Diagnosing problems of ornamental plants

Look, look and look some more, says this Cornell pathologist. Then begin to ask questions.

by Jerry Roche, Editor-in-Chief

■ A plant disease, by definition, is any disturbance of a plant that interferes with its normal structure, function or economic value, according to Richard Buckley of the Cornell University Plant Pathology Department.

But a plant disease is a lot more than its definition, he says, adding, "You need three components: a host, a causal agent and a favorable environment."

Buckley believes that the favorable environment is the most important part. "I can find *Rhizoctonia solani* (brown patch) in almost any turf that comes into my lab," he notes, "but the environment stimulates that pathogen."

He classifies **causal agents** into two types: biotic (living) and abiotic (non-living).

Biotic agents include pathogens like fungi, bacteria, viruses, nematodes and MLOs; and pests like insects, mites, mollusks, small animals and deer.

Mechanical abiotic agents include mowing injuries, construction, hail, perched water tables, compaction, planting too deep, girdling roots and mice chewings. Typical symptoms of mechanical agents are breaks, bruises, punctures, cracks, chewing marks, girdling and root pruning.

Physical abiotic agents include temperature, light, moisture, winter injury, winter sunburn blisters or cracks, drought stress, rain and dampness. Typical symptoms of physical agents are tip and edge burn, intervenal necrosis and loss of older leaves.

Chemical abiotic agents include: the misapplication of pesticides (either by contact injury or translocation), ozone injury, sulfur dioxide pollution, fluoride injury and salt damage. Typical symptoms of chemical agents include patterned tip and edge burn, interveinal necrosis and loss of older leaves.

Volutella blight on a boxwood plant.

'It's often wiser to sacrifice one [plant] to save many.'

Symptoms, Buckley says, are plant abnormalities. "We use symptoms as one of the cues to diagnose a disease, but in many cases they are a deception so we need more cues," he notes.

Typical symptoms of disease are: leaf spot, blight, dieback, chewed leaves, wilt, distorted growth, stippling and abnormal color.

"Signs of disease are other visual cues that we can examine to determine the presence of disease," says Buckley. They include: fruiting bodies, resting structures, mycellium, bacterial ooze, eggs and/or cysts, chemical residues and cultural records like spray records and weather logs.

Diagnosis—The Cornell pathologist has a systematic approach to decision-making. His eight steps to diagnosing a disease, in order, are:

1) Identify the plant—To identify the plant, you must examine the entire plant and the plant community. Most living organisms are very specific to their hosts. Start at the top of the plant and identify each part individually. "You have to keep searching, and it's a difficult thing to do in the landscape," Buckley says. "It's often wiser to sacrifice one [plant] to save many."

2) Define the problem—To define the problem, you must determine the number of species affected. If it's a wide range, it's probably an abiotic problem.

3) Determine patterns—When determining patterns, you must identify both uniform and non-uniform patterns.

4) Delineate the progression of the symptom(s)—Progressive symptoms are generally caused by living organisms; non-progressive symptoms generally are not. "You have to be real careful, though," he adds.

5) Ask questions—Here are some key questions to ask, of either the client or the crew that works at the site. Communication is very important, Buckley notes: "What is the distribution of the problem? What are the site conditions? What kind of weather prior to symptoms appearing? What are cultural practices? What are the chemical inputs? When did the symptoms appear? What is the age of the plant?"

6) Observe typical symptoms and signs—Use all your senses to diagnose:

sight, smell, touch and hearing (ask questions).

7) Check references.

8) Sample and test.

Fungal diseases—Buckley observes that fungi cause 80 percent of all diseases. "Fungi growth generally starts at the central point and grows in circles," he says. "There is often a distinct line between healthy and non-healthy tissue, often with a colorful border. Tissues are often very dry. Look for the presense of fungal fruiting bodies, too."

Bacterial diseases—Bacteria cause a lot of leaf spots with "halos" (diffuse margins). The spots will be angular, irregular and water-soaked. Polysaccharide ooze and fishy or rotten odors are typical, too.

Virus diseases—They work on the cell level with the genetic make-up of the plant. They often cause ring spots, abnormal growth and abnormal color. Viruses need a way to spread, though, and in most cases it's a gnawing, sucking insect. One of the tactics to control virus diseases is to control the vectors.

The bottom line: "If you don't know the answer, seek professional help," Buckley suggests. "Collect samples during the investigative process and submit them to your cooperative extension agent or a private testing lab. Quick-test kits are also excellent tools."

—Richard Buckley is a plant pathologist for Cook College, Rutgers University. The preceding information was given during a speech he gave at the New Jersey Turf Expo.

Possible causes of nutrient deficiency in ornamental plants

SYMPTOM	POSSIBLE CAUSE
Chlorosis	
entire plant	nitrogen deficiency; high light
young leaves	poor soil aeration; salinity; iron or sulfur deficiency
older leaves	nitrogen or magnesium deficiency; overwatering; poor soil aeration
leaf margins	salinity; magnesium deficiency
intervenal	iron or manganese deficiency
irregular spots	cold temperature
Necrosis	
water-soaked areas	cold temperature
tips or margins	potassium deficiency (old leaves); boron toxicity (old leaves); salinity; temperature extremes; desiccation; low humidity; root damage
center of leaf	sun scorch; cold; nutrient toxicity
Leaf deformation	
leaves abnormally small	micronutrient deficiency; salinity; high light; root-bound or -damaged plants
petioles elongated	low light
holes in leaves	mechanical injury; slugs, snails; insects
new leaves stunted	manganese or other micronutrient deficiency; salinity; poor aeration; overwatering
Stem deformities	
rot at soil line	salinity; fertilizer placed against stem; overwatering; poor aeration
wilting	salinity; high temperature; desiccation; low humidity; low soil moisture; root damage
thin, spindly, weak	low light; crowding of plants
Root abnormalities	
slow development	salinity; soil temperature extremes; planted too deep; poor aeration; overwatering
poor/rotted roots	salinity; overwatering; poor aeration
Stunted plants	fertilizer extremes; nutrient deficiencies; extremes of light; overwatering; poor aeration; poor roots

Source: Pacific Coast Nurseryman and Garden Supply Dealer, May 1992

Weather can lead to damage of some shrubs

■ Wet weather is directly tied to the development of *Phytophthora cinnamomi*, a deadly fungus of yew or taxus plants, according to Jim Chatfield, an extension agent in Ohio.

Roller-coaster-type weather takes a toll on older shrubs, even if they planted in reasonably good sites, Chatfield observes.

"We've known for a long time that taxus can't tolerate wet soil. It must be planted in well-drained sites."

Phytophthora root rot symptoms include yellowing foliage, reduced growth, brown to brick-red root lesions and dieback of branches. The disease gradually cuts off the flow of water and nutrients in plants. Infected taxus usually decline slowly over ont to three years before dying.

East of the Mississippi River, *Phytophthora cinnamomi* has been reported only in Ohio and Indiana.

"If you remove a taxus that appeared to have died from Phythophthora root rot, you might want to wait a while before replacing it," says plant pathologist Mike Ellis. "It's not a good idea to immediately replace a dead shrub where soil is heavy and wet and where disease is present."

Wet weather can also hurt yews by prompting harmful feeding onthe shrubs' roots by black vine weevil grubs. Symptoms are similar to Phytophthora root rot.

More research is needed it determine the extent fo the disease and of other taxus pests and disorders, Ellis says.

"The key here is to remember that Phytophthora can thrive in (wet) conditions," he concludes. "Under normal circumstances, it isn't as great a concern."