▲**Photo 1A:** This Norway maple was presumed to be dying by a golf course superintendent due to leaf drop and what appeared to be serious "blight" or scorch symptoms. Removal was being considered. The disease causing the problem was tar spot, a non-lethal disease that tends to become conspicuous by mid to late summer.

▲**Photo 1B:** Because of the very wet 2010 spring, tar spot became epidemic in many locations in Michigan. Tar spot was so prevalent on many leaves that the classical individual spots (this photo) were not as evident; rather, the spots had coalesced to cause a scorched appearance or total browning of the leaves.

The Plant Doctor's LANDSCAPE TIPS

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FOLIAR PROBLEMS: ARE THEY LETHAL?

INTRODUCTION:

Leaves fall, become discolored or disappear from plants for a variety of reasons. The loss of foliage from deciduous plants during the growing season sometimes causes great alarm to people who love their trees and shrubs. The loss or discoloration of foliage on conifers or other "evergreen" plants during the summer season or winter season can also initiate panic with many plant owners. Of major concern for any type of foliar problem is the reaction by many people who assume that their woody plants have died, that they need to be removed and that they need to be replaced with new viable specimens. Sometimes, professionals even misdiagnose leaf loss and discoloration as a sign that the plant has died and needs to be removed. Unscrupulous "tree cutters," in combination with unknowing clients, sometimes view foliar problems as a means to achieve business for tree removals. In many if not most cases, the loss or discoloration of foliage indicates a problem, but not a problem that is lethal. In many if not most cases, these plants will recover with time.

CAUSES OF FOLIAGE DISCOLORATION AND LOSS:

Of all woody plant problems, plant foliage is generally the first tissues that show visible symptoms of a problem, whether the problem originates from roots, stem (trunks) or foliage. Following are some examples of causes of foliar problems and their symptoms.

Diseases: Plant diseases, caused by a variety of microorganisms including fungi, bacteria, viruses and nematodes, are, perhaps, the number one culprit for misdiagnosis of plant death. These diseases may cause spots or blights on foliage that simply leads to leaf discoloration or leaf drop (Photos 1, 2 & 3). With some foliar diseases, the leaf loss occurs in the late spring or early summer. This is the most dangerous situation from the standpoint of human intervention because many people believe their trees are dead during this time period. Other diseases cause leaf discoloration and loss later in the season. With these "late season diseases" (even though infection took place earlier in the spring), humans may not intervene or may be more reluctant to intervene because of the often coincidental loss of foliage associated with the fall season. Nevertheless, I have witnessed many misdiagnoses of foliar disease problems that should not have been lethal but became lethal due to human intervention – cutting and removal.

Insects/Arthropods: Insects cause damage to foliage in several ways. Some insects/arthropods, such as aphids, plant bugs, leaf hoppers and spider mites, have piercing-sucking mouth parts that create tiny spots or stippling on leaves. Abundant stippling may discolor foliage and, in severe cases, may even lead to premature leaf drop. Other major classes of insects have chewing mouthparts. These include many caterpillars (larvae) and adults that chew foliage. Examples include forest tent caterpillar (Photo 4) and various grasshoppers. Foliar loss due to chewing insects may be "extremely severe" and result in the appearance of plant death. Usually, the plant is not dead and will recover.

▲**Photo 2A:** The photo of this sycamore was taken in early June. Anthracnose, a fungal disease, was responsible for the leaf loss during the spring. This period is particularly dangerous for such trees because human misdiagnosis and intervention may result in the removal and demise of this nice tree.

▲**Photo 2B:** Waiting several weeks resulted in complete recovery of the tree in Photo 2A. Anthracnose occurs every year on various trees and shrubs but is generally not lethal to these plants. One exception is an introduced "alien" anthracnose (Discula) on dogwood (Cornus florida).

Cultural: Cultural problems are those problems instigated by humans. The application of deicing salt, misapplication of chemicals, herbicides or other sprays, excess irrigation and inappropriate planting techniques are a few examples of cultural problems that may cause foliage discoloration or loss. Provided there is not long-term damage to such critical root and stem tissues, plants may recover from cultural problems.

Environmental: Environmental causes are those that are defined as generally not under human control. These may include drought, heat, cold, flooding and lightning injury (Photo 5). Many environmental problems may cause a short-term problem for plants that result in leaf discoloration and loss but which may not be lethal to plants.

▲ **Photo 3:** Scab of crabapple and apple and other rosaceous plants is a multicyclic disease that continues to re-infect and cause additional lesions on foliage throughout the season. By mid to late summer, infected leaves began to fall from trees, leaving bare branches and a dying appearance. Many crabapples have been needlessly removed due to misdiagnosis of this problem; they would have recovered just fine the following spring, when protective sprays might be contemplated.

▲ **Photo 4A:** This photo was taken of these two red oaks on a golf course in Northern Michigan in late June. They appeared dead and removal was being considered. Because the trees had been pruned in the early spring and oak wilt had been confirmed nearby, it was presumed that oak wilt had killed the trees. I suggested postponing removal because stem tissue and buds appeared viable.

▲ **Photo 4B:** This photo of the same two red oaks in Photo 4A was taken in mid-August; the trees had completely recovered. The original problem was not oak wilt after all; a voracious population of forest tent caterpillars had totally consumed the foliage on these trees. Despite the loss of well over 95% of their foliage, the trees had sufficient reserves to push all new growth and their health appears fine. Chronic defoliation, year after year, may cause stress on trees and may result in some decline or, in rare instances, death, but often from other issues.

◀ **Photo 5:** These potted spruce trees in a nursery exhibited severe needle reddening and browning from winter burn. Many landscape trees exhibit similar symptoms during certain years. Bud and stem tissues were succulent and viable; their recovery was guaranteed.

◀ **Photo 6:** The presence of brown foliage and brown cambial tissues on this arborvitae was traced down to the lower stem, where a root rot, most likely Armillaria mellea, was killing the plant. Note the white fungal mat.

MANAGING FOLIAGE PROBLEMS:

An accurate diagnosis of the foliar problem is paramount for determining the health of the tree or shrub in question. Several techniques can assist us in diagnosing whether the foliar problems are superficial (not lethal) or whether they represent symptoms of some other more serious issue. One technique is to section the stem tissue to look for a green, succulent cambium directly beneath the bark, which indicates good health and viability (Photos 6, 7 & 8). The presence of a tan-brown, dry cambium indicates death or non-viability. Further sectioning until live, green cambium is found can reveal the extent and seriousness of the problem (Photo 6). Bending the stem or branch for flexibility may also be elucidating: healthy stems bend easily while dead stems snap. Another technique is to examine the buds, essentially, the plant's "children," for resuming growth the next season. The presence of succulent buds with green bases (when pulled from twigs) indicates good health and viability while brown, crumbling buds indicates death.

Obviously, if insects are viewed chewing away at foliage, a spray can be applied to stop the damage from getting worse . . . if warranted. However, even if insects practically defoliate plants, the plants are likely to recover just fine. With diseases, the application of sprays cannot generally be warranted after symptoms have developed because the infections have already taken place and most available sprays will not eliminate the infection. For diseases, properly timed spring application of fungicides (for fungal diseases) on valuable plant specimens may minimize the foliar problems for most of that growing season. With most foliar problems, simply waiting for the trees to releaf the same season or the following spring may be most advisable tactic.

For more information, please feel free to email me at robertsd@msu.edu or contact a professional plant health-care provider. The author, MSU or MGIA do not endorse any particular products. If using pesticides, be sure to read and follow label directions.

▲ **Photo 7:** The brown cambium and crumbling buds on this forsythia indicates death; the plant will not recover. The death resulted from a misapplication of herbicide to the shrubs.

▲ **Photo 8:** The cambium is green on this Privet hedge, but the buds are necrotic as evidenced by their crumbly and dried-up appearance. Also the result of herbicide misapplication, this hedge will likely not recover due to the absence of viable buds.

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