18. Black Knot of Cherry and Plum

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Black knot, caused by the fungus *Apiosporina morbosa*, can significantly reduce fruit production and kill small branches in heavily infected trees.

Hosts and Distribution

Black knot occurs throughout the United States. It affects cherries, plums, and most other members of the genus *Prunus*. Common hosts in the Great Plains include bird (*Prunus padus*), bitter (*P. emarginata*), black (*P. serotina*), choke (*P. virginiana*), mahaleb (*P. mahaleb*), Nanking (*P. tomentosa*), pin (*P. pensylvanica*), sand (*P. pumila*), sour (*P. cerasus*), and sweet (*P. avium*) cherries; apricot (*P. armeniaca*) and peach (*P. persica*); and American (*P. americana*), Canada (*P. nigra*), and domestic plums (*Prunus* spp.).

Symptoms and Signs

The fungus produces elongate woody swellings (galls) or knots on twigs, branches, and small stems (figs. 18-1 and 18-2). The knots are usually about one to eight inches long and up to one inch thick, but some may reach one foot or more in length. On large branches and stems, infections can result in cankerous galls or rough bark, or both. Scattered black masses of fungal tissue (stromata) that produce fruiting bodies also may be present. Knots become greenish and soft in late spring about one year after infection, but become black and hard over time (fig. 18-2). Old knots may be covered with a white to pink mycoparasitic fungus (*Trichothecium roseum*) (fig. 18-3), and insects often tunnel into the knots.

Figure 18-1—Black knot on chokecherry (James A. Walla, Northern Tree Specialties, used with permission).

Figure 18-2— Old (black) and new (olive green) black knot swellings (Aaron D. Bergdahl, North Dakota Forest Service, used with permission).

Figure 18-3—Old black knot swelling partially covered by a white parasitic fungus (James T. Blodgett, U.S. Forest Service).

When mature, knot surfaces are covered with hard black fungal fruiting bodies (pseudothecia) composed entirely of stromata. The inner knot is composed of both host and fungal tissues. Pseudothecia produce two-celled club-shaped, olivaceous spores (ascospores) measuring 13 to 18 µm × 4.5 to 7.5 µm.

Disease Cycle

Ascospores (sexual spores) of the fungus are discharged in spring from fruiting bodies on the surface of the knots. Sporulation may occur from the time that tips of green leaves emerge from buds until shoot growth stops. Sporulation is often greatest from the pink/white blossom stage to two weeks after bloom. Rain is required for spore discharge, and spores are carried by rainsplash and wind. Germinating spores penetrate unwounded surface tissue of current-season growth and may also infect older tissues through wounds. Infection is most severe when prolonged moist conditions are accompanied by temperatures between 55 and 77 °F.

Knots appear several months after infection. Depending on host species, cultivar susceptibility, and length of the growing season, some knots are visible by late summer; others do not appear until the following spring. Knots that appear during fall or spring continue growing through the next summer. Conidiospores (asexual reproductive spores) are produced on developing knots beginning about when ascospore discharge ends from mature knots and continuing into midsummer. These spores are considered to have little role in infection.

At least one year and usually two years are required before new knots produce mature fruiting bodies. Fruiting bodies on the old knot die after releasing ascospores in spring, but the fungus often grows into adjacent wood the year before sporulation and produces ascospores there the next year. Some infections may expand for several years, potentially expanding into large branches and stems.

Damage

Severely infected trees can have little value due to physical and aesthetic effects. Heavy black knot infections can significantly reduce plant vigor and fruit production. Older branches beyond knots frequently die. New branches beyond knots often do not develop or new shoots may leaf out and wilt in early summer.

Management

The disease is kept in check by less than optimal infection conditions; thus, management is usually not needed. Unbalanced host-pathogen phenology, partial host resistance, and the presence of mycoparasites can also reduce the need for extensive disease management.

Damage from black knot can be reduced by pruning. Damage can also be mitigated by removing or pruning infected wild hosts in nearby wooded areas and fence rows within 600 ft of the desired host trees. Make pruning cuts three to four inches or more below the knot, as the fungus may extend beyond the swelling. The best times to prune are late winter and early spring, because knots are most easily seen before the tree has leaves and because the source of spores should be removed before the next infection season begins. Pruned knots on the ground are another source of spores that can cause new infections if left in the area, so gather and dispose of all pruned knots before April 1.

Because the disease usually has a two-year life cycle, stems should be closely inspected and knots should be removed for two consecutive years. Infections from the previous year will often be small or not visible when mature knots are pruned the first year. In subsequent years, less removal is required to prevent disease buildup.

If black knot is severe within 200 yards of a planting site, do not plant *Prunus* species, or select resistant species and cultivars when possible. The pathogen is often host specialized, and a species or cultivar thought to be resistant may be susceptible to a pathogen form present in the area that is different from where the plant was tested, or the plant may become infected if new pathogen forms move into the area.

Fungicide sprays can provide some protection, but the protection is not sufficient if sanitation and pruning are not included. Fungicides registered in some states for use against black knot include chlorothalonil, copper hydroxide, mancozeb, and thiophanate-methyl. Full protection would require the fungicide to be present throughout the sporulation period. However, if infection pressure is not severe, then protection from the pink/white blossom stage until two weeks after bloom may be sufficient. Follow label instructions for application timing, precautions, and other information.

Selected References

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