

20. Botryodiplodia Canker of Sycamore

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American sycamore is native to the eastern half of the United States, including some eastern parts of the Great Plains. It is planted frequently in rural and urban environments for noncommercial uses, but is also grown in plantations for economic return in hardwood-related industries. American sycamore grows best on moist sites, but will thrive on a variety of soil and moisture conditions. Natural stands are most common along lakes, rivers, and streams. The dry climate of the Great Plains is a limiting factor for American sycamore. When planted on dry sites, sycamore becomes more vulnerable to cankers caused by *Botryodiplodia theobromae*.

Hosts and Distribution

B. theobromae has a broad host range and geographical distribution. There are at least 48 synonyms for this fungus. Among the names most commonly used in recent years are *Diplodia theobromae*, *D. natalensis*, and *Lasiodiplodia theobromae*. The perfect stage of the fungus is known by the name *Botryosphaeria rhodina*.

B. theobromae is found throughout the world on a large variety of plants in tropical, subtropical, and temperate zones. It causes cankers in trees located in temperate zones. Its hosts in or near the Great Plains are Ailanthus, hickory, flowering dogwood, persimmon, American holly, walnut, and oak. The fungus is only weakly pathogenic in some of these trees, and may cause cankers only when trees are severely stressed.

Figure 20-1. Incipient *Botryodiplodia theobromae* canker of sycamore.



Figure 20-2. Advancing edge of large canker.

Symptoms and Signs

Botryodiplodia cankers in sycamore develop on both limbs and boles. The cankers are inconspicuous during initial development and detectable only by careful examination. Incipient cankers have tan to dark brown streaks in the normally green to white, smooth bark of sycamore (fig. 20-1). The streaks usually run longitudinally with the grain of the wood. As cankers enlarge and age, cracks appear in the affected bark, and callus forms around dead tissue (fig. 20-2). Old, inactive cankers appear flattened, sunken, and completely surrounded by callus (fig. 20-3). Cankers vary from a few cm to several m in length.

B. theobromae also causes twig and limb dieback. Early stages of dieback are indicated by dying twigs and limbs with browning leaves. Dieback may occur in just one limb or throughout most of the crown (fig. 20-4). In severe cases, when the main stem is affected, sprouts

grow from the lower bole and root collar. Similar symptoms can be caused by other fungi, severe droughts, and chemical injury. Associated fungi and environmental conditions should be carefully investigated when attempting to identify the causes of dieback.

B. theobromae fruits on infected tissue but may saprophytically colonize and fruit on dead wood. Pycnidia, the fruiting bodies, are black and about the size of a pinhead. They are embedded in the outer layer of dead bark. Conidia produced by pycnidia must be observed microscopically for positive identification. In addition to identifying the fungus by pycnidial production on dead wood, cultures should be made from the advancing edges of cankers and dieback. *B. theobromae* and other canker fungi can be cultured on potato dextrose agar.

Disease Cycle

Conidia from *B. theobromae* pycnidia on dead bark are the primary inoculum for new infections. They are dispersed by wind, but can also be carried by insects, splashing rain, or pruning tools. When conidia make contact with suitable infection courts, such as wounded stems and branch stubs, they germinate and colonize host tissues.

Colonization does not always result in a canker. Susceptibility of the tree involved, virulence of the fungus strain, and environmental conditions are determining factors for canker formation. The most virulent strains can cause cankers in non-stressed trees, but the least virulent strains do not. Canker development is favored by high temperatures and waterstress. Conidia are again produced on established cankers, and the infection process is repeated if environmental conditions are favorable.

Damage

The effects of infection can range from small, inconspicuous cankers to tree mortality. Small cankers "callus over" and have little effect on trees. Large cankers slow the rate of growth, cause wood defects, and weaken stems to make trees more vulnerable to wind-breakage. Dieback changes the growth pattern and form of individual trees. Forked terminals result from apical dieback. Severe dieback and/or cankering may kill trees.

Control

Losses from *Botryodiplodia* cankers can be reduced by cultural practices. Avoid wounding stems and making branch stubs. Prune during late fall or winter when colonization by *B. theobromae* is lessened because of low temperatures. Avoid planting on poor and dry sites because waterstress favors infection and disease development. Shade trees should be watered during periods of drought. When possible, plant seedlings that are adapted to a particular geographic or climatic site. The seed source should be local if possible. Use genetically improved stock with resistance to *Botryodiplodia* cankers when available.



Figure 20-3. Old inactive canker surrounded by callus.

Selected References

- Filer, T. H., Jr. Sycamore cankers caused by *Botryodiplodia theobromae*. *Phytopathology*. 59: 76-78; 1969.
- Lewis, R., Jr. Influence of infection court, host vigor, and culture filtrates on canker production by *Botryodiplodia theobromae* conidia in sycamore. *Plant Disease Reporter*. 62: 934-937; 1978.
- Thompson, G. E. Die-back of sycamore. *Plant Disease Reporter* 35: 29-30; 1951.

Figure 20-4. Dieback of twigs and limbs.

