Filamentous FOES and Mycological MALADIES

Figure 1. Surface view of the black knot showing the numerous embedded ascostromata.

Black Knot

A Potential Chaga Look Alike, Caused by *Apiosporina morbosa* (Schwein.) Arx

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Black knot is a very destructive fungal disease on susceptible cultivars of plum, prune, sour cherry, and numerous other *Prunus* species in various managed and wild environments. While losses in commercial orchards are sporadic, the disease is more often found in poorly managed orchards, home fruit and ornamental plantings, or on abandoned and wild trees. This fungal pathogen is also occasionally found on apricot, peach, sweet cherry and various ornamental *Prunus* spp.

First described in 1821 in Pennsylvania, black knot is now widely distributed throughout North America. It was one of the most destructive diseases of plum and tart cherry in northern and eastern fruit regions during the late 1800s, but today is considered of less importance in most commercial orchards. Significant losses can still occur in areas where the pathogen is well established. And it kind of looks like chaga.

The fungus is an ascomycete in the family Venturiaceae (von Arx, 1954). It produces fruiting bodies in hard, black stromata, embedded in swollen branch tissue. The swelling is facilitated by the organism's ability to produce the plant hormone indole acetic acid. Ascostromata are black, globose, sometimes turbinate, up to half a millimeter broad, with a slightly

Figure 2. First appearance of ascostromata on the black knot surface in the second spring following the original infection. Photo courtesy of Paul A. Mistretta, USDA Forest Service, Bugwood.org.

Figure 3. Black knot on small branches of choke cherry, *Prunus virginiana*, hard, blackened knot tissue. Photo courtesy of Mike Schomaker, Colorado State Forest Service, Bugwood.org.

flattened apex and central ostiole (Fig. 1). Asci are clavate, sessile, bitunicate, and 8-spored. Ascospores are clavate, apex obtusely rounded, tapered towards the base, septate near the base, smooth-walled, and olivaceous. Conidiophores are erect, pale brown, flexuous, and geniculate with thickened scars on small denticles. Conidia are pale brown,

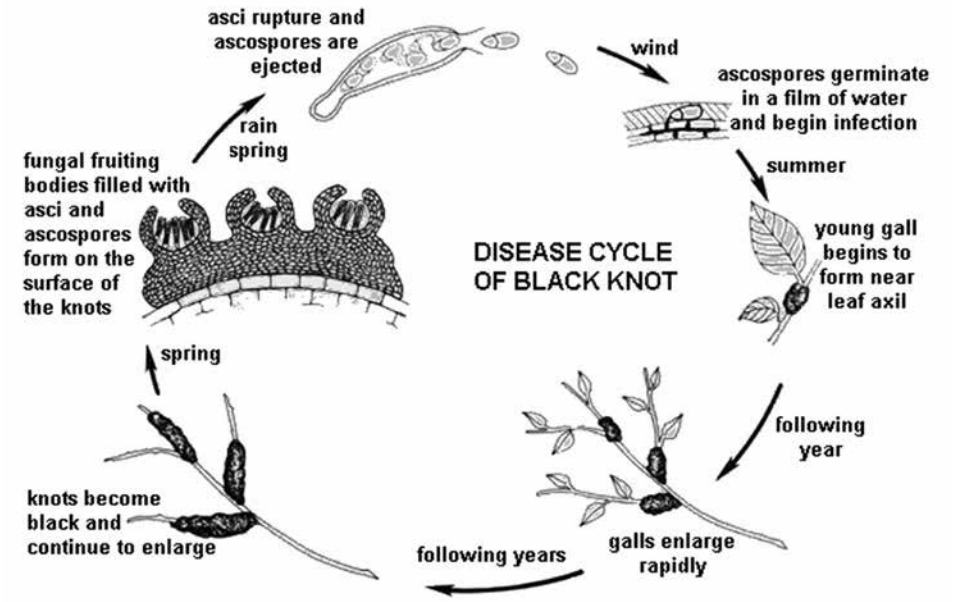

Figure 4. Black knot disease cycle. Courtesy of Wayne F. Wilcox, Cornell University.

Figure 5. Black knot on the trunk of wild black cherry, *Prunus serotina*. Photo courtesy of David Stephens, Bugwood.org.

may or may not be septate, smooth, and produced singly or in short chains (Sutton and Waterston, 1970).

The disease occurs only on the woody parts of trees, primarily on twigs and branches, and sometimes on trunks and scaffold limbs. The warty swellings first become visible on new shoots in late summer or the following spring. At first the knots are olive-green and corky (Fig. 2), but with age turn black and become hard and brittle (Fig. 3). The knots vary in length from one inch to nearly one foot. Many times, they do not completely encircle the branch. Knots one year or older may become covered with a pinkish-white mold of another fungus and riddled with insects, especially the lesser peachtree borer.

Infections occur on new shoot growth, mainly from ascospores during periods of measurable rainfall of six hours or more at 72°F (Fig. 4) (Smith et al., 1970). Ascospores of the fungus are discharged from ascostromata embedded in the surface of the knots. Germination is very low at 45 to 50°F but increases significantly from 55 to 75°F. Very little infection is known to occur from conidia. Unwounded susceptible twigs may become infected soon after bud-break throughout the active shoot elongation period (Northover and McFadden-Smith, 1995). Following infection, excessive production of parenchyma cells is pushed outward, forming the base of the knot. The first symptoms of infection are visible by early autumn, but further development continues the following spring. The knots develop rapidly the second summer, and the layer in which the ascospores are formed develops during the second winter after infection is initiated. The fungus in the woody tissues continues to grow in the spring and fall, increasing the length of the knots. Their eventual size depends greatly on the species and cultivar of the host plant. The knots can get quite large (Figs. 5 and 6).

In agricultural and ornamental settings, control of black knot requires a combination of cultural and chemical methods. Cultural practices should include removing wild plum and cherry seedlings from fence rows, woodlots,

Figure 6. Black knot on the trunk of wild black cherry, *Prunus serotina*. Photo courtesy of R. L. Anderson.

and along orchard perimeters; inspect orchards and surrounding areas each winter for black knots and prune out infected shoots and limbs; remove pruned knots from the orchard and bury or burn them before budbreak in the spring. When pruning infected material in the dormant season, always make the cut 3 to 4 inches below the margin of each knot, since the fungus grows in the tissue beyond the visible swellings. Use of a fungicide by itself, without implementing the recommended cultural practices, may not provide adequate control of the disease. There is considerable variation in cultivar susceptibility to black knot. There is no economical approach to managing the disease in the wild.

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