

SAMPLING GUIDELINES

As a rule, A laboratory exam of a plant specimen is only as good as the sample submitted. Proper sampling helps ensure accurate results. In fact, sample quality is frequently the weakest link in the overall diagnostic process.

In general, the greater the sample in quantity and quality, the greater likelihood of an accurate diagnosis. Collect samples of all plant parts that show symptoms, and include material that exhibits a range of symptoms, from slightly affected to severely affected. When feasible, also include some healthy plants or plant parts for comparison. Do not collect samples that have been recently treated with pesticides, since culturing a pathogen from the treated specimen may be a futile task, leading to misleading results. Do not send dead, dry, or decaying material such as dead or decomposing leaves, dry or dead branches, or completely dead plants. Saprophytic organisms will likely have begun colonizing the tissue by that time, making the culturing of pathogens impossible. Never place plant samples in any type of liquid, especially alcohol. This will distort or mask symptoms, and will make it impossible to culture any pathogens.

Along with the plant sample, provide as much complete information as possible, and attach the paperwork with the information to the OUTSIDE of the bags containing the plant samples. Keep plant samples cool and out of the sun until they can be properly packaged for mailing.

When feasible, the ideal sample is to send the entire plant (Figure 1). If it is impractical to send *entire* plants, send the affected portions of plants, including as many affected plant parts as possible such as roots & root crown, flowers, fruit, foliage, trunk bark, branches & twigs. Send the largest sections of the plant(s) that is possible.

The key is providing a fresh, intact, representative sample for diagnosis. Thus, following the guidelines below will provide you with the best chances of receiving an accurate diagnosis.

WHOLE PLANT OR ROOTS AND ROOT CROWN

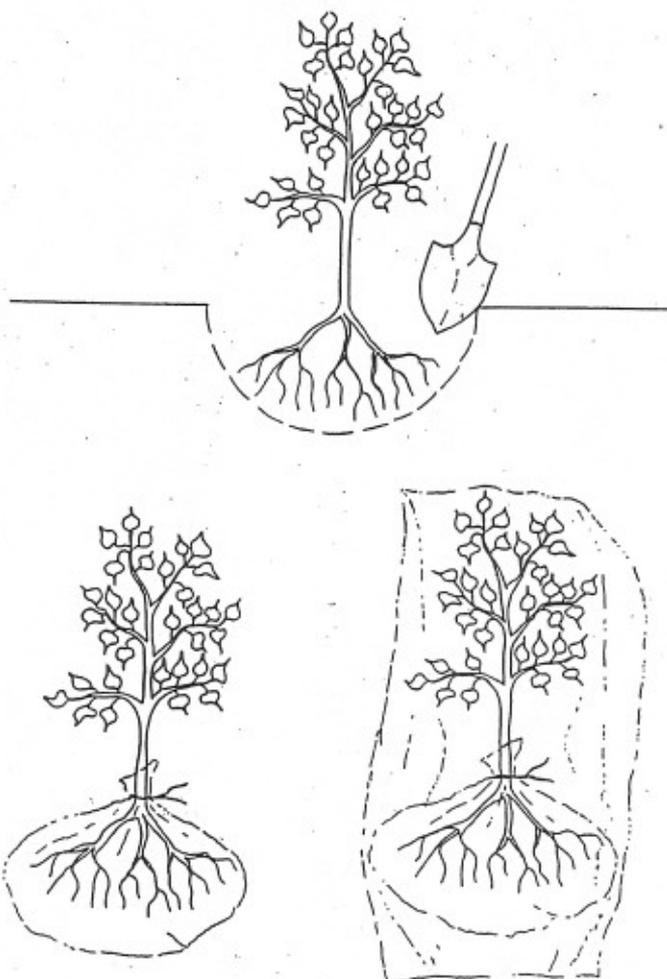


Figure 1. sampling entire plant

- Carefully dig up plant with shovel, leaving as many intact roots as possible.
- Bag the root ball disturbing the soil as little as possible. Double-bag if the soil is wet. Do not add additional water. Tie off the bag at the base of the stem. This will keep the roots moist, and prevent contamination of the foliage by soil.
- Place the entire sample in a large plastic bag, but do not seal it. For plants with herbaceous foliage such as tomatoes, add some DRY newspaper or paper towels to absorb excess moisture and to prevent deterioration of the plant sample. This is particularly important during periods of warm weather.
- Pack the sample lightly (don't crush) in a carton for mailing.

LEAVES AND FLOWERS

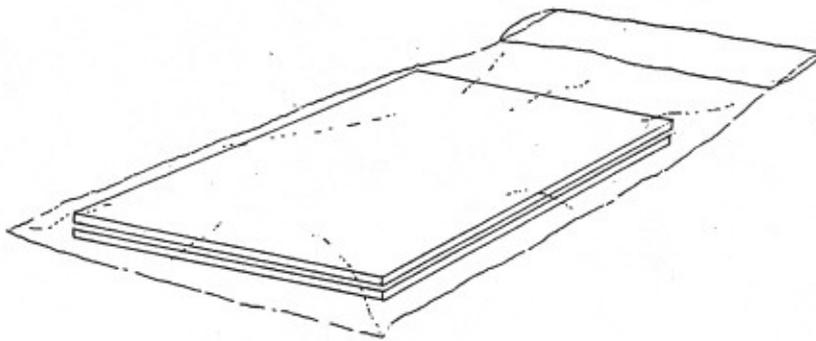
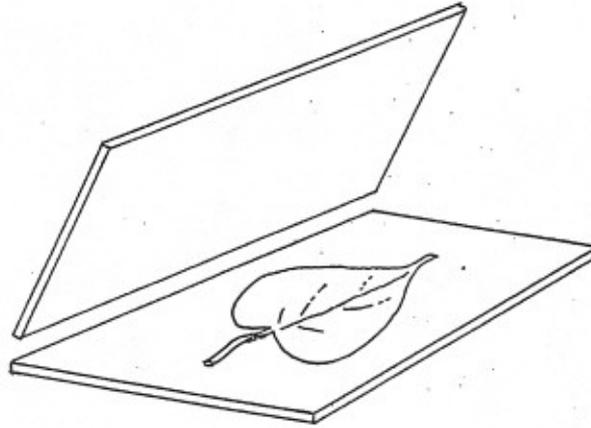


Figure 2. Samples of Leaves or Flowers

- Press leaves or flowers flat between sheets of DRY newspaper or paper towels. Sandwich the leaves and sheets of paper between two pieces of cardboard to keep the leaves from rolling up or becoming misshapen.
- Place in a plastic bag, but do not seal the bag. Folding the end of the bag over the package is OK.
- Place in a mailer/folder/envelope for mailing.

FRUIT SPECIMENS

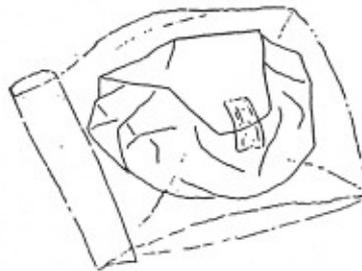
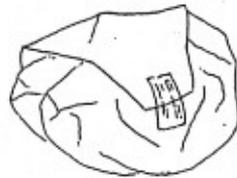
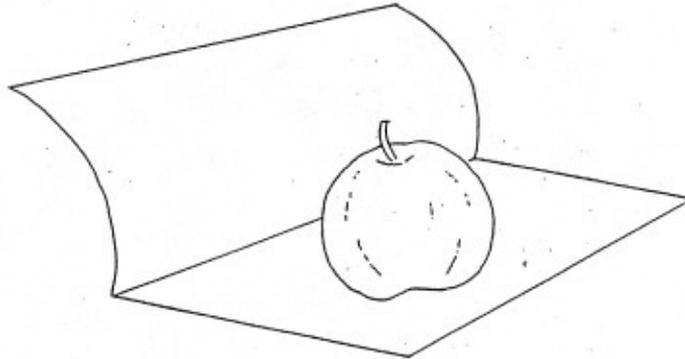


Figure 3. Samples of Fruit

- Wrap fruit in DRY newspaper or paper towels. For particularly fragile (easily bruised) fruit such as peaches, wrap fruit samples separately with dry newspaper or paper towels.
- Place the wrapped fruit in a plastic bag, but do not seal the bag. Folding the end of the bag over the package is OK.
- Place the specimens in a cushioned container for mailing. Pack with plenty of crumpled up newspaper or other material to cushion the fruit and to prevent the fruit from being crushed under the weight of the samples.

BRANCHES & TWIGS

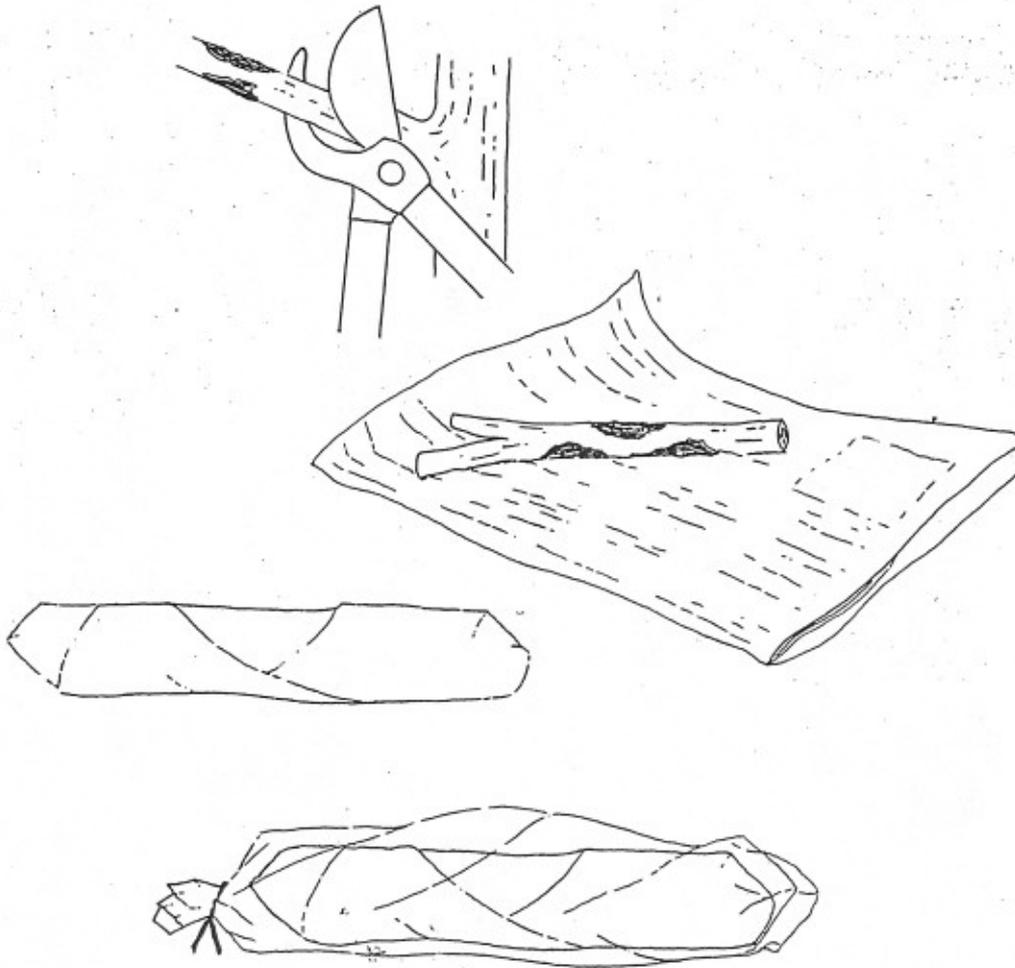


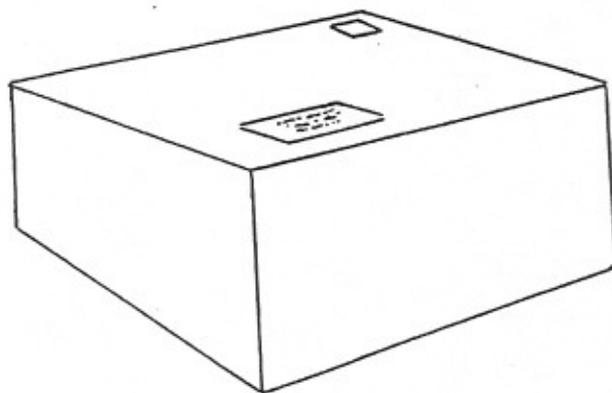
Figure 4. Samples of branches

- Cut the diseased branch several inches below the cankered or diseased area. The twig or branch should be a minimum of 6 to 12 inches in length, being certain to include the margin at which the healthy tissue meets the dying or diseased tissue.
- Wrap the branch(es) in several layers of dry paper towels or newspaper.
- Place the paper-wrapped branch(es) in a plastic bag, along with some additional paper towels or newspaper that has been moistened, and seal the plastic bag.
- Place the sample in a carton for mailing.

PACKAGING AND MAILING

Label the bagged sample clearly with relevant information—Pest and Damage Report (PDR) number, collector's information, host name, etc. Keep the paperwork separate from the plant specimens. For example, attach the paperwork to the OUTSIDE of the bagged specimen, NEVER place it INSIDE the bag with the specimen. Use sturdy packaging that will prevent crushing or other damage to the specimen in transit. Fill open space with crumpled newspaper, foam packing chips, or other items that will prevent the specimens from getting badly shaken in transit.

Mail or ship samples so that they arrive at the laboratory quickly, intact, and fresh, using the most expedient means of transportation. Mail or ship samples early in the week to avoid the risk of specimens sitting in a hot post office over a weekend or holiday.



FILLING OUT THE ACCOMPANYING PAPERWORK FOR A PLANT PATHOLOGY SAMPLE

Always include as much information about the sample, site, and your field observations as possible. More often than not, a diagnosis is based on the conditions, situations, and observations as they appear in the field. Laboratory exams and tests are primarily for the purpose of confirming suspicions based on field observations, and usually involve looking at a specimen at the microscopic level, culturing, or testing for a pathogen to accurately identify the specific pathogen involved. Thus, it is absolutely vital that adequate information is supplied with the specimen. The more complete the information, the better the chances of getting an accurate diagnosis. For example, a sample with information that identifies specific leaf spot symptoms is likely to get a more accurate diagnosis than merely a bag of leaves with no information, and thus, leaving the laboratory diagnostician to guess what the sampler was looking at.

Here are some guidelines in filling out the CDFA PPDB *Pest and Damage Report* (PDR). For your convenience, a generic, blank, and un-numbered PDR form follows this section.

"OWNER" is the owner or grower, or a consignee if an intercepted shipment. It is not intended to be the name and address of the sample collector. That information goes in the "COLLECTOR" space.

"QUARANTINE SHIPPER/BROKER" should be filled out for specimens collected from shipments. If a shipment is being held up pending diagnosis, you may mark "rush" on the PDR. Do not mark "rush" on other types of samples. "QUARANTINE ORIGIN" is the location from which the shipment originated.

"COLLECTOR" is the name of the collector of the specimen for diagnosis.

"AFFILIATION" refers to the collector's affiliation such as federal (F), state (S), county (C) extension (E), university (U), or other (O).

"HOST/CROP NAME." Many diseases such as rust fungi are very host specific. Therefore, identify the host as accurately and completely as possible, including common name, genus, species, variety, cultivar, etc.

In the box labeled "GENERAL OR PLANT PATHOLOGY" check off the "PLANT PARTS AFFECTED" with the symptoms that you, the collector, observe. Note the specific symptoms observed in the field. This is very important since the plants may not arrive in precisely the same condition as they were collected in the field. In fact, there may be many "symptoms" present by the time the sample arrives at the lab, some of which are of no concern to the sampler. Secondly, check off the relevant boxes specifying specific "PLANT SYMPTOMS" that you observe, including whether the symptoms are "GENERAL" i.e. seem to affect the entire plant, or "LIMITED" to specific plant parts such

as leaves only. Under "PLANT DISTRIBUTION" indicate whether the symptomatic plants are "limited" to obviously just a couple of affected plants out of many normal-looking plants; "scattered" throughout many otherwise healthy-looking plants either individually or in "pockets"; or "widespread," i.e. representative of many such symptomatic plants in the population. These are extremely important clues to a diagnosis. Observing symptoms on single plants scattered among many healthy plants, versus an entire row or block of symptomatic plants, for example, can ultimately be very significant in arriving at a diagnosis.

"REMARKS." In the remarks section, note any other information of which you would like the laboratory staff to be aware, and that has not already been described elsewhere on the PDR, including weather, pesticides or fertilizers applied, irrigation practices, slope and aspect of the site, reflective hard-scapes, horticultural practices, soil disturbance, etc. You can even use the back of the form to make diagrams or additional notes if you wish, and even enclose photographs if you shoot some pictures of the field, tree, etc.

At times it may seem that providing such thorough information is an unnecessary chore. But any plant problem that is significant enough to warrant sending a sample to the laboratory for examination and analysis is worth the extra time and effort in providing the information, as well as carefully collecting, packaging, and expediently shipping the sample, to ensure an accurate diagnosis.

