Diagnosing Plant Problems

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Learning Objectives

1. Identify those skills necessary to begin functioning as a plant problem diagnostician.

2. Understand the similarities and differences between diagnosing problems by sample, in the field, and by telephone.

3. Understand the process of formulating a diagnosis.

4. Understand the importance and methods of gathering information about plant problems.

5. Be able to use reference material, laboratories and other forms of assistance in confirming a diagnosis.
Diagnosing Plant Problems

What is Diagnostics?

Plants in our gardens and landscapes will one day have problems. Whether in an effort to save existing plants or prevent problems from recurring, it is important to know "what went wrong." A diagnosis is the process of gathering information about a plant problem and determining the cause. Once the cause has been determined it is then possible to recommend a solution or remedy.

Good plant problem diagnosticians are a scarce commodity. The road to becoming a good plant problem diagnostican involves the desire to help others, the desire to learn, and the patience to slowly but steadily develop the necessary skills. Diagnosing plant problems will be challenging, exciting, and often fun. And the satisfaction of helping other gardeners with your diagnostic work is highly rewarding. Good luck.

Diagnosing plant problems can involve considerable "detective work". Sometimes you will have insufficient information. Other times, the primary cause of a problem is hidden by other, more obvious, but less important problems. Your success at diagnosing plant problems will be determined by how much you know about the host plant, how much you know about plant problems in general, how good you are at obtaining information from the client, and how good you are at putting it all together.

Basic Steps in Reaching a Diagnosis:

1. Identify the plant.

2. Examine the plant and note carefully symptoms and signs.

3. Based on your knowledge of the plant and information from reference books, formulate a tentative diagnosis. This will help you focus your examination of the plant and assist in collecting relevant information.

4. Attempt to confirm your tentative diagnosis - for example, if you think that a borer is the cause of a wilting shoot, cut into the shoot to see if tunnelling, sawdust-like frass, or the insect is present. Or, if you think a potted plant is off color and wilting from root rot, gently remove the plant from the pot and examine the roots. Be flexible! If you are unable to confirm your initial tentative diagnosis with additional evidence, formulate another tentative diagnosis.

5. Seek expert assistance. Sometimes additional laboratory work will be needed to confirm your diagnosis.
The Basic Skills of a Plant Diagnostician

Before you can solve a plant problem it's important to know a few things. You must know the identity of the plant, a little about how plants grow, a little about the culture of the plant, and a little about some of the common problems found on the plant.

The Knowledge of Basic Plant Science

Your familiarity with the normal appearance and cultural requirements of the plant enable you to differentiate normal changes from symptoms of a problem. Every year extension agents receive inquiries from concerned gardeners: "What are these weird corky ridges on the sweet gum twigs?" (They are normal bark for this tree). "My fern has "rust pustules" erupting from the leaves!" (These are reproductive spores, perfectly normal). "My white pine suddenly has many needles turning orange/brown and dropping off!" (If this happens in September-October, and only involves previous season needles. It is normal fall needle drop. At other times of the year or current season needles are involved, it is a serious symptom). This knowledge comes with experience. Remember to compliment the concerned person on their powers of observation while you reassure them that the condition is normal, not sinister.

Plant Identification

The first step in plant problem diagnosis is to identify the host plant. The better your plant identification skills the faster you will be able to move on to diagnosing the problem and the more confidence the client will have in your skills. Most references on plant pests and diseases are organized by plant, so knowing the plant is the essential first step in using many reference books.

Plant Morphology and Physiology

**Plant morphology is the study of the form and structure of plants.** This includes the shape and arrangement of leaves and stems, the form and arrangement of roots, and the structure of the vascular system, which serves as the plant's plumbing. An understanding of a plant's structure helps determine where things have gone wrong. For example, leaves wilt when they do not have enough water. You know that roots take in water and the water moves through vascular systems in stems, petioles, etc. to reach the leaf. Wilted leaves could be caused by a variety of causes which disrupt this water movement: (1) dry soil, (2) disease or mechanical damage to the root system, (3) damage to the vascular system from a wilt disease or an insect borer. Familiarity with plant morphology helps you know where to look for symptoms.

**Plant physiology is the study of how plant systems work.** This includes: **photosynthesis**, the process by which a plant manufactures food; **respiration**, the process in which plants
turn their food into energy; transpiration, the process in which water vapor is lost from plant leaves; and translocation, the process in which water and dissolved minerals move from the roots to the leaves and sugars move from the leaves downward through the plant.

You do not have to become an expert in plant morphology and physiology to help other gardeners with plant problems. A basic understanding of a plant’s structure and function will increase your ability to diagnose plant problems and provide insight into why plants have problems. For example, trees and shrubs which are transplanted in mid summer are likely to fail to establish. This is because the plant loses more water (through transpiration) in hot weather, and the reduced root system may be unable to provide enough water, resulting in wilted and scorched leaves. These damaged leaves will have less tissue for photosynthesis, so the plant will be less able to store food for growth next season.

Knowledge of Basic Horticulture

Plants depend on gardeners for their very existence. Failure to care properly for a plant results in many of the plant problems you will be asked to diagnose. In order to diagnose such problems you should understand basic plant care. The best plant diagnosticians usually have experience in growing plants.

The life of a cultivated plant is divided into three stages: (1) the beginning stage, which involves some propagation process, (2) the establishment stage, which involves a planting or transplanting process, and (3) the maintenance stage, which involves the care received after establishment. Each of these stages involves certain techniques and procedures. The more you understand these techniques and procedures the better your diagnostic ability. For example, a maple tree may be dying because of poor planting, over-fertilization, or under-watering. Your ability to determine whether any cultural factors play a role in the maple problem depends on your knowledge of tree planting procedures and fertilization techniques for maple trees.

Knowledge of Common Plant Pests

When a plant dies, or fails to grow properly, the first assumption made by the average gardener is that a disease or insect is the cause. The more you know about the common insect, mite and disease problems of horticultural plants, the faster you will be able to diagnose many of the samples and questions.

Caution--even if the client is sure that it is a pest, it could be normal, or a cultural problem.
Insect and Mite Pests

There are many different insects and mites that damage plants. Although it may be difficult to become familiar with all these, it is possible to recognize the various types of damage caused by different types of insects and mites. Insects may injure plants in a number of ways including feeding on them directly, but some indirect damage from insect activity also occurs. Refer to the diagram on page 6 for a generalized view of types of injury.

**Chewing damage** - often described as devoured plant parts - (such as leaves), skeletonization, notching, mining of leaves = leafminers, eaten wood, bark, roots = root feeders, stems, fruit and seeds.

Symptoms include ragged leaves, holes in wood, bark, or fruit and seed, serpentine or blotch mines in leaves, wilted or dead plant parts, or presence of "worms".

Examples: Cabbageworms, cutworms, grasshoppers, beetles, weevils, sawfly larvae.

**Sucking injury** - piercing the epidermis and sucking sap and cell contents from the cells. The hole is so small that it cannot be seen without magnification.

Symptoms include off-color (often yellowed) foliage, white, brown or red on leaves, fruit, twigs: curling or misshapen foliage and fruit, general wilting of part, or wilting of the entire plant; browning and drying may also occur.

Examples: aphids, scales, plant bugs, squash bugs, leafhoppers, spider mites.

**Gall formation** - insect activities cause plant to produce a structure of deformed tissue, often seen as a swelling. The insect develops in the "gall", food and shelter being readily available. The gall is initiated by the adult insects egg laying activities and/or the larva giving off some sort of chemical stimulant.

Symptoms: Swelling, misshapen parts of plant.

Examples: Gall wasps, many midges.

**Egg laying (oviposition) injury:** - results in scars on stems, twigs, bark or fruit.

Symptoms: cuts or tears in soft tissue where eggs are laid, scarring, splitting of bark or stems, breaking of stems and twigs, misshapen and sometimes infested fruit or leaves.

Examples: plant bugs, cicada, tree crickets, certain beetles.

**Excretions** - sucking insects often give off honeydew, a sweet sticky liquid, on which grows sooty mold, a black fungus. When the fungus covers the leaves, bark, or other plant parts, they cannot carry out photosynthesis, and a weakened plant results.
Symptoms: sticky deposits on leaves, sooty black leaves, twigs, branches and fruit, possible dieback of affected plant parts.

Examples: aphids, scale insects

Injection of toxic substances - insects may be responsible for carrying diseases from one plant to another. They may introduce the disease organism in a number of ways including by feeding, egg laying, or boring into plants. They may carry disease agents on or in their bodies and move them from one plant to the next.

Symptoms: plant disease symptoms - wilting, dieback, witches brooming, curling or distortion of plant parts.

Examples: Elm bark beetles - Dutch elm disease; various aphids vector certain virus diseases.

Other Animal Pests

Sometimes animals other than insects and mites affect our plants. Deer eat the bark off trees, pull up tulips and "prune" shrubs; mice feed on plant roots, causing wilt; moles sever the roots; birds peck holes in trees or eat our vegetable seedlings; dogs and cats mark their territory by spraying urine on objects and plants, causing blighted shrubs and flowers. Animal damage is often especially difficult to control when the animal is a family pet or a protected migratory bird.

Plant Diseases

You should try to learn as much as possible about the common plant diseases. A good starting point for improving your ability to diagnose plant diseases is to gain a working knowledge of the common symptoms and signs produced by plant diseases.

A disease symptom is a change in the appearance or growth of the plant. Wilting, galls, leaf spots, blights, and root rots are all disease symptoms. A disease sign is the actual disease causing pathogen or its parts. The mildew seen on a plant affected by the disease powdery mildew is a sign of the disease. This is because the whiter "mildew" is made of spores and mycelium which are visible fungal structures.

If you can recognize the symptoms, and identify the host plant, you can use various reference materials to make, or at least, narrow down a diagnosis. Signs must be present on a sample sent for laboratory confirmation of your diagnosis. When examining a plant sample make note of all symptoms and signs.
Reference Books

All the areas discussed above constitute a large knowledge base, too much to commit to memory; therefore, one of the strengths of a good plant diagnostician is knowing where to look for more information. Your increasing experience diagnosing plant problems is one of your most valuable resources. Become familiar with reference books, manuals and keys. Use them often.

The Art of Diagnosis

Your goal is to help people. Usually that will involve deciding what’s wrong with a plant and how to correct the problem. But how do you look at a piece of branch, or listen to a telephone description of a problem and make a diagnosis?

Diagnosis By Direct Observation

Sometimes you can make a quick diagnosis by direct observation of the sample or by a clear description of the problem over the telephone. A branch covered with bagworms is an easy problem to diagnose.

Diagnosis By Deduction

In many ways the plant problem diagnostician is a detective. You examine the plant for clues, you ask questions, you check references and conduct tests, and finally you put it together and make a diagnosis. For example: a tomato plant sample is brought to you. All 10 plants are similarly damaged. They have yellow leaves and stunted growth. You see very few fine feeder roots. You learn from questioning the grower that he applied half of a 20 pound bag of 10-10-10 fertilizer to a tomato plot which measures 5 x 12 feet or 60 square feet. This means that the grower put 10 pounds of fertilizer of 60 square feet, which translates to a rate of 166 pounds per 1000 square feet. The normal rate for a 10-10-10 fertilizer is 20 pounds per 1000 square feet. Thus the fertilization rate was almost 10 times normal, enough to kill off fine feeder roots. All information points to damage to the roots caused by over-fertilization. If you can obtain enough information, deductive diagnosis can be accurate and fun.

Diagnosis By Elimination

You are trying to identify an insect specimen. You start at the beginning of a picture book on insects and turn page after page looking for a picture that matches the sample in front of you. Such a diagnostic method does not seem very professional but it often works. Often, when working with a well known host plant you can check a reference book and note the most common problems affecting that plant. One by one you try to confirm or eliminate the various problems listed. Usually one of the problem descriptions matches the symptoms of your problem plant.
Laboratory Backup

While there are not plant diagnostic machines, there are various laboratory tests that can help confirm or make a diagnosis. Cornell University has a soil testing laboratory, an Insect and Plant Disease Diagnostic Laboratory and a nematode assay laboratory. In using these laboratories it is important to understand exactly what they can, and can not, do. Home gardeners often submit samples of soil to the soil testing laboratory in order to find out why their plants have died. It must be confusing when all they receive in return is a set of numbers explaining the nutritional status of their soil.

The soil testing laboratory can provide information on the nutritional status of the soil, and a soil test should be made whenever nutrient or pH problems are suspected. However, the soil testing laboratory does not investigate soil samples for potential insect or disease problems.

The Insect and Plant Disease (IPDDL) Diagnostic Laboratory can provide confirmation on whether the insect sent or an infectious disease is causing a problem. Every effort should be made to diagnose problems in house before shipping samples off for diagnosis. When using the IPDDL, check with laboratory personnel to determine the proper type of sample to be submitted for analysis. The nematode assay laboratory identifies plant parasitic nematodes in soil and plant parts and provides control options.

Double Checking the Diagnosis

Once you have arrived at a diagnosis, unless it is an obvious diagnosis, double-check yourself. Ask other master gardeners, or Extension personnel, for their opinions. Read through the reference books about your diagnosis to make certain everything matches. Double-checking will keep you from rushing through a diagnosis and possible jumping to the wrong conclusion. Often at a crowded plant clinic, or when there are a lot of phone calls waiting, there is a tendency to try to get through each diagnosis as quickly as possible, and indeed, the mark of an experienced diagnostician is the ability to work through problems quickly. But beware, an increase in speed is not worth a reduction in accuracy.

Should You Ever Guess?

There are going to be times when the available information does not lend itself to a satisfactory diagnosis but the client pressures you for an answer. In such cases there’s nothing wrong in making an educated guess as long as the client understands that’s what he is receiving. On the other hand, if you hedge all your diagnostic work in 'maybe' and 'I'm not sure', you credibility will drop. That’s why it’s important to double-check your work and when you’re sure, sound sure.
Making Recommendations

Making recommendations depends on a correct diagnosis of the problem. Use caution in recommendations involving the application of pesticides, and for problems which have no practical solutions. Extension bulletins generally include control recommendations for common pests, diseases, weeds and cultural problems.

Recommending Pesticides

There is a general climate today of mistrust and fear about chemical pesticides. Right or wrong, this climate does exist. You should never recommend a pesticide unless it is explicitly listed in a Cooperative Extension Service publication for control of the problem you have diagnosed. If you have trouble locating a pesticide listed for a particular problem ask Extension personnel for assistance. Do not recommend pesticides simply because you have "heard" they work.

Problems Without Solutions

There are some situations in which there is no recommendation to be made. There are occasionally insect, disease or environmental problems for which there is no satisfactory recommendation. A good example is the problem of moles. We know moles damage the lawn and landscape, but there isn't a reliable and practical control. It is difficult to tell the client that there is nothing they can do to help their plant or solve their problem. There is often the feeling that it is best to recommend anything in order to give the client something to try. If there is no possible recommendation, say so in the kindest words you can muster. Sympathize, but do not make up answers.

In making recommendations, strive to teach. It is often quick and easy to recommend something to spray on the plant, or something to add to the soil, but you will do the client more good by discussing cultural practices that might reduce or eliminate the problem in the future. Try to give options. If you diagnose apple scab on a crabapple, the client's options may be to spray repeatedly with a fungicide, do nothing and live with the problem (apple scab probably won't kill the tree), or cut the tree down and replace with a disease resistant plant. You can suggest a course of action, but try not to dictate.

Types of Plant Diagnostic Activities

Extension work will present several different opportunities to diagnose plant problems. The same process is involved in most situations, although the emphasis may vary. Telephone calls and plant clinics contribute the most diagnostic opportunities. Both of these are more difficult than the third method, site visitation. Visiting the location of the plant and inspecting the entire plant will give you more information than just looking at a small sample or just hearing about a problem over the telephone.
Site Visit Diagnosis

Success at diagnosing plant problems during site visits depends on a combination of factors. It depends on your knowledge of the plant involved, the plant's basic cultural requirements, and the potential problems that might affect it. It also depends on your ability to gather information, both through observation of the plant and discussion with the client. With a site visit you have the maximum opportunity to gather information. There are three important parts of a site visit inspection: (1) the site survey, (2) the general plant survey, and (3) the detailed plant inspection.

The Site Survey

The site survey consists of looking at the area or landscape surrounding the problem plant. This might include checking the exposure (sun or shade), checking the soil conditions, noting the location of the plant (in a field or near a road), observing water drainage patterns within the landscape, etc. During the site survey you should check to see whether the plant was planted correctly, whether it is under any environmental stresses (heat, drought, wind), and whether other plants are affected by the problem.

A common tendency for inexperienced diagnosticians is to inspect only the plant. Such a limited inspection often misses cultural or environmental condition that are the real cause of the plant problem.

The General Plant Inspection

Once you have examined the site, the next step is to look at the general condition of the plant. How much of the plant is experiencing a problem? Are symptoms more severe on parts of the plant? (new growth, old growth, bottom of the plant, top)? Has the plant been growing satisfactorily before the onset of the problem? To determine plant vigor look at a shoot growth and leaf size and color. Compare this season's shoot growth to previous seasons. All these questions can be answered by the general plant inspection.

The general plant inspection may show that the plant is dead and there may be no need for recommendations. It is difficult or impossible to work with a plant that has been dead for an extended period. Time will be better spent providing information on replacing the plant in terms of plant selection, planting procedures, and follow up care. Note here, if the plant died from a pest or disease that remains in soil, such as nematodes, root weevils, fungal wilt diseases and root rots, a correct diagnosis may be essential to planning for replanting.

The Close Up Inspection

After observing the site and taking a general look at the plant, look the plant over in detail. Here you are looking for insects or mites, or any observable disease symptoms or signs. The cause of the problem may not be obvious so you should make a thorough inspection. Check the leaves or needles, the stems and branches, and, if possible, the roots. If it is a tree look the trunk over carefully. In working with container plants (house plants) it is always advisable to slip the plant out of its pot and look at the condition of the roots.
are you looking for? Are there holes in bark or sunken areas? Are roots white, alive and healthy, discolored or dead? Do you see insects, mites or fungal structures? You are gathering information that you will use later to formulate a diagnosis.

**Diagnostic Equipment**

Since many of the insects, mites, symptoms and signs are very small, some means of magnification will be helpful. A hand lens is useful in the field. Microscopes are available in the office. A knife for digging into bark and plant stems is important, as are tools for digging into soil. A pocket notebook and pencil or pen are essential for taking notes and labeling samples. It is also a good idea to carry bags for soil, plant or insect samples. A styrofoam cooler and ice are important in warm weather to keep samples cool. Although not always needed, a camera can be an important field diagnostic tool for recording your observations. Once you have diagnosed the problem, good pictures of field symptoms can be used to teach others. It is often easier to show photographs to others than actual plant samples. In terms of equipment it is better to be over prepared than under prepared.

**Working with Plant Samples**

Much of a master gardener's diagnostic work will be with plant samples. A line of gardeners, samples in hand, waiting to talk to the plant clinic experts is the essence of a successful master gardener program. Usually the sample will provide the clues necessary to solve the problem. But when the sample only confirms the identification of the plant, you must concentrate on acquiring information to reach a diagnosis. Your job is to learn about the plant's environment, the care the plant has received, and whether the sample is representative of the problem affecting the plant.

**Telephone Diagnosis**

In telephone work you must completely rely on information provided by the caller in order to make you diagnosis. There will be common, familiar problems, such as Japanese beetles or black spot on roses, when a little information easily leads to a correct diagnosis. In other cases it will be very difficult to make a diagnosis over the telephone and you may need to ask for a sample to be sent in.

Unfortunately, many of the descriptive terms we use in ordinary conversation are very subjective, and there is often a wide gap between what the caller is telling you and what you are visualizing. When a telephone call results in a lot of uncertainty it is best to have the client supply a plant sample.

There are times in working on a problem over the phone that you draw a complete blank. Someone tells you their oak or pine tree is dying and you do not have any idea of what is wrong. In such cases, and in telephone diagnostic work in general, it is a good idea to have a written plan of action to follow. This usually takes the form of a list of questions to ask the caller depending on the type of plant involved. Typical questions might include: How old is the plant? When was it planted? Where is the plant located? When was the problem
first noticed, etc. The more information that flows between you and the client the better your chances at a successful diagnosis. The art of questioning the caller will develop as you gain experience in diagnosing problems over the telephone.

Working With Different Types of Plant Materials

As a master gardener you will work with a wide variety of yard and garden plants including landscape trees and shrubs, flowers, lawns, fruits, vegetables and house plants. In diagnostic work there are differences in the way you approach problems with the different types of plants.

**Woody Landscape Ornamentals**

**Measuring Woody Plant Growth**

As with all plants, there is often a delay between the time a problem occurs and the appearance of the symptoms. When evaluating woody plants, evaluate their vigor and look for specific signs and symptoms. A helpful technique for evaluating the condition of a woody plant over a period of time is to measure the distance between terminal bud scar scars. At the end of each growing season a woody plant forms a terminal bud at the end of the branch. This bud is covered by scales attached to the branch. The following year when the bud opens and a new shoot begins to grow the scales drop off and leave a noticeable scar on the branch. You can measure the distance between bud scale scars to judge the amount of growth the plant has made during the past several years. Often, a tree that is reported to have 'suddenly' died will show that growth has been in decline for several years. A complex of environmental problems, such as drought and compacted soils, and attacks from diseases or insects, will often combine to kill a declining plant when one of the factors would not damage a vigorous plant. Declining plants are susceptible to pests and diseases that do not attack healthy plants.

**The Importance of Roots**

Knowledge of the root system is important in determining the health of a plant. It is usually impossible to examine the roots of woody plants. Nevertheless, always suspect root damage when the entire plant is declining. On newly planted trees and shrubs it may be possible to dig near the plant, or have the client dig near the plant, and determine the condition of the roots. A major cause of death of newly planted trees and shrubs is a failed root system. When plants fail to establish in older landscapes, the problem is more likely to be nematode or insect damage to the roots.

**Herbaceous Plants**

Annuals and perennials, whether an ornamental or food crop plant, require a different type of diagnostic approach. Usually there is more than one plant in the planting. Determine whether the problem is affecting a single plant or a group of plants. This helps distinguish between a cultural or environmental problem, which will usually affect many or all the
plants, and an infectious disease or insect problem, which will initially affect a small number of plants.

Looking at Roots

It is usually easy to examine the roots of herbaceous plants, a considerable advantage over working with woody plants. When you have the opportunity to examine the root system of a plant, always dig, don’t pull. When you pull plants up, many of the roots break off and remain in the soil. It is important to know the extent of the root system. The lack of roots can explain failure of the plant to grow. Look for abnormal roots, bumps on the roots and evidence of root rot or chewed roots.

Interior Plants

Interior plants represent a special situation in plant diagnostics because they depend on the grower for all their needs. The plant’s entire environment is under the control of the grower. What you can learn about the client’s care of the plant will help you to formulate a correct diagnosis. When working with a pot grown plant it is always advisable to inspect the roots. When dealing with a plant sample or telephone contact, and a root inspection is not possible, be cautious in your diagnosis. It is difficult to make a diagnosis without knowledge of the roots, and root rot or damage is very commonly the underlying cause of a variety of symptoms seen on leaves and shoots.

Light is another vital factor for interior plants. Interiorscape light levels are nearly always much lower than optimum light levels for growth which were provided in plant light production. Although inadequate light may not kill plants, it may weaken them and make them more susceptible to other threats, such as root rot form overwatering. Discuss light requirements with the client and try to determine whether too little, or too much, light is part of the problem. Sudden changes in the amount of light can cause foliage to yellow and drop and other serious symptoms. Interiorscape light levels are nearly always lower than light provided in plant production.

Diagnosing Lawn Problems

It is important in working with lawn problems to know the history of the problem: how it first appeared, when it first appeared, the extent of the lawn area affected, and the type of grass involved. Many lawn pests and diseases appear under similar weather conditions every year, so if you know the kind of turf grass, you are halfway to a diagnosis. When faced with a lawn in very bad condition, it’s probably best to concentrate on the repair process and the steps that can make the lawn less susceptible to future problems.

The Turf Sample

If the opportunity exists, have the client bring you a turf sample. Select plugs measuring 3” across and 6” or more deep. Dead sod is usually worthless from a diagnostic point of view. If a patch of lawn is dying try to get a sample from the outer edge of the patch.
It is in this location that insects or disease organisms are most active and identifiable. If the client indicates that the lawn just died out all over, suspect environmental or cultural problems. Cool season turf will go dormant during drought, so ask if the lawn is irrigated.

**Dealing With People**

**Always Try To Teach**

*Your primary responsibility is to help people.* One of the first things to do when working in a diagnostic situation is to listen. Find out what the real problem is. Often beginning gardeners come to a plant clinic with a single plant problem, but what they actually need is basic gardening advice. Instead of spending time on a detailed inspection of a piece of tomato plant you might better serve many clients by discussing how they can grow better tomatoes. You could solve many future plant problems by suggesting a good gardening book. In all situations take the opportunity that diagnostic work invites, and teach.

**When Things Don’t Go Right**

Always be calm and courteous. There will be times when you just don’t know the answer. Don’t get flustered. Admit you’re not sure of the diagnosis, but don’t apologize; this implies you’ve done something wrong - and you haven’t. Share reasons the diagnosis is difficult: the sample was too old, or too small, or the host plant was unusual and not covered in the reference books. Offer to continue working on the problem. If the client becomes upset, he might complain he wasted his time working with you, stay calm. All diagnosticians have heard such complaints; don’t be pressured into inventing a diagnosis. Stay in control of the situation. If there are Extension personnel available, discuss the problem with them; otherwise, take the client’s name, address and phone number and promise to pass the problem on to the appropriate Extension person. Diagnostic work can be frustrating at times, but never let is upset you or ruin your day.

**Improving Your Diagnostic Skills**

For a beginner the world of plant problem solving is difficult and somewhat intimidating. You may sit down at your first plant clinic and not have a clue to the solution of the first ten problems; it’s discouraging but it’s not unusual. As each diagnostic encounter passes, you’ll find you get better. There are a few things you can do to speed your skill development.

**Keep Records**

Keep a list of the plant problems you work on. In the heat of the plant clinic or phone answering battle this is hard because of time pressure, but take the time to make notes. A diary type listing is best, but if you’re not the narrative type just list the date, the host plant, the observable or described symptoms and your diagnosis. If you have time, also record the references and page number used in the diagnosis.
Be Observant

The world is full of plant problems. Diseases, insects, and environmental conditions affect plants all around us. Only a small fraction of these end up at the plant clinic or get described on the telephone. Every time you take a walk or work in your yard, be on the lookout for plant problems or plant phenomenon. Many of the things you see during your day’s activities you will see again during your Extension diagnostic work. When you tell the client that you have seen this in your garden and then explain what it is and how he should react to it, you are teaching and helping in the most effective way. Never hesitate to bring in samples from your yard or neighborhood to other master gardeners or Extension personnel. This type of diagnostic work is without pressure, fun, and a great way to learn.

RESOURCES:

1. **American Phytopathological Society Compendiums.** APS Press. 3340 Pilot Knobb Rd., St. Paul MN.


8. MacNab, Sherf and Springer. 1983. *Identifying Disease of Vegetables.* PA State University, Univ. Park, PA.


10. Shirley Ross. *First Aid for Houseplants.*
