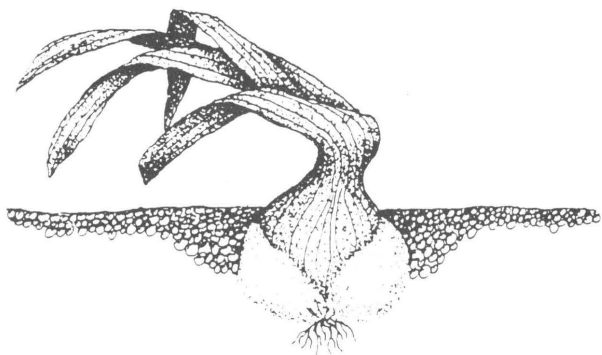


Drought and waterlogging produce many of the same symptoms on the above-ground parts of the plant, mainly chlorosis (yellowing leaves), abscission (shedding older leaves), and wilt. Waterlogging of the root zone also results in oxygen deficiency, leading to a halt in root growth and metabolism, death of the roots, and wilt.

Damage due to *chemical factors* — inappropriately used pesticides or excessive rates of pesticides can cause symptoms, such as leaf burn, distortion, chlorosis, or bleaching, depending on the chemical. On a field basis, pesticide or fertilizer damage symptoms frequently are associated with application patterns.

Nutrient deficiencies show up as yellowing, stunting, or death of older plant leaves or new growth, depending on the missing nutrients.



Refer to expert information. Talk to your Extension agent or local garden center, explaining the symptoms thoroughly, or check all the symptoms against a good chart or reference book, keeping in mind the factor you have determined as the likely cause. If it appears insects or pathogens are causing the problem, be sure to positively identify the pest so you can choose the most effective control measure.

Double-Check the Obvious

It never hurts to look again for obvious problems. Is the stem/trunk badly damaged? Has the plant been sitting in a saucer of water for a week? Has your neighbor sprayed weedkiller lately? Does your cat enjoy fern salad? Is your dog deprived of fire hydrants? Do your children "help" you by cleaning the plants with furniture polish or window cleaner?

For more information on selection, planting, cultural practices, and environmental quality, contact your local Virginia Cooperative Extension Office. If you want to learn more about horticulture through training and volunteer work, ask your Extension agent about becoming an Extension Master Gardener. For monthly gardening information, subscribe to *The Virginia Gardener Newsletter* by sending your name and address and a check for \$5.00 made out to "Treasurer, Va Tech" to the Virginia Gardener, Department of Horticulture, Virginia Tech, Blacksburg, VA 24061-0349. Horticultural information is also available on the Internet by connecting with Virginia Cooperative Extension's server at <http://www.ext.vt.edu>

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Diagnosing Plant Problems

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Diagnosing Plant Problems

Diagnosis of plant problems is often a difficult task. There can be many different causes for a given symptom, not all of them related to insects or diseases. Soil nutrition and texture, weather conditions, quantity of light, and other environmental and cultural conditions influence the health of a plant.

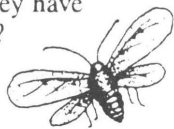
The most effective approach is to know what questions to ask to narrow down the possibilities. For example, you need to consider recent rainfall and fertilization schedule if you notice brown, dry edges on the leaves of your plants since both dry weather and excess fertilizer can cause such damage. As another example, both excessively dry soil or waterlogged soil can cause the same plant reaction — wilt. Even insect damage can sometimes be confused with plant diseases caused by microorganisms.

Causes of Plant Damage

Factors causing plant damage can be grouped into two major categories. **Living factors** include pests (insects, mites, rodents, rabbits, deer) and pathogens (disease-causing microorganisms, including fungi, bacteria, viruses, nematodes). **Non-living factors** include mechanical factors (breakage, abrasions), environmental factors (temperature, light, moisture, oxygen, lightning, wind), and chemical factors (fertilizer or pesticide excess, nutritional disorders).

Use a Systematic Approach

Define the problem. Closely examine the entire plant and others around it. Take note of all the symptoms. For example, if the plant has insects, examine the leaves with insects on them; do they have brown spots, holes, chewed edges? Are they turning pale green or yellow? Is there more than one kind of insect present?



Look for patterns. Do other plants have the same problem? Are they all in the same place or in different locations? Are they all the same type of plant? Damage to all different types of plants in a particular spot can indicate non-living factors. Damage to a few species of plants or only to plants of the same species can indicate living factors.

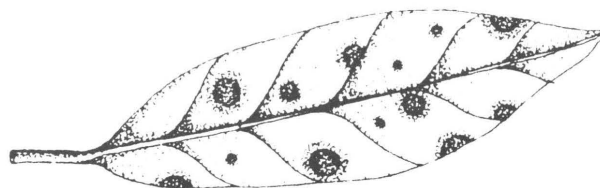
Examine spread of problem. Is the problem spreading gradually? This can indicate living factors. If the problem occurred suddenly and remains in a particular spot or on a particular plant, this points toward non-living factors.

Determine likely cause of damage. Based on the pattern and spread, decide if the problem is more likely caused by living factors or non-living factors. If living, is the problem a pathogen or a pest?

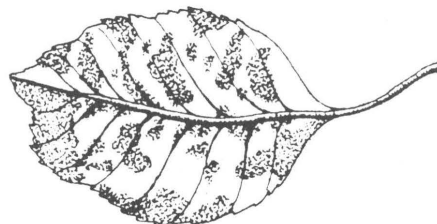
Living Factors

If disease is a possibility, check the following general guidelines for identifying the different causes of disease:

A *fungus* pathogen often causes round leaf spots, stem rots with a dry/papery texture, concentric rings, discoloration, or wilt. Fruiting structures (sometimes microscopic) may form on affected tissue.



A *bacterial* disease can take the form of galls (swollen areas), irregularly shaped leaf spots, wilting (then yellowing and dying), or rot (often a wet rot).

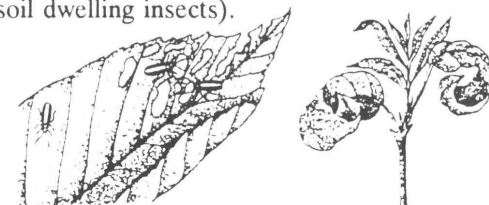


A *viral* pathogen can inhibit chlorophyll formation, causing degrees of yellowing or mottling, stunting, distortion, or dieback of part of the plant. Viruses usually debilitate rather than kill, as they are parasitic.

Nematodes are microscopic roundworms that cause disease-like symptoms. Stem nematodes feed on stems and cause shortening of internodes. Root nematodes feed underground, damaging the root system; this leads to moisture and nutrient stress which shows up as wilting and stunting. Foliar nematodes cause angular leaf spots.

If an insect problem seems likely, check the following:

A *chewing/rasping* insect feeds on plant tissue and can cause ragged/chewed or missing leaves (caterpillars, slugs, beetles, grasshoppers), rolled leaves (leafroller), tunnels in between upper and lower leaf surfaces (leaf miners), holes in stems, branches or trunk; sections of tree dying; or premature yellowing (wood borers), girdled or dead stems (cutworms, twig girdlers, or stem borers), or general decline of plants due to root damage (soil dwelling insects).



A *sucking* insect feeds on plant fluids and injects toxins into the plant. The toxins can cause leaf spotting or stippling (aphids, leafhoppers, spider mites, other bugs), leaf distortion such as curling or puckering (or more commonly this can be damage from leafhoppers and thrips), or poisoning of entire plants, resulting in stunted growth and/or yellowing (scale, mealybugs, mites, aphids, whitefly).

Non-living Factors

Damage caused by *mechanical factors* is usually revealed by close visual examination; check for broken or girdled stems or roots, also bruised, punctured, or broken leaves.

Damage due to *physical factors* often results from environmental extremes. *Cold* damage is characterized by death of exposed foliage. Container plants are susceptible to cold damage to the root system, characterized by blackened or spongy roots with lack of new growth or root hairs, usually near the container edge.

A rapid change from low *light* to high light intensity, or vice versa, can cause yellowing of leaves, reduced growth, and leaf drop or death. Too little light can reduce, delay, or prevent flowering.

Excess *heat* usually causes scorch symptoms on leaf tips and interveinal areas. Portions of leaves shaded by other leaves, or leaves on the shady side of the plant, may be undamaged. Frequently, heat damage will occur uniformly over all plants in an affected area.