

The 23 Questions of Plant Problem Diagnostics

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This workshop is an update of the 22 Questions of Plant Diagnostics, this time adding Question 23: How should we review and reconsider past diagnoses? We also will feature extensive numbers of tree and tree disease, pest, and abiotic samples for diagnosis. Plant problem diagnostics is a key to good tree health care management and a precursor to proper and effective arboricultural treatment. Diagnostics is a Socratic process that begins with key questions about the plant: addressing plant identification, what is normal for the plant, and what are the common problems for the plant. It proceeds through a list of systematic questions about signs and symptoms, aspects of the site, information from those who know the plantings best, and a constant asking of the “what else” question about what might be involved with why this good tree has gone bad.

This workshop—modeled on programs we have given throughout the U.S. and Canada at conferences and to tree care, nursery, and landscape companies—makes extensive use of samples and case studies. Environmental, cultural, pest, disease, chemical injury, and other problems, including common examples of misdiagnosis will be addressed. We also will address the problem of diagnostic hubris. The key to diagnostics in understanding the limitations diagnosticians often have, and the mistaken lure of being a one-step know-it-all. Many a diagnosis has gone wrong because of the failure to properly answer one of the 20 questions, such as the true identity of the plant and whether what is seen is normal or abnormal for that plant, or whether the “common problems” question is trumped by a new problem. The only truly sure-fire rule of plant problem diagnostics: there are no sure-fire rules . . . but asking the 23 Questions is a big help.

Humility and an approach of constant questioning are essential in diagnostics, yet often difficult. You know the feeling. You learn something and cannot wait to show your stuff. Callery pear with scattered curled shoots (like a “shepherds-crook”), brown to blackened leaves—bacterial fireblight. Needle browning on a pine—Diplodia tip blight. Oh—it is all over the tree? More serious—the prognosis is poor, the tree on its last legs. Root rot. Dying green ash, holes in the bark—clearwing borers finishing off a moisture-stressed tree. Slam dunk diagnoses. It’s a great feeling to be a know-it all. You can diagnose these problems with your eyes closed . . . which is what you are often doing, pretty much. What if these are all phone call consultations?

Off-the-cuff diagnosis is a great temptation. At its worst over the phone, but always alluring. And it is hard to resist, especially with the guy across the street or a competitor so certain and so quick with answers. Especially when your customer wants you to show confidence and expertise. You are the expert, after all. But diagnostics is more difficult than it first seems. Plant problem diagnostics is an upper level skill. Figuring out why a good plant went wrong is a critical skill with many jobs for green industry professionals. Simple it is not.

Think about the advantage that physicians have over plant doctors. Their patients can talk to them (even though we often lie about our health); they deal with only one host, *Homo sapiens*, rather than the dozens, scores, or even hundreds of host plants we grow and maintain; and there is a lot of money and technology thrown at human medical problems. Nevertheless, studies show that for physicians, the greatest source of medical errors, including those resulting in patient death, are due to improper diagnoses. This truly matters. For physicians and for plant sleuths, “Treatment without diagnosis is malpractice,” as urban forester Alan Siewert, our good friend, has noted.

Yet even physicians, of whom a few are known to have egos as well, recognize the need for review after the fact. A common definition of a physician's Grand Rounds is "a ritual of medical education, consisting of presenting the medical problems and treatment of a particular patient to an audience consisting of doctors, residents, and medical students." The best health care professionals carry this ethos of review with them long after the diagnosis, treatment, and resolution of a particular patient. You do not need to watch every episode of *House* or *Cold Case Files* to understand the importance of working and reworking the case.

So let us return to the beginning. That Callery pear with the curled shoots and discolored leaves? Fireblight? Certainly possible, but if you were not responding on the phone, you may have noticed that beneath the damaged shoots were egg-laying scars from periodical cicada—the real cause of the problem in this case. The brown needles all over the pine? Root rot? Well, the caller said it was a pine, but it was actually a baldcypress, a deciduous conifer that quite naturally has fall color and foliar drop each fall. And those holey ashes to ashes? Well, that example is what really makes the case for humility and constant questioning for diagnosticians.

An Asian insect, the emerald ash borer was first discovered in Michigan (North America) in June 2002 and confirmed later that August. As scientists have pieced together its story, it is estimated that its arrival was 15-20 years earlier. During that time, there were symptoms on infested trees of thinning canopy, basal sprouts, and epicormic growth, and reports of dying and dead trees.

Verticillium wilt, ash yellows, ash decline, general construction damage, and drought stress all cause such symptoms, too, and were the common diagnoses of what was occurring on ashes during the years before emerald ash borer was diagnosed. Often these problems involve native insect borers on ash that contribute to decline and death of these stressed trees. But, undiagnosed for some time, was this burgeoning infestation with emerald ash borer on many trees.

Eventually diagnosticians noted distinct D-shaped exit holes on infested trees, suggestive of the *Agrilus* beetle (the emerald ash borer is, indeed, *Agrilus planipennis*). They noticed serpentine, frass-filled larval galleries beneath the bark of living trees. They found small larvae that looked like miniature tapeworms in these living ash trees. What was missed? Many of us did not completely take to heart the diagnostic questions of "What exactly do we see?" and "What else?" and the nagging post-mortem Question 21: "What if we are wrong?"

Alexander Pope noted that "to err is human," and our purpose in relating the emerald ash borer missteps is not to beat ourselves up. It took physicians a long time to figure out the complexities of AIDS and other autoimmune diseases. But we never should be complacent as diagnosticians, and our *Quincy*-like probing must go ever on and on.

Don't make the symptoms fit the diagnosis; do make the diagnosis fit the symptoms. And in addition to the 21st Question of "What if we were wrong?"—let's take seriously our obligation to perpetually conduct our version of medicine's Grand Rounds. For trees, perhaps we should conduct "Grand Rings," to keep open the diagnostic process.

Recognize that we never know all of the answers. Recognize that we must review and reconsider what we once thought we knew. Come, let us grow together in our skills in answering why a good tree went bad. As Abraham Lincoln said: "I don't think much of a man who is not wiser today than he was yesterday."