

Botryosphaeria Cankers and Dieback

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Four or more species of Botryosphaeria have been associated with cankers (Fig. 1) and/or dieback on a wide range of trees and shrubs in Florida (1,4). These fungi can also cause leaf spots and fruit rots which will not be addressed in this circular. This cosmopolitan group of generally nonspecialized pathogens has an extremely wide host range. Due to its unique location, Florida hosts both the more common temperate and tropical species, with two or more species often being reported from the same host. Botryosphaeria is commonly recovered from stem cankers and terminal branch segments exhibiting dieback on plants which have been injured by other biotic or abiotic factors (3,5). Wounds caused by mechanical injury (pruning wounds, equipment wounds, etc.), environmental injury (freezing or high temperatures), insect injuries (borers, oviposit wounds, etc.), and chemical injuries (herbicide injury to thin-barked species) are common infection sites (3,5). Plants which are stressed by cultural conditions are also more commonly affected (poor site factors, moisture stress, nutritional problems, transplanting, etc.) (3,5). Based on their widespread occurrence and opportunistic nature (coupled with a ready resource of stressed plants), Botryosphaeria spp. rank high on the list of important fungal pathogens of woody plants in Florida.

**PATHOGENS:** Botryosphaeria cankers and dieback have been attributed to a number of Botryosphaeria species. The taxonomic distinctions between species are not universally accepted and problems with nomenclatural precedence are frequently noted in the literature (2,3,5,6). Species of Botryosphaeria (Class: Loculoascomycetes, Order: Dothideales) are most frequently encountered in their conidial or asexual stage. Conidia are produced in pycnidia in all cases, however, there is a good deal of variation (both within and between species) in the organization of the pycnidia (single or stromatic groups) and in the color, shape, and septation of the conidia (Fig. 2). As a result of this variation, anamorphs of Botryosphaeria are found in the form genera: Botryodiplodia, Diplodia, Dothiorella, Fusicoccum, Macrophoma, and Sphaeropsis (3,4,5,6). The nomenclatural status of these various form genera are also not totally agreed upon by all authors.



Fig. 1. Botryosphaeria canker on redbud (Cercis canadensis L.).

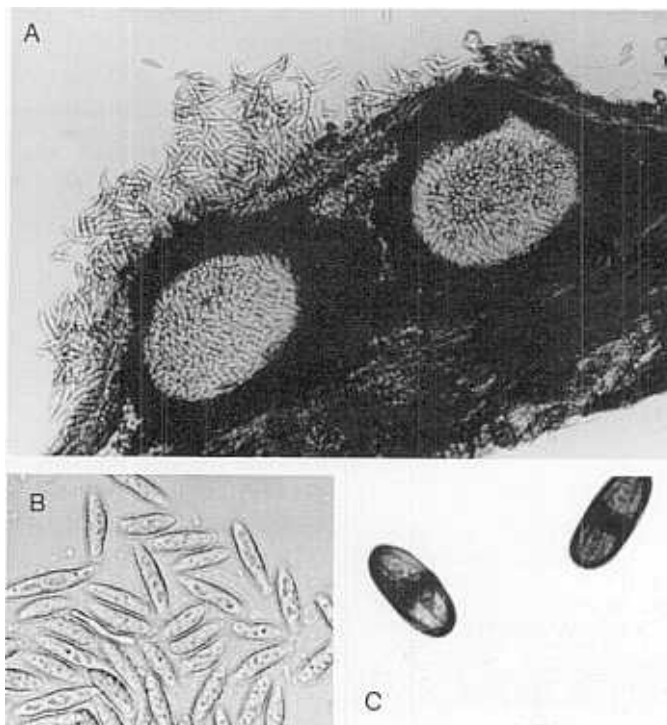


Fig. 2. A) Pycnidia, B) conidia of Botryosphaeria ribis; C) conidia of B. rhodina.

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The two most frequently encountered species of *Botryosphaeria* in Florida are *B. rhodina* (Cooke) Arx and *B. ribis* Gross. & Duggar (1). *Botryosphaeria rhodina* is a common tropical to subtropical species which has been reported on at least 280 genera of plant hosts worldwide (5). The asexual stage of *B. rhodina* is distinct in that the mature conidia are oval (18-30 X 10-18 $\mu$ m), dark, one septate, and longitudinally striate at maturity (3,5). The conidia, however, do not mature until after they have been discharged from the pycnidium. As discharged in the conidial cirrus or within the pycnidial centrum, the conidia are hyaline, aseptate, and densely granulate. *Botryosphaeria ribis* is more temperate in its distribution (5) and the nomenclatural status of the species is more tentative. It is often considered as a synonym of *B. dothidea* (Moug.:Fr) Ces. & De Not. and *B. berengeriana* De Not. (2,3,6). This taxonomic question has yet to be satisfactorily resolved, the reader is reminded, therefore, that the names noted here may overlap in the literature. The asexual stage of *B. ribis* displays much variability. Two types of conidia are often observed, macroconidia which are generally oblong and slightly fusoid [17-25 X 5-7  $\mu$ m (5,6), 16-31 X 4-8  $\mu$ m (3)] and microconidia [2-3 X 1  $\mu$ m (3,5,6)]. The conidia are hyaline and nonseptate. A good deal of variability is noted among conidia, even from the same pycnidium. Other species of *Botryosphaeria* reported in Florida (1) include: *B. corticis* (Demaree & Wilcox) Arx & Muller, *B. disrupta* (Berk. & Curt.) Arx & Muller, and *B. quercuum* (Schwein.) Sacc.

**DISEASE SYNDROME:** Species of *Botryosphaeria* are considered facultative parasites. They survive as saprophytes on dead plant tissues and should be considered as being ubiquitous in the environment. Even in healthy plants there are dead tissues which may be colonized. If a plant is subsequently stressed or injured the fungus may invade healthy tissues.

Symptoms caused by *Botryosphaeria* canker vary with the species of host infected and the degree of predisposing stresses. As noted previously, wounds, either natural or inflicted, are often the site of canker initiation. Cankers may vary from small lesions surrounding the wound, to sunken elliptical lesions delimited by a callus ridge, to spreading sunken lesions which are not contained by callus. Generally the bark over the canker will be discolored, this is most readily seen on thin barked species. Spreading diffuse *Botryosphaeria* cankers are often narrow and elongate, the fungus moving quickly along the length of the stem. Beneath the bark, the cortical/cambial tissues of cankered stems are brown as compared to the white or pale green healthy tissues. Xylem tissues can also be discolored by *Botryosphaeria* canker and a brown wedge-shaped section may be observed in a stem cross section.

Fruiting bodies of the fungus form on dead tissues and may produce viable spores over a period of years (3,5). These fruiting bodies are generally small (0.5-3.0 mm) (6) and on the bark surface appear as small raised black spots. The asexual spores (conidia) are most frequently implicated in the spread of disease. The conidia are exuded from the pycnidia when the tissues are moistened and are spread primarily via rainsplash.

**CONTROL:** Growers should try to minimize wounding and maintain vigorous plants. Pruning should be done in dry weather with tools which are frequently sterilized. If *Botryosphaeria* canker is present, the affected tissues should be aseptically pruned out. The infested debris should be destroyed, the fungus can produce spores on these pruned out branches for long periods of time (3). A protectant fungicide can be applied to cut surfaces. Effective chemical controls are lacking, good sanitation and good cultural practices are the best methods to prevent *Botryosphaeria* canker.

**SURVEY AND DETECTION:** The initial visible symptom of *Botryosphaeria* canker is often a wilting and flagging of leaves on branches distal to the canker. A closer examination of the stems will generally reveal a slightly sunken and often discolored area on the bark. A pocket knife should be used to cut away the bark to reveal the cortical and cambial tissues (do not cut all the way to the xylem), a brown discoloration indicates a pathogen may be at work.

#### LITERATURE CITED

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