RESEARCH LABORATORY TECHNICAL REPORT

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Black Knot of Prunus

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Black knot fungus (*Apiosporina morbosa*, formerly known as *Dibotryon morbosum* and *Plowrightia morbosum*) affects various *Prunus* species, including flowering plums, native cherries, and certain cultivated stone fruits. This disease infects young twigs, causing crusty black swellings called "knots" to form along branches. In highly susceptible trees, it can result in twig girdling and dieback, general tree weaking, and substantial disfigurement. Black knot is native and present throughout North America but tends to be most severe in the Northeastern United States and adjacent portions of Canada and the Midwest.

Symptoms

Infections are not easily seen at first, typically appearing only as light green to brown swellings on the current season's growth by autumn. In the following spring, knots enlarge rapidly and may become olive-green with a velvety texture. During this second season, knots (now on second year twigs) develop into the more recognizably crusty, spindle-shaped black knots (Figure 1). As a result of this multi-year cycle of development, knots commonly go unnoticed until the second fall or winter after infection, once leaves have dropped and mature knots are easily spotted on bare branches. In following years, the knots continue to elongate on branches and produce spores each spring.

Figure 1: Black knot swellings on Thundercloud plum, causing twigs to twist and weaken

Disease Cycle

Black knot is often introduced to landscape plantings from infected wild plum and cherry growing in nearby woods. Spores are spread via wind and rain splash. New twigs may become infected starting around bloom and continuing as long as the shoot tissue is green and succulent. Warm (above 55°F, or 13°C), wet weather provides optimal conditions for spore release from mature knots and infection of new shoots. Some infected twigs may wilt and die over the summer, while most are slowly weakened as the knots enlarge annually, growing further into the branch tissue. Badly diseased stone fruit trees suffer economic injury (loss of productivity and value), while ornamental trees can suffer severe aesthetic damage (loss of canopy attractiveness) through branch stunting and dieback, contributing to accelerated mortality.

Disease Management

Pruning out black knot is usually the best management strategy to reduce infections, though eradication is rare. Recommendations for pruning range among professional sources from about 3-8 inches (8-20 cm) below the visible edge of the knot's swelling. Erring towards a longer length for a pruning cut location may be helpful. All pruned infected material must be

removed from the site or destroyed. Knots left on the ground can still release spores in the spring. It is also critical that pruning be done at least 2-3 years in a row due to the long disease cycle of knot development. For example, pruning out all visible knots one winter will miss many infections from the previous spring that have not yet become evident. Pruning can be done any time during the winter months before bud break when branch swellings are inactive but easily visible and spring spore dispersal has not yet begun. The exception is stone fruit trees that are highly susceptible to Cytospora canker, which can infect pruning wounds during the dormant season. In these cases, delaying until closer to bloom when temperatures rise (50°F or 10°C) may be helpful.

Although no biological control agents are commercially available, there is a native fungus often observed to attack black knot. This fungal parasite, *Trichothecium roseum*, grows whitish-pink over the black knot tissue (Figure 2). While the hyperparasite greatly reduces the ability of the knot to produce spores, it is not sufficient for satisfactory control.

Figure 2: *Trichothecium roseum* growing on a knot

Fungicides are not typically recommended for home and landscape use against black knot due to limited efficacy and the need for up to five applications each spring to adequately protect new growth from infection. For stone fruit production where black knot control is critical, a combination of rigorous knot pruning and fungicides such as captan, chlorothalonil and other commercial products is employed.

For those planning to grow plums in a home orchard, understanding local disease pressure and considering less susceptible cultivars is a good strategy (Table 1). Please contact your Bartlett Arborist Representative to discuss appropriate black knot management strategies.

Disease Diagnostics

Black knot fungus is known to infect only *Prunus* species. Cankerous growths appearing on non-*Prunus* plants may look very similar but are not caused by the same pathogen. Few other problems on *Prunus* resemble the mature black knot swellings (Figure 3), although early-stage swellings can be less recognizable.

Figure 3: Outer layer of young fungal tissue (stroma) shaved away revealing live host tissue underneath

Confirmation is made via sampling and microscopy of mature knots. These are examined to find fruiting bodies, which are then cut open (Figure 4). Spores are extracted and matched with those of *Apiosporina morbosa* (Figure 5).

Figure 4: Mature fungal fruiting bodies (pseudothecia) on the knot (left). Extracted specialized cells (asci) and spores (ascospores) contained in them (right)

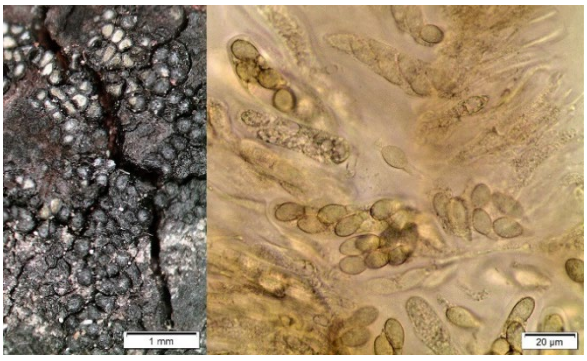

Table 1: *Prunus* susceptibility information*

Considered highly susceptible
American plum, *Prunus americana*
Canadian plum, *Prunus nigra,* e.g. 'Princess Kay'
Chokecherry, *Prunus virginiana*, e.g. 'Shubert' and 'Canada Red'
European bird cherry, *Prunus padus*
European plum, *Prunus domestica*
Japanese plum, *Prunus salicina*
Purple leafed plum, *Prunus cerasifera*
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Highly susceptible plum cultivars: Bluefree, Damson, Lombard, Ozark Premium, Shropshire, Stanley, Vampire, Veeblue, Vision
Considered slightly to moderately susceptible
Nanking cherry, *Prunus tomentosa*
Pin cherry, *Prunus pensylvanica*
Sargent cherry, *Prunus sargentii*
Sour cherry, *Prunus cerasus*, including 'Evans', 'SK Carmine Jewel' and the "Romance" series
Sand cherry, *Prunus pumila*
Western sand cherry, *Prunus purmila* var. *besseyi*
Purple leaf sand cherry, *Prunus* x *cisterna*
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Moderately susceptible plum cultivars: Bradshaw, Early Italian, Fellenburg, Italian, Methley, Milton, Shiro, Valerie, Valor, Vanette, Vibrant, Voyageur, and Vanier
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Slightly susceptible plum cultivars: Burbank, Early Golden, Formosa, Santa Rosa, Violette
Considered moderately to highly resistant
Amur chokecherry, *Prunus maacki*, including 'Goldrush®' (JeFree)
Apricot, *Prunus armeniaca*
Flowering almond, *Prunus triloba*
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Highly resistant plum cultivars: President, Redcoat, Underwood

* This table is compiled from several sources, but available information remains limited. Resistance or susceptibility categorizations of some cultivars vary.

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References

[1] W. A. Sinclair and H. H. Lyon, "Diseases of Trees and Shrubs, 2nd edn." Ithaca, NY, USA: Cornell University Press, 660 pp., 2005.

[2] J. M. Ogawa, E. I. Zehr, G. W. Bird, D. F. Ritchie, K. Uriu, J. K. Uyemoto. "Compendium of stone fruit diseases." APS Press. 1995.

[3] S. M. Douglas, "Black Knot of Plum and Cherry", The Connecticut Agricultural Experiment Station, PP003 (5/03R), 2003. Accessed on Dec 8, 2023. Available: https://portal.ct.gov/CAES/Fact-Sheets/Plant-Pathology/Black-Knot-of-Plum-and-Cherry

[4] R. Koetter and M. Grabowski, "Black Knot", The University of Minnesota Extension, Reviewed 2018. Accessed Dec 8, 2023 Available: https://extension.umn.edu/plant-diseases/black-knot

[5] S. W. Wescott (original author, 1978), "Black Knot: *Apiosporina morbosa*", Cornell University, Plant Disease Diagnostic Clinic, Updated 1990 and 1996 by D. M. Karasevicz and 2018 by S. L. Jensen. Accessed Dec 8, 2023 Available: http://plantclinic.cornell.edu/factsheets/blackknot.pdf