EVALUATING DISEASE PROBLEMS ON TREES

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Trees under stress in the landscape can be readily recognized when observed throughout the seasons. Deciduous trees under yearly stress will show accumulated signs of decline, including, primarily, branch and twig dieback. In spring, declining deciduous trees leaf out later than healthier specimens of the same tree species. Also, the leaves may be smaller and more yellow. In autumn, the declining trees will defoliate sooner than healthier specimens. Declining evergreens will have shorter needles, more yellow foliage and will retain fewer complements (previous years) of needles. For example 3-year-old needles will be retained by vigorous Scotch pine, but not by stressed specimens.

Trees may decline from environmental stresses, such as drought, or from disease. Both abiotic (non-living factors) and biotic (living organisms) can act together to increase tree decline.

The most common situation causing tree decline in the landscape is a combination of site problems. In golf courses some trees suffer from the same causes of decline as urban trees: heavy foot traffic, nearby pavement, road traffic, and a restricted root system. Other trees of the same species may not suffer similarly because they are in more natural sites, such as wood lots in the rough.

Trees that receive heavy foot traffic, and those near paved roadways, overtime, will be in sites of compacted soil. In such sites soil gradually increases in bulk density ("compaction"). This phenomenon can occur without foot or tractor traffic as well because road de-icing salts that may wash or drain onto these sites can alter the soil chemical structure by replacing calcium ions with sodium ions. Compaction, either chemical or physical, decreases permeability of the soil to water and this further increases the saltiness of the soil, thus increasing compaction.

"Urban tree decline" can be tested and diagnosed by analyzing foliage and soil. Typically a tree suffering from "urban decline" will show high sodium levels and a deficiency in foliar nitrogen when the soil tests rich in nitrogen. Adding fertilizers will often increase the decline because the fertilizers often increase the salinity of the soil.

Drought is the worst abiotic stress factor that can contribute to tree decline. When a tree is in compacted saline soil, drought has a compounding effect due to the lack of permeability of the soil to water. Trees planted in sites that restrict root growth because of pavement, further suffer from extremes in the water table. Drought becomes exaggerated as does excessive moisture and both factors promote tree decline. Salt injury increases in drought and salts accumulated in compacted soils because of the decreased leaching.

Treating "urban tree decline" involves "vertical mulching". Bore holes about 2 inches diameter and 18 inches deep around the tree spaced 2 feet apart in circles from near the crown to the drip line. Do not add fertilizers or otherwise fill the holes in the first year or two. Then routinely deep-water the trees in summer dry spells. This treatment increases permeability, permits leaching of salts, decreases competition with turf for water and nutrients and stimulates root regeneration. Also prune back the top of declining trees preceding this treatment.

Other causes of twig and branch dieback and tree decline are more difficult to determine. Many pathogens can cause such symptoms while infecting very different parts of the plants. For example, branch dieback on Russian Olive generally is due to the fungus Phomopsis which produces cankers that girdle branches, however, branch dieback on Russian Olive, Maple and many other trees may be due to the root pathogen Verticillium which is common in old mint and potato field soils. The pathogen is in the soil and infects roots of trees, but causes branch dieback. The fungus plugs up the "piping" and stops water movement into specific branches. The extent of the damage and dieback will depend on the ability of the tree to form barrie's in its wood to compartmentalize the fungus during autumn. A vigorous tree can succeed in preventing the fungus from invading the new sapwood in spring, a declining tree cannot.

There are so many diseases that affect trees that one should send samples to the Michigan State University Insect and Plant Diagnostic Clinic to obtain an accurate diagnosis. The clinic charges $10 per sample.

Fungicides generally are of no use in controlling pathogens that kill woody branches on trees. However, they readily control foliar and most twig blight diseases except for those few caused by bacteria,such as Fireblight of crabapple. Fungicides may be protectants, systemics or eradicants. Most fungicides available for use on trees in the landscape are protectants. These must be applied before the fungus infects the tree; not when disease is evident. Generally, they are applied at bud break and persist for 2 weeks. Manzate 200, Dithane, and Daconil 2787 are common protectant fungicides with many ornamental trees on the

registered labels. Daconil 2787 is more persistent than most and may not require a second application until 6 to 8 weeks. Growing tissues grow away from the protectant coating of the protectant fungicides.

Common systemic fungicides include Benlate. Bayleton. and Cleary's 3336. Benlate and Cleary`s 3336 have registered labels that permit use on most ornamentals. These fungicides move into the leaf cells and therefore. as leaves and shoots expand and elongate in spring, the fungicide continues to protect the growing tissues.

Eradicant fungicides are new and will become more common in the next 5 years. They can be applied several days after the fungi have infected foliage following rains. and kill the pathogen in the plant tissue. The only fungicide of this nature currently marketed to golf courses is Prochloraz.

Most foliar diseases of ornamental trees do not cause enough damage to warrant the use of fungicides. except scab on mountain ash and crabapples; anthracnose on Sycamore, maple and white oak; and cedar-apple rust on crabs and hawthorns. Anthracnose kills buds. twigs and expanding leaves defoliating trees sometimes 3 times in one season. Cankers caused by the fungus also produce "witches brooms" of branches that are unsightly and destroy the esthetic appearance of the trees. The "witches brooms" should be pruned out. Most sycamores in Michigan will show the disease symptoms, particularly in spring.

Some examples of other common diseases affecting trees in gold courses will be briefly discussed.

Large specimen blue and white spruce often begin to lose lower branches following infection by the Cytospora canker fungus. If untreated, the trees will eventually lose many lower limbs and take on the appearance of a forest timber tree having branches only at the peak. Although the pathogen is a fungus. fungicides are ineffective. The best possible treatment to halt the progress of the disease is "vertical mulching" with summer watering. Fertilizers can help those spruce in woodland or "rough" settings where soil is not compacted or saline. Summer deep watering is essential.

Austrian pines have suffered significant damage in the last few years. The Diplodia pathogen has been epidemic in some locations. killing the new growth along with pine shoot moths. Dothistroma needle blight has caused loss of many needles in particular years and has weakened Austrian pines enough to attract the beetle carrier of the pine wood nematode, killing the tree with pine wilt.

Briefly, the Diplodia tip blight pathogen is controlled with two applications of benomyl fungicides, one at bud break and one a week later. Applications are ineffective if sprayed when the expanding candle (shoot) is half of its final length. Several years of applications are generally needed to cause a perceptible effect on the appearance of the tree. Dothistroma is controlled with two applications of copper containing fungicides: fixed coppers, copper resins or copper-sulfate-lime bordeaux mixtures. One application in mid-May protects the previous years needles and one application in mid-June protects the newly elongating needles. Controlling these two diseases and shoot moth are the only treatments which might prevent infection by the uncontrollable pine wood nematode.

Each disease of trees requires very different control measures: for example, Dutch Elm Disease and Apple Scab. Recommendations should be obtained from your local County Cooperative Extension agent or the Plant Diagnostic Clinic of Michigan State University, room 138 Plant Biology Building, (517) 355-4536.