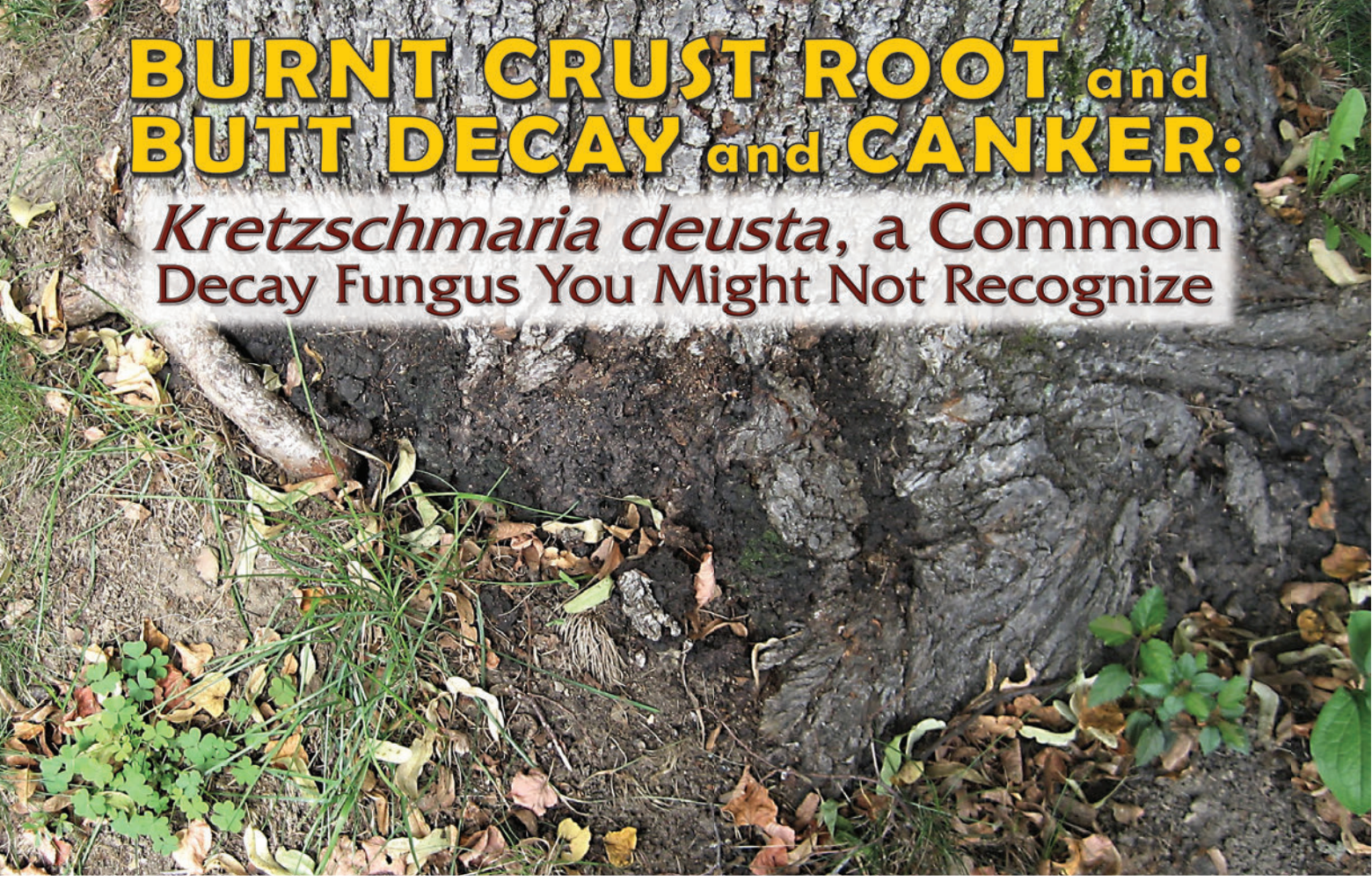
BURNT CRUST ROOT and BUTT DECAY and CANKER: *Kretzschmaria deusta*, a Common Decay Fungus You Might Not Recognize



Photograph 1. **Kretzschmaria deusta** ***fruiting on a littleleaf linden. Arborists may not know that this fungus is an important wood decay and canker pathogen or may overlook its presence because of its low profile. Unless otherwise noted, all images courtesy of the author.***

By Christopher Luley, Ph.D.

Kretzschmaria deusta is not exactly a household name. But it is the scientific name of one of the most common and important root and butt decay pathogens in urban trees. The so-called burnt-crust fungus may not be recognized by arborists because it is not a conk, mushroom or bracket like most other decay fungi (Photograph 1). It also is easily overlooked because of its variable appearance and reduced size (Photograph 2).

The fungus, which has a wide host range, can aggressively attack weakened trees. It also can kill living tissues in the bark and sapwood in trunks and roots, and

Photograph 2. A sugar maple infected with **Kretzschmaria deusta**. ***Note the black crusty material in the butt and roots in the center of the image (yellow arrow) and the multiple rolls of wound wood that have been killed by the fungus (green arrow).***

Decay Fungi Series

This is the third article in a series from Christopher J. Luley on decay fungi species found in urban trees that will run in *TCI Magazine* this year. The first part, "Berkeley's Polypore," ran in March. Part 2, "*Ganoderma sessile* (aka *Ganoderma lucidum*) – An Important Root Disease and Butt Decay by Any Name," ran in April.

then decay the wood. Trees infected with *K. deusta* may eventually fail as the decay weakens roots and the wood in the base of the tree (Photograph 3).

In the spirit of changing names, this fungus is a leader, going previously by *Hypoxylon deustum*, *Ustulina deusta* and *U. vulgaris*, among others! It belongs to the large group of fungi in the ascomycete group – or those fungi that fruit as small cup- or flask-shaped structures, and that usually require a microscope to properly identify. *K. deusta* gets its common name "burnt crust" for the black, tar-like material (technically named stroma, the fungal tissue that contain the sexual reproductive structures of the fungus) that develops on infected trees (Photograph 4).

Photograph 4. Stroma or fungal material of the pathogen on a hickory (despite the oak leaf in the image). The sexual spore stage is imbedded in this material, which is dry and crumbly when it is removed from the tree.

Identification

Field identification of *K. deusta* has to be considered tentative because confirmation requires a microscope to observe fruiting structures and spores. However, the fungus commonly is found fruiting on the butt or roots, on the margins or face of dead wood in living trees, or sometimes on bark of infected tissues. The fungus is widely distributed in North America.

Two spore stages of the fungus are produced, and this can confuse identification. The "imperfect" or asexual spore stage is often seen in the spring when the stroma is initially developing. This stage forms a white to gray layer on top of the developing black stromatic tissue (Photograph 5). The thickness of the black, crusty fungal tissue associated with the perfect stage increases during the growing season (Photograph 4). The black crust persists and can be found at most times of the year, while the lighter-colored imperfect stage is seldom seen later in the season. The black stroma degrades during the dormant season, but even during the growing season it also easily crumbles into pieces when you try to remove it from infected tissues.

Photograph 3. Kretzschmaria deusta*-infected tree that failed. It is the same tree depicted in Photograph 2. The tree was also infected with* Armillaria sp. *that also likely contributed to the failure.*

Biology and importance

K. deusta is like most decay fungi and infects wounds via spores released from fruiting structures, although there is also evidence that root-to-root spread can occur. The fungus is somewhat unique in that it can kill living sapwood in the base of the tree and roots, and can cause cankers by killing the bark and cambium (Photograph 6, next page).

K. deusta is most aggressive on weakened trees, but trees with seemingly healthy crowns also can be attacked. The decay can progress relatively rapidly on trees weakened by other factors. In the Northeast, it is often seen infecting tissues killed by bleeding canker infections on European beech. Crown symptoms usually only develop on trees that have most of their roots or trunks infected. Arborists should be aware that some trees may be extensively decayed and show very few crown symptoms.

K. deusta has a wide host range but is most common on sugar and other maples, European linden, European beech, hicko-

Photograph 5. The white to gray imperfect or asexual stage of Kretzschmaria deusta *on a European beech. Note that the tree is also showing symptoms of Phytophthora bleeding canker.*

Photograph 6. **Kretzschmaria deusta** ***is also a canker pathogen in that it can kill bark and cambium in addition to decaying wood. Note discolored sapwood beneath after the fruiting and bark was removed. See Photograph 1 for the appearance of the bark before it was removed.***

ry, hackberry, sycamore and elm. It is less common on oaks, but this is a reported host in the literature. Hackberry infected with the fungus should almost always be removed as soon as possible, as this tree species has shown little resistance to rapid killing and decay of roots, particularly in southern states.

The decay caused by *K. deusta* is somewhat unique in that the fungus creates holes in cell walls by degrading cellulose. This degradation reduces the tensile strength of wood and leaves the wood brittle. Seriously infected trees often snap off at roots or near ground level without the formation of significant hollows (Pho-

Photograph 7. A European beech that snapped off at ground level due to at least partial infection by **Kretzschmaria deusta** ***Photograph by Trevor Hall, Bartlett Tree Experts.***

Photograph 8. A sugar maple cross section infected with Kretzschmaria deusta. *Note the black "zone lines" (yellow arrow) or fungal material in the decayed wood and the absence of hollows forming in the decayed area. The tree also had carpenter ants nesting in the decayed wood.*

tograph 7). Bulges or other symptoms of adaptive growth are also usually absent in infected trees. Decayed wood when cut usually has a large number of "zone lines," or distinct black lines of fungal material that zigzag throughout the decayed wood (Photograph 8).

Managing infected trees

Arborists need to take note and assess *K. deusta*-infected trees carefully for a number of reasons, including:

- Sounding with a mallet is seldom very useful to quantify decay because hollows are usually not formed in decaying wood. Sounding may detect areas where bark is loose from infection.
- Trees may have advanced decay but may not exhibit crown symptoms (Photograph 9).
- Advanced decay-detecting tools such as tomography and resistance drilling are not likely to fully identify decayed wood in the early stages of development.
- Interpretation of resistance-drilling charts in trees infected with *K. deusta* can be very challenging because of the way soft rot develops in wood.
- Trees weakened by urban stress can be decayed relatively rapidly by the fungus.

Care should be taken in removing trees with K. deusta, *because infected hinge wood may not hold as desired.*

Crown reduction should be approached with care because reducing crown area and associated energy-production capacity may reduce the ability of the tree to resist decay spread.

Care should be taken in removing trees with *K. deusta,* because infected hinge wood may not hold as desired (Photograph 10).

There are no fungicides registered for management of *K. deusta*. My attempts to slow spread with phosphoric acid-containing fungicides on European beech-

Photograph 9. A purple leaf European beech infected with Kretzschmaria deusta *that is showing no crown symptoms despite an advancing infection, as depicted in Photograph 5.*

Photograph 10. Hinge wood on this large sugar maple did not hold as desired, because the wood had been decayed by Kretzschmaria deusta. *Photograph provided by Nathan Wright, National Grid.*

es infected with Phytophthora bleeding canker have not produced an observable reduction in subsequent disease spread.

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