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# Black Knot of Stone Fruits

Becky Wek
*South Dakota State University*

Martin Draper

South Dakota Extension FS936

**Becky Wek,**
**Extension Intern**

**Martin Draper,**
**Extension Plant Pathologist**

# Black Knot of Stone Fruits

Fig 1. Black knot cankers on a lateral branch of a Canada red cherry tree.

Fig 2. A black knot gall on the main stem or trunk of a tree.

**Black knot disease** is common in various ornamental trees of the genus *Prunus*, including flowering almond, apricot, cherry, chokecherry, peach, and plum. It is most severe on wild and cultivated cherries and plums and has been recorded in the U.S. for over 130 years.

In South Dakota, black knot is frequently observed on the Mayday tree (*Prunus padus*) and Canada red cherry (*Prunus virginiana* var. *'Schubert'*). Although the disease is not very difficult to control, its unsightly appearance gives nursery and orchard growers reason to prevent its introduction into their tree stocks.

Black knot is caused by the fungus *Apiosporina morbosa*. Symptoms of the disease are rough, coal-like, black galls in woody tissue along branches (Fig 1) and even on the trunk of the tree (Fig 2). Infection on some trees can be devastating. Heavily infected trees (Fig 3) often have been weakened by neglect. Wild chokecherry and plum are usually the source of inoculum for infection of domestic *Prunus* plantings (Fig 4).

The best defense against black knot is the selection of robust, healthy, disease-free stock. Once the fungus establishes, however, pruning is usually sufficient to control the disease—but you must properly clean the pruning tools after each tree to decrease risk of spreading the disease and you must pick up and destroy the cuttings. Fungicidal sprays have also been proven helpful in arresting the progress of the disease by eliminating spread of spores but only if the infected branches are also removed.

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Fig 3. A planting with heavily infected trees with many black knot galls. Black knot damage limits the attractiveness and desirability of the planting.

## The Disease Cycle

The major symptom, the “black knot,” lends the disease its common name. This most notable symptom of the infection begins as a small, light brown swelling at the base of the leaves, on fruit spurs, and on the ends of branches. This may extend from the green cluster stage, where the buds are breaking and small leaves are just detectable to the finish of shoot growth in June. On the current year's growth the knots will be at the base of leaf petioles. Older wood knots will begin to form at the site of former leaf and flower buds. A newly infected branch will begin to swell slightly during the first year after infection.

Symptoms and timing of infection vary with the host. Most commonly, ascospores of the fungus infect through open wounds on the tree, such as bud scale scars.

The full disease cycle takes 2 years to complete, possibly girdling and killing small and medium sized branches. Black knot galls on the main stem of the tree are not likely to kill the tree.

The fungus overwinters in fruiting bodies on the outside of the knot or sometimes inside the infected woody tissue. In the spring of the second season, the branch will continue to swell, and the bark may become cracked and rough. Young galls are velvety to rough and tumor-like and may be no larger than 1 or 2 inches in diameter (Fig 5). As the growth of the fungus continues, the galls take on a spindle shape. In the spring, the galls may be covered with a dark, olive-green velvety material. These are another kind of spores of the fungus and are not thought to be important in the infection process.

As the galls develop, they will become darker in color, eventually turning into dark black knots, resembling hard lumps of coal. During fall or winter of that second season, fruiting bodies will form in the knots. The galls can continue to expand down the branch, and often the branch will be swollen near the gall (Fig 6).

The fruiting bodies are the source of the ascospores that lead to infections. The black color of the gall is caused by masses of these fruiting bodies on the surface of the knot.

Severe galls cause dieback as branches are girdled. Galls can also sometimes be invaded by wood-boring insects that can damage the tree further. The knots can harbor insects such as bark beetles.

Fig 4. Black knot is common in wild chokecherry and plum thickets.

Fig 5. Young black knot galls. Note the expansion on either end of the gall.

Fig 6. An expanding gall of black knot. The swollen tissue will erupt into black tumor-like masses in the coming year.

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The knots caused by the pathogen may grow up to 12 inches long, with no leaves on the branch outside of the knot, causing a very unsightly and unattractive presentation for an ornamental tree. In the landscape setting, these trees lose their value because of a lopsided or over-pruned appearance.

## Spread of Black Knot Disease

New black knot infections occur when the spores are released from the fruiting bodies. This dispersal requires at least 6 hours of wet weather, which partially explains why summer spores often cause no infection. Ascospores are released in the spring, as early as the pre-bloom stage and as late as when terminal shoots are more than 10 inches long. Most of the ascospores are released during early bloom.

Infections occur during cool (~62ºF), wet weather in the spring. Moisture can be from light rainfall, dew, or fog. Heavy rains, on the other hand, may reduce the likelihood of spore release and infection.

Wounds in the bark create easy targets for the fungal pathogen to attack. When the periderm (bark) of a tree is intact, it is virtually impenetrable to the attack of a fungus. The best solution to eliminate the spread of black knot, therefore—as in any disease—is to keep the trees healthy.

## Management of Black Knot Disease

Initially, black knot is controlled by planting only disease-free stock. Homeowners should be selective when purchasing stock for ornamental plantings or fruit production. Always choose healthy looking stock with no indications of black knot.

The simplest and most cost-efficient method of controlling black knot, once it appears, is pruning. By effectively pruning infected tissue from the branch, the entire pathogen may be removed.

But your prized tree may may have been infected by spores from a tree some distance away. In fruit or ornamental plantings surrounded by wild areas, the inoculum source may be difficult to locate. If possible, the disease should be eliminated from all infected plants within a radius of 1/4 mile.

Pruning must be done correctly to be effective. Cuts must be at least 4 inches below the visible sign of knot on the outer twigs and branches (Fig 7), and you must keep the tools clean to avoid spreading the spores farther. Sanitize cutting tools with a solution of 10% household bleach (1 part undiluted household bleach: 9 parts water) between each cut to minimize the spread of the fungus.

Fig 7. Proper pruning removes the entire gall. Make the final pruning cut at least four inches below the last indication of swelling on the branch (Near the left thumb). A person's hand is about four inches wide and can be used as a gauge of where to cut.

Pruning during the dormant season provides the best results. The pathogen will also be dormant and less likely to spread into open pruning wounds. If a large knot has developed and has grown into the trunk, tree removal and replacement is the best solution.

One of the most important parts of pruning to remove the pathogen is to destroy the debris. If branches and knots are left near the tree or another host, spores could easily re-infect open wounds. Pruned debris should be removed from the site and burned if possible.

Preventative fungicidal sprays can be used as a supplement to pruning. Fungicides however, are ineffective for post-infection treatment.

Preventative sprays on knot-free trees have been effective when applied during the spore release period from just before bud break to the shuck split stage. Shuck split, the point where the new fruit is just barely visible (Fig 8), can be difficult to recognize but generally occurs about 3 weeks after full bloom. You may need to spray three times at 7 to 10 days apart to cover the susceptible growth stages. The entire tree should be wetted. It is particularly important that the woody tissues, branches, and buds are covered.

Fig 8. Final fungicide applications should be made at the shuck split stage pictured above with apricot fruit. Shuck split generally occurs about three weeks after full bloom. In smaller fruited stone fruit species this stage may be harder to recognize.

Currently, thiophanate-methyl is the preferred fungicide for black knot management. Check your local county Extension office for additional products that may be acceptable for managing this disease.

As with most plant diseases, the disease may be prevented by planting resistant varieties. Many resistant varieties of fruit-producing cherry and plum are currently available from nursery and orchard producers. Generally, Asian derived varieties are more resistant than American varieties.



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