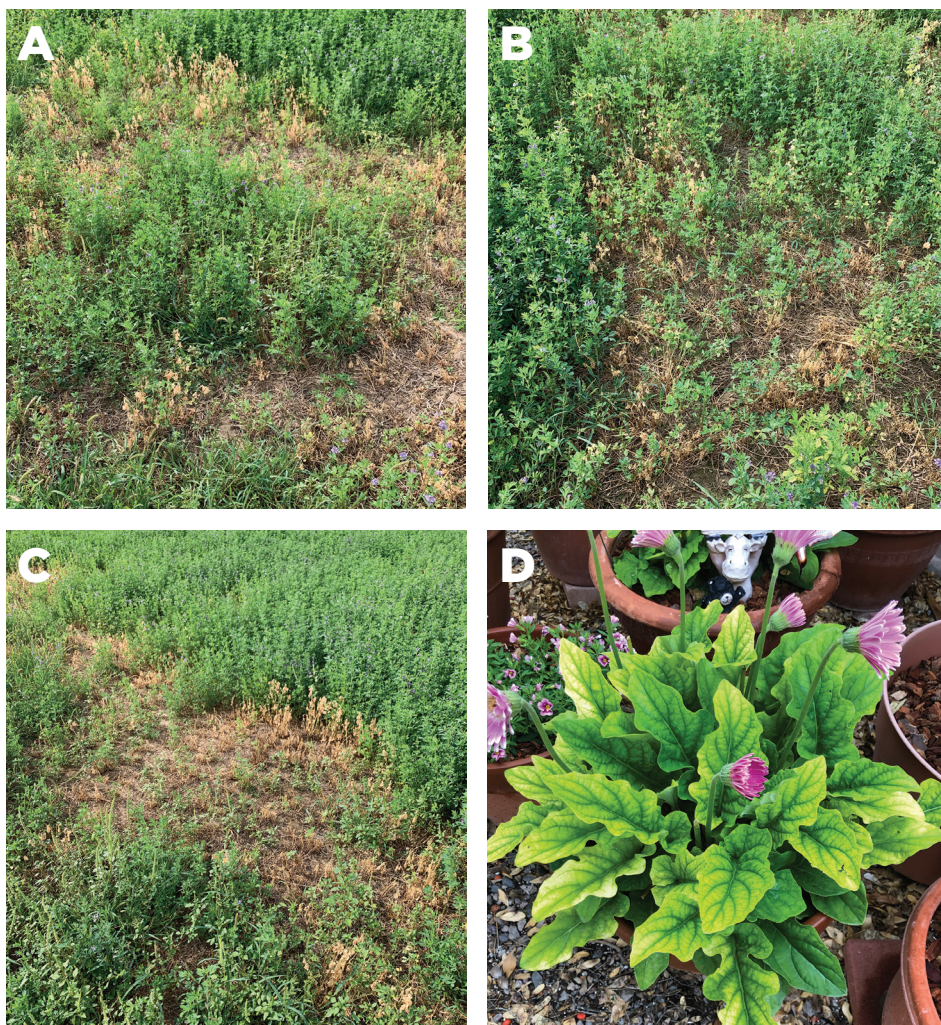
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Figure 2. Plant Specimen Submission Form, available at <https://aces.nmsu.edu/ces/plantclinic/documents/nmsu-pdc-form-012-001-plant-specimen-submission-form.pdf>

- c. List all cultural practices, such as irrigation frequency, rate and time of chemical application (herbicides, insecticides, fungicides, etc.), fertilizer regime, and crop rotation over the previous three years when applicable.
- d. Try to give an estimate of the weather conditions preceding and during symptom development.
- e. For home or urban plantings, indicate the type of environment in which the plant is growing (e.g., lawn, flower bed, pot, house, greenhouse).
- f. Several, good-quality, in-focus photographs or digital images of the plant in its environment can be extremely helpful to the diagnostician. Digital images can be sent via email to: pl11@nmsu.edu

If the images correspond with a submitted sample, please be sure to note that in the email message (Figures 3A–D).

2. **Select plant material that shows the symptoms.**
If possible, it is best to send several samples showing various stages of the problem. Early stages of symptom development are especially important.
3. **Send samples of all plant parts whenever possible, including roots.** Aboveground symptoms may be caused by root or stem diseases; thus, examining all parts can be essential for an accurate diagnosis. Dig plants (do not pull them) out of the soil. Pulling plants out of the soil will generally break off the roots, especially if they are rotten. Retain a small amount of soil around the roots. Do not wash roots. Keep the roots and soil separate from the aboveground parts of the plant by placing them in a paper bag and sealing them off with a rubber band.
4. **When the entire plant cannot be sent, send several affected portions of the plant (Figure 4).** Remember to include the margin of disease on stem and branch samples.



Figures 3A–D: Examples of submitted photos. A, B, and C: *Phymatotrichum* root rot on alfalfa. D: Iron deficiency in *Gerbera* sp.

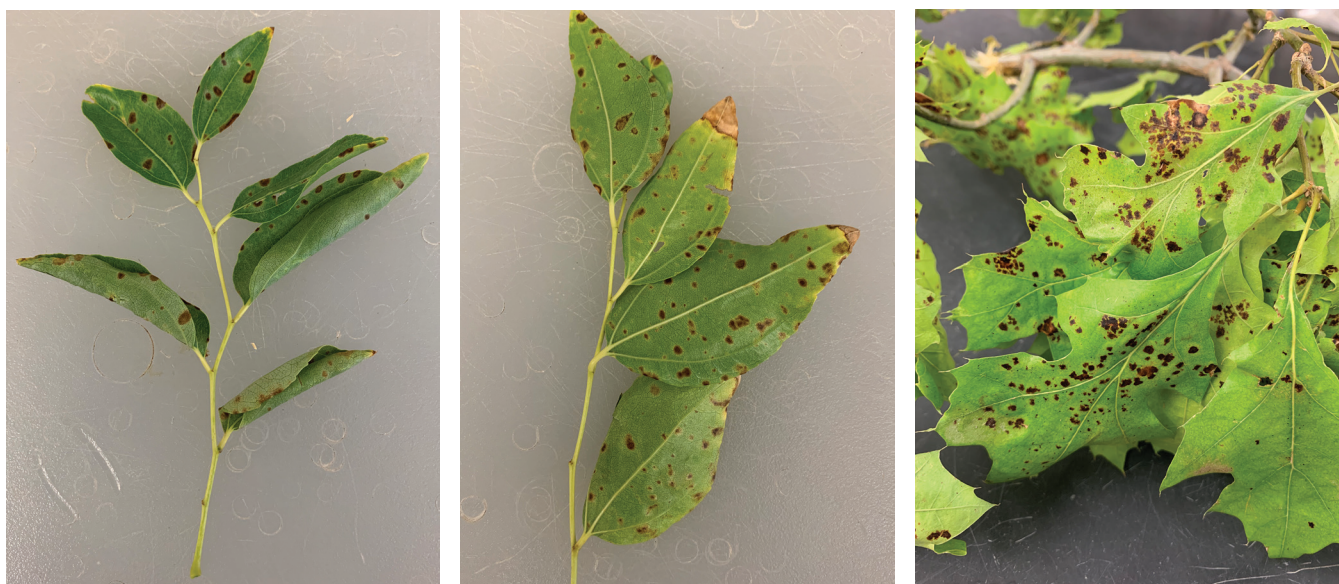


Figure 4. Examples of proper sample submissions of leaf spot.



Figure 5. Sample of branch section.

5. If you suspect vascular wilt diseases, such as Verticillium wilt, send a sample from dying branches with wilted yellow leaves. **Do not send dead wood.** Place several branch sections 1/4 to 1 inch in diameter and approximately 6 inches in length in a plastic bag. This will prevent the sample from drying in transit (Figure 5).
6. Turfgrass samples should be taken from the edge of the affected area and should include both dying and healthy areas. **Do not send dead grass.** Send several 3 inch × 3 inch squares of sod, which should include at least 2 inches of soil. Wrap the sample in a thin layer of damp (not wet) paper towels, followed by dry newspaper (Figures 6A–B).
7. Fleshy specimens, such as fruit, mushrooms, or other fungal fruiting bodies, should be as firm as possible and show both early and intermediate symptoms. Wrap specimens separately in dry paper towels or dry newspaper. **Do not put in plastic.** Pack specimens so they are not crushed during shipping.



Figures 6A–B. Examples of turf submission.

Packing

1. Keep plants cool and moist prior to shipping.

Use an ice chest when collecting samples and then place them in the refrigerator until they can be sent.

2. Pack in a sturdy container to prevent crushing during transit.

Use newspaper to pack specimens firmly in the container. Be sure to include a completed submission form with your contact information, including email address or phone number.

3. Mail specimens as soon as possible after collection

(overnight delivery is recommended). Mail early in the week to avoid delivery delays over weekends, and be aware of holidays that also might delay delivery.

Address packages to:

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Extension Plant Sciences, MSC 3AE
New Mexico State University
P.O. Box 30003
Las Cruces, NM 88003–8003

For overnight, UPS, or Fed Ex:

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Skeen Hall Room N140
Las Cruces, NM 88003–8003

The diagnosis and report you receive is only as good as the sample you send. In some cases, diagnoses may require the use of tests or equip-

ment that are not available at our facility. In those cases, commercial laboratories may be recommended. While time devoted to individual samples is limited, diagnostic reports will reflect considered opinion and best judgment based on all the information available. Complete information regarding the sample that is submitted will help the diagnostician provide an accurate diagnosis. For some problems, such as insect damage, other professionals/specialists may be consulted. Specimens may be forwarded to scientists more qualified to analyze the material. Remember that proper diagnosis begins with you. Submitting good-quality specimens accompanied by complete and accurate information is the first step in identifying and solving the problem. Your satisfaction may depend on it!

Original authors: *Natalie P. Goldberg, Extension Plant Pathologist; and Jason M. French, Plant Diagnostic Clinician*



Phillip Lujan is the program manager and diagnostician for NMSU's Plant Diagnostic Clinic. He received his B.S. and M.S. in agricultural biology with a minor in molecular biology from NMSU. He is currently researching the potential use of pecan byproducts on chile peppers for improved soil-borne disease management.



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