OAK WILT – A new threat to forest and landscape trees in New York State

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Thanks to keen observations by several homeowners in Schenectady County, New York and prompt action by Cornell Cooperative Extension educator Chris Logue, plant pathologists at Cornell recently confirmed for the first time that oak wilt - a lethal disease of red oaks in the upper Midwest and mid-Atlantic states and Texas – is now present in New York State. So far, oak wilt is only known to occur in the state in an area equal to about three city blocks in Scotia. However, as word of the discovery spreads and more people learn to identify symptoms of the disease, Cornell Plant Disease Diagnostic Laboratory staff expect to process more samples from various localities elsewhere and, from them, to get a better picture of just how widespread the disease is.

In the meantime, here is a brief synopsis of what scientists have learned about oak wilt since the disease was first identified by forest pathologists in Wisconsin in 1944.

What is this disease?
Oak wilt is caused by a fungus – *Ceratocystis fagacearum.* Scientists don't know for sure where the fungus came from; it may have been introduced to North America from some other part of the world or it may have evolved as a variant of some closely related endemic fungus growing on another plant. *C. fagacearum* grows in the water-conducting vessels of host trees and as it does, it causes the vessels to produce gummy plugs that prevent water transport, eventually causing tree death. The mode of action of the fungus in oaks is similar to that of the Dutch elm disease pathogen in elms, but there are few other similarities between the two organisms and their hosts.

What species of trees are likely to be affected? All species of oaks native to New York State are susceptible to oak wilt to some degree, but those in the red oak "group" (e.g. northern red oak, black oak, pin oak) are much more likely to die soon after they contract the disease. Movement of the pathogen in these trees is so rapid that it may kill trees in as little as three weeks. White and bur oaks are more resistant to the disease (but they are not immune) and may survive for many years after infection, losing just a few branches each year. However, each individual tree reacts differently from others in the same species and it is difficult, if not impossible, to predict how long an infected bur or white oak will live.

How can I distinguish red oak from white oak or bur oak? Red oaks typically have leaves with pointed lobes as illustrated below. White and bur oak leaves have rounded lobes. There are a number of other differences between the various groups of trees with regard to bud formation, acorn shape, wood anatomy, and bark texture, but the difference in leaf structure is often sufficient to distinguish susceptible from resistant oak types in the field.

How does the fungus spread from a diseased tree to a healthy one? Oak wilt can be spread between trees in two ways. First, it is well documented that most of the spread of the disease from tree to tree is by way of grafted roots. Roots of oaks growing in close proximity to each other (e.g. within 50 feet) often intermingle and eventually graft, forming functional unions that allow free flow of water, nutrients and (unfortunately) fungus spores from tree to tree. In some areas of the country where red oak is the predominant forest tree, the disease often occurs in clusters known to pathologists as "infection centers". However, it has also been observed to spread from tree to tree along a city street lined with red oaks if the trees are close enough together for roots to graft.

Second, the oak wilt fungus produces spores for overland spread in an unusual way. As a diseased tree nears death and for up to a year after it has died, the fungus produces opposing pads of sterile tissue on the inner bark and outer wood of the tree. As these pads expand and press against each other, they cause enough pressure to split the bark open, creating a 3-8 inch long fissure that is barely noticeable to untrained observers. At the same time that the pads are expanding, another type of fungus growth known as a "mycelial mat" forms around the pressure pads on both the bark and the wood. The mycelial mat produces spores that could be carried overland to infect a healthy oak and it also produces a sweet odor reminiscent of rotting fruit.

Fortunately, nitidulid or sap beetles - the insects that are most likely to be attracted to the odor from a split in the bark of an infected tree are relatively lazy. Thus, once they find a mat beneath the bark and begin to feed on the fungus therein, they are reluctant to leave. However, one chemical signal that will cause the beetles to move is the odor from of a freshly wounded, healthy oak tree. And red oaks that have recently been pruned or suffered storm damage, especially in May and June when most oak wilt fungus spores are produced, are prime targets for new infections.

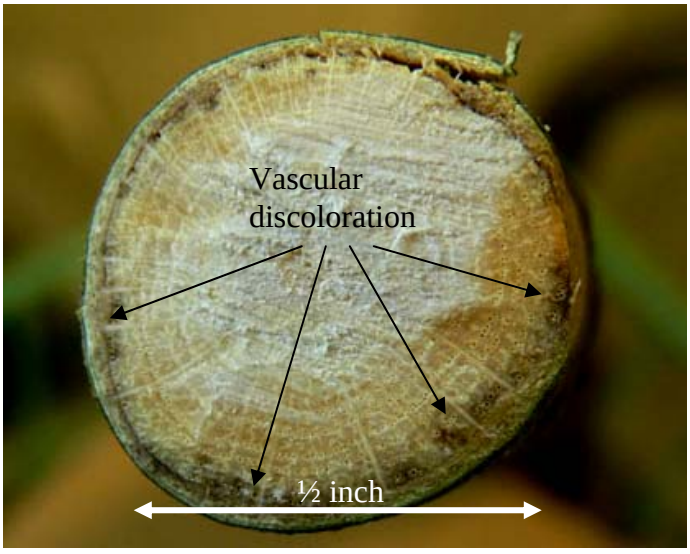
The odor of fungus mats may also attract other insects and squirrels. We don't yet know whether these other visitors to infected trees actually pose a significant threat as vectors of the pathogen in New York, but this is one of several questions to be answered in coming months.

What can be done to prevent the disease from spreading to new areas or from intensifying in areas where it already occurs?

Arborists, plant health care professionals, and municipal foresters have had reasonably good success in keeping losses from oak wilt to a minimum with aggressive integrated pest management programs. Important steps include the following:

1. *If you live in New York's Capital District, examine oaks on your property regularly, paying special attention to red oaks with rapidly wilting leaves.* Diseased tree typically start to wilt in June or July and red oaks, in particular, may wilt completely in as little as three weeks. Leaves on infected trees typically show marginal "scorch" but other pathogens and environmental problems also cause scorch, so do not use this symptom alone as a diagnostic criterion.

If you suspect that your trees may have oak wilt, either collect samples yourself or enlist the aid of a trained arborist to collect them for you. Submit the samples to your county Cornell Cooperative Extension office for preliminary exam and possible forwarding on to Cornell's Plant Pathology Diagnostic Laboratory for further processing. *The best samples are from recently wilted branches with some leaves that are still partially green. Collect 4-6 branch pieces that are about 6 inches long and ¼ - ½ inch diameter. Leave the bark on the branches. Sometimes, but not always, the most recent vascular tissue is prominently discolored, a symptom that enables laboratory staff to make the best judgments about where to take wood chips for additional processing. If you can't find discoloration in one or more twigs from a suspect tree, then at least be sure to collect twigs that have recently wilted leaves. Wood that is dry and/or completely brown is of no value to diagnosticians.*



2. *Remove diseased trees immediately and take steps to ensure that the wood dries quickly enough to minimize formation of sporulating mycelial mats.* One way to safely dispose of diseased wood is to cut and split it in the fall or winter, as you would for firewood. Then, completely wrap the cut wood in black plastic for a year. Afterwards, the plastic can be removed and the firewood can safely be left out until it is burned. Branches and stem pieces small enough to be chipped should be treated as such. Larger logs can be sawn into lumber as long as they are processed before the following spring. Some landowners have actually been able to utilize proceeds from log sales to offset other oak wilt management costs.

2. *Use a backhoe, trencher, or vibratory plow to disrupt root grafts between diseased and healthy trees.* The locations of the trenches will vary depending on the species composition in any give site, but in most residential sites with valuable oaks in jeopardy, two trenches may be dug. The first separates confirmed diseased trees from the nearest neighboring oaks; the second separates the nearest neighbors from the next closest population. Trenches should be 54-60 inches deep to assure that all potential grafts are broken and equipment operators must be mindful of underground utilities as they plan their work.

3. *Do not prune oaks in the spring (April 15 – July 15 in NY State) unless they pose an imminent danger to life or property!* Insects that spread the oak wilt fungus will visit new wounds on oak trees within 15 minutes, and they may very likely be carrying spores of the fungus if it is present in the vicinity.

4. *In sites with a history of oak wilt, cover all new wounds – including pruning wounds, lawnmower dings, weed whacker abrasions and any other injury that exposes fresh wood - with paint.* Pruning paint is preferable, but any kind of paint will discourage insects from visiting the wounds.

5. *Inject currently healthy red oaks in the vicinity of diseased trees with propiconazole (Alamo®) per label instructions.* This product is registered in New York State for control of several tree diseases, including oak wilt, *but it must be applied by a professional arborist.* Alamo® has a good track record for protecting healthy red oaks from root graft and beetle transmission of the disease, but trees must be injected every 2-3 years for best results. The product offers no protection for red oaks that already have oak wilt but it may prolong the lives of more resistant bur and white oaks if they have become diseased.

Finally, even thought oak wilt has found its way to New York, the future of the species is not as grim as one might think. Our colleagues in the Midwest, with many more acres of contiguous red oaks at stake, have had considerable success in keeping losses to a minimum by following the guidelines above. With our varied forest species composition in the Northeast, especially with many non-hosts scattered among our oaks, we ought to have a somewhat easier task before us. Nonetheless, success in any site will still require a sincere commitment.