Peach Fruit Rots Caused by *Botryosphaeria* spp. and *Glomerella cingulata*

LAURE H. RITTENBURG, Graduate Assistant, and FLOYD F. HENDRIX, JR., Professor, Department of Plant Pathology, University of Georgia, Athens 30602

ABSTRACT

Rittenburg, L. H., and Hendrix, F. F., Jr. 1983. Peach fruit rots caused by *Botryosphaeria* spp. and *Glomerella cingulata*. Plant Disease 67:449-450.

Botryosphaeria obtusa, B. dothidea, B. rhodina, and *Glomerella cingulata* have been isolated from decaying peach fruit in production areas in Georgia and Alabama. In pathogenicity tests, these organisms caused a rot of unripe, mature, and ripe peach fruit. Wounds were necessary for infection except when infected twigs were used as an inoculum source and placed on unwounded fruit.

Gummosis caused by *Botryosphaeria dothidea* (Moug. ex. Fr.) Ces. & de Not., initially reported in 1974 (5), has the potential to severely curtail peach production in Georgia's Fort Valley area as well as other peach-growing areas in the South. Symptoms of the disease begin as a copious gummy exudate on the main trunk that progresses distally to the branches and twigs. In advanced stages of infection, much of the fruiting wood in the tree is killed. The disease, however, was not observed on the fruit.

During the past 2 yr, about 2% of the fruits in our spray guide tests were decayed by *Botryosphaeria* spp. Fruit rots from various locations in Georgia and Alabama sent to our laboratory for diagnosis have yielded the same organisms. Typical symptoms include brown to black sunken, firm, necrotic areas with a leathery textured exocarp that clings tenaciously to the mesocarp of the fruit. Observations at early stages of the decay include dry, light to dark bruised areas as well as thickened areas of the exocarp accompanied by a darkening in color with a tarlike texture. Progressively, regardless of the early symptoms, the exocarp assumes a wrinkled appearance covering a firm rot. *B. obtusa* (Schw.) Shoemaker, *B. dothidea*, and *B. rhodina* (Berk. & Curt) Arx as well as *Glomerella cingulata* (Stonem.) Spauld. & Schrenk have been isolated from the affected tissue. The rots cannot be differentiated symptomatically and may be confused with firm rots caused by other pathogens. Currently, identification is dependent upon laboratory isolation except when *G. cingulata* is sporulating. Field diagnosis may become a critical point in the development and application of control measures.

We carried out isolations and pathogenicity tests on peach fruits to characterize the symptoms caused by each pathogen to serve as a basis for field diagnosis. The means of entry and effect of fruit developmental stage on pathogenesis were also determined.

MATERIALS AND METHODS

Sampling. Five hundred peaches with blemishes ranging from bruises to depressions resulting from stem rubs were collected from growers' orchards. Specimens affected with either brown rot or Rhizopus rot were excluded. After surface-sterilization in a 0.525% NaOCl-10% ETOH solution, tissue from the border of the blemish was plated on acidified fresh potato-dextrose agar and incubated at 24 C for 14 days.

Inoculations. Six hundred unblemished Monroe peaches collected from the Horticultural Experiment Farm in Athens, GA, were used to demonstrate pathogenicity. The fruits were separated into groups representing three stages of maturity, unripe, mature, and ripe, and were then inoculated with spore suspensions (25×10^3 conidia/ml) of single isolates of *B. obtusa, B. dothidea, B. rhodina*, and *G. cingulata*. Half of the fruit in each stage were inoculated by injection of 0.1 ml of the suspension with a hypodermic needle and the other half inoculated by laying the 0.1 ml suspension on an unwounded peach surface. Water was used as the control.

Peach prunings were collected and used as inoculum to determine if disease development could be initiated from infected stems. Twigs containing pycnidia as well as twigs containing only gummy exudates were laid on the epidermis across the shoulders of the peaches and placed in a moist chamber for 7 days. Half of the specimens were wounded by scratching the exocarp with the infected twig and in the other half, the epidermis remained intact under the twig.

RESULTS

Survey. Culture examinations of the positive isolates revealed 43% *B. dothidea* and 29% *B. obtusa*, whereas both *G. cingulata* and *B. rhodina* each resulted in 14% of the infections. These positive isolations were differentiated on the basis of lesion type. Lesions characterized by dark, sunken, elliptical areas were the source of 43% of the positive isolations, whereas 29% of the positive isolations were from sunken, nonnecrotic areas where the epidermis was rubbed by a limb but apparently left intact. In addition, dark necrotic epidermal abrasions and firm subcuticular bruises resulted in 14% each of the remaining positive isolations.

Pathogenicity tests. Fruit in all stages of maturity were susceptible to decay but only when wound inoculations were made with the spore suspensions. Although all four fungi caused a fruit rot, *B. rhodina* caused the most rapid and severe decay, followed by *G. cingulata*.

Infected twigs served as a very effective source of inoculum with decay developing in 55% of the wounded and unwounded specimens. Twigs with pycnidia of *B. dothidea* used as inoculum resulted in 80% fruit rot, whereas twigs containing gummy exudates but no pycnidia resulted in only 30% decay. Fruit wounded by and exposed to infected twigs developed 40% rot due to *B. dothidea*, but unwounded fruit developed 70% rot. The wounded fruit were rapidly decayed by brown rot and Rhizopus rot, which significantly contributed to the low percentage of decay by *Botryosphaeria*.

DISCUSSION

Between 1950 and 1954, some fruit rots similar to those described in this paper apparently caused by *Diplodina* and *Diplodia* spp. were described in Louisiana, Georgia, and South Carolina (1–4,7,8). From Wright and Smith's description of *Diplodia natalensis* (7), we conclude that they worked with the conidial state or an anamorph of *B. rhodina* as did Stevens (4). Wright and Smith's was the first known description of a peach rot caused by this organism. As for the other organisms referred to as *Diplodina* (1,2), the descriptions and illustrations are somewhat contradictory, and therefore, the identity of the organisms causing these rots is uncertain.

This report is the first description of a rot on peach fruit caused by either *B. obtusa* or *B. dothidea*. The frequency of isolation of these pathogens from fruit

This research was supported by state and Hatch funds appropriated to the Georgia Experiment Station.

Accepted for publication 2 December 1982.

The publication costs of this article were defrayed in part by page charge payment. This article must therefore be hereby marked "*advertisement*" in accordance with 18 U.S.C. § 1734 solely to indicate this fact.

rubbed by twigs and branches on the tree demonstrates that this wound in all probability is an important portal of entry for these pathogens as well as other peach pathogens. Whether the twigs or limbs must be infected or whether they simply act as a wounding agent allowing the organism entry into the fruit has not yet been determined.

Although *B. dothidea* is primarily a wound pathogen (6), the higher percentage of *Botryosphaeria*-infected fruits in the unwounded samples can easily be explained by the wounded fruits becoming colonized by other wound pathogens, particularly *Monilinia* and *Rhizopus*. These organisms rot injured fruit much more rapidly than *Botryosphaeria* or *Glomerella*. Inoculum of *Monilinia* and *Rhizopus* was abundant in the orchard and hence on the twigs used as inoculum because it was late in the growing season.

LITERATURE CITED

1. Horn, N. L. 1952. *Diplodina* on peach in Louisiana. Plant Dis. Rep. 36:351.
2. Horn, N. L., and Hawthorne, P. L. 1954. A new fruit rot of peach. Phytopathology 44:134-136.
3. Smith, M. A., and Wright, W. R. 1951. Natural infection of peach fruit by *Diplodia*. Plant Dis. Rep. 35:222.
4. Stevens, N. E. 1926. Occurrence of the currant cane blight fungus on numerous hosts in the Southern States. Mycologia 18:278-282.
5. Weaver, D. J. 1974. A gummosis disease of peach trees caused by *Botryosphaeria dothidea*. Phytopathology 64:1429-1432.
6. Witcher, W., and Clayton, C. N. 1963. Blueberry stem blight caused by *Botryosphaeria dothidea* (*B. ribis*). Phytopathology 53:705-712.
7. Wright, W. R., and Smith, M. A. 1954. Diplodia fruit rot of peaches. Phytopathology 44:471-472.
8. Wright, W. R., Smith, M. A., and Ramsey, G. B. 1954. Diplodina rot of South Carolina peaches. Plant Dis. Rep. 38:436-437.