

# New Diseases and Epidemics

## Occurrence of a New Race of *Botryosphaeria corticis* on Highbush and Rabbiteye Blueberry

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### ABSTRACT

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A new race of *Botryosphaeria corticis* was demonstrated on the basis of disease reactions on a set of differential cultivars of highbush blueberry. Race SC-7 was highly virulent on the cultivars Bluecrop, Croatan, Earliblue, and Wolcott. No other known race of *B. corticis* produces a susceptible reaction on all four of these cultivars. Race SC-6 was identified as the predominant race causing severe stem canker development on rabbiteye cultivars in North Carolina and Georgia.

*Botryosphaeria corticis* (Demaree & Wilcox) Ark & Muller, causes a stem canker disease of highbush (*Vaccinium corymbosum*) and rabbiteye (*V. ashei*) blueberry in North Carolina (3,4,6). In 1950, Wolcott was introduced as an early-ripening, canker-resistant cultivar (5). Within 15 yr, more than 75% of the blueberry acreage in North Carolina was planted to this cultivar; however, stem canker became important on this cultivar because of the increased incidence of a more virulent race of *B. corticis* (1). The total acreage planted to Wolcott has been drastically reduced during the past 10 yr because of the severity of stem canker.

Previous studies have demonstrated that there are at least six pathogenic races of *B. corticis* infecting highbush blueberry (4). In 1973, 124 isolates of *B. corticis* were obtained from cankers on Wolcott plants in four southeastern North Carolina counties. The percentages of isolates identified as race SC-1, SC-2, SC-3, SC-4, SC-5, and SC-6 were 71, 10, 0, 4, 0, and 15, respectively (R. D. Milholland, unpublished). SC-5 is the only race that Wolcott has resistance to and is probably the race that was prevalent when Wolcott was released in 1950.

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In 1983, stem canker symptoms were observed on NC 1688, an advanced early-ripening selection in the North Carolina blueberry breeding program, at two of six locations in southeastern North Carolina. Severe stem canker also was observed on rabbiteye cultivars grown in North Carolina and Georgia. Rabbiteye cultivars were previously considered more resistant to stem canker than were highbush cultivars (2).

This study was initiated to identify the race(s) of *B. corticis* producing cankers on NC 1688 and the rabbiteye cultivars grown in North Carolina and Georgia.

### MATERIALS AND METHODS

*B. corticis* was isolated from large, swollen cankers with deep fissures and cracks on the rabbiteye cultivars Tifblue and Climax and the rabbiteye blueberry selection T-133. Three isolates were obtained from stem cankers collected at the Georgia Coastal Plains Experiment Station at Alapaha and were provided by J. R. Ballington, Department of Horticultural Science, North Carolina State University at Raleigh. The fungus also was isolated from a canker on the cultivar Tifblue located in Bladen County, NC. Ninety percent of the plants in the 1-ha planting were severely affected by *B. corticis* (Fig. 1).

Isolates of *B. corticis* from highbush blueberry plants were collected from cankers on the cultivar Wolcott in Bladen County and from the blueberry selection NC 1688 in Duplin and Craven counties of North Carolina. Pathogenicity and race determination were evaluated on the following highbush cultivars: Bluecrop, Croatan, Earliblue, Murphy, and Wolcott. These cultivars were selected as the most important of the 12 cultivars used in the previous study to identify stem canker races of *B. corticis* (4).

Monoconidial isolates were used in all

inoculation tests. The inoculum was standardized to a concentration of  $1 \times 10^5$  conidia per milliliter and applied with an air-compressor sprayer to stems of rapidly growing blueberry plants (4). Three greenhouse-grown plants of each cultivar were inoculated with each isolate of *B. corticis*. One plant of each cultivar was sprayed with distilled water and served as a control. Plants were placed in a moist chamber for 72 hr, then placed on a greenhouse bench at 25–30 C. Plants were rated for canker infections on the stems 4 mo after inoculation. The five disease-reaction types used to characterize lesion development have been described previously (4). Plants with type 1 and 2 reactions developed small red flecks and small slightly raised lesions, respectively,

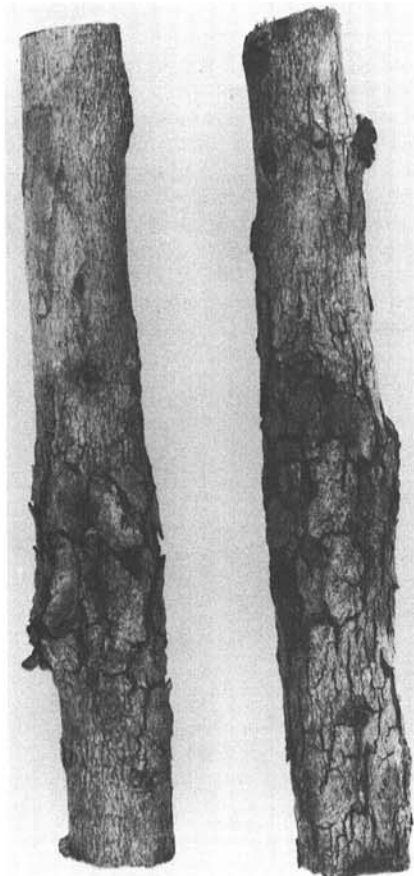


Fig. 1. Stem canker development on the rabbiteye cultivar Tifblue caused by *Botryosphaeria corticis*. The large cankers are swollen with deep fissures and cracks.

and were considered resistant. A type 3 reaction consisted of mostly small lesions with a few scattered, large lesions (2-4 mm in diameter). Plants rated as type 4 and 5 developed large swollen lesions (4-5 mm in diameter) with dark green borders or abundant red discoloration and were classed as canker-susceptible.

## RESULTS AND DISCUSSION

Canker disease reactions of the differential cultivars ranged from highly resistant to susceptible for the seven isolates of *B. corticis* (Table 1). None of the plants inoculated with isolates of *B. corticis* were immune; however, there were considerable qualitative differences in canker development on the different cultivars 4 mo after inoculation.

The cultivars Bluecrop and Wolcott were susceptible to all *B. corticis* isolates tested, whereas Murphy was resistant to all isolates. SC-1, isolated from Wolcott, was the most prevalent race in the 1973 survey and probably still is the predominant race in areas where Wolcott is planted.

All four isolates from the rabbiteye cultivars were identified as race SC-6. The North Carolina planting of Tifblue was located in Bladen County, NC, where the original isolates identified as race SC-6 were collected from wild *Vaccinium* spp. (4). With the increase in acreage of rabbiteye planted for commercial production, stem canker has become a serious problem on that cultivar in North Carolina.

Blueberries produced in North Carolina are the first to reach the fresh market in late May; therefore, it is important to replace Wolcott with an early-ripening cultivar that has resistance to the prevalent races of *B. corticis*. The

**Table 1.** Stem canker severity ratings produced by different isolates of *Botryosphaeria corticis* on differential cultivars of blueberry 4 mo after inoculation<sup>a</sup>

| Source and isolate    | Cultivar |         |           |         |         | Race |
|-----------------------|----------|---------|-----------|---------|---------|------|
|                       | Bluecrop | Wolcott | Earliblue | Croatan | Murphy  |      |
| <b>North Carolina</b> |          |         |           |         |         |      |
| Wolcott               | 4.0 (S)  | 5.0 (S) | 4.0 (S)   | 2.0 (R) | 1.0 (R) | SC-1 |
| Tifblue               | 4.5 (S)  | 5.0 (S) | 1.0 (R)   | 2.0 (R) | 1.0 (R) | SC-6 |
| NC 1688-B             | 5.0 (S)  | 5.0 (S) | 4.5 (S)   | 4.5 (S) | 2.0 (R) | SC-7 |
| NC 1688-N             | 4.0 (S)  | 5.0 (S) | 5.0 (S)   | 5.0 (S) | 1.0 (R) | SC-7 |
| <b>Georgia</b>        |          |         |           |         |         |      |
| Tifblue               | 5.0 (S)  | 5.0 (S) | 1.3 (R)   | 1.0 (R) | 1.0 (R) | SC-6 |
| Climax                | 5.0 (S)  | 5.0 (S) | 1.6 (R)   | 1.0 (R) | 1.0 (R) | SC-6 |
| T-133                 | 5.0 (S)  | 5.0 (S) | 1.0 (R)   | 1.0 (R) | 1.0 (R) | SC-6 |

<sup>a</sup>Disease susceptibility rating (0-5) for isolates of *B. corticis*. Plants rated 1, 2, and 3 were classed as canker-resistant (R) and those rated 4 and 5 were classed as canker-susceptible (S).

highbush blueberry selection NC 1688 (Wolcott × Fla-15) was first screened for canker resistance in 1979. Its resistance to race SC-1 and its excellent horticultural traits make it a promising replacement for the cultivar Wolcott. All of the differential cultivars except Murphy were highly susceptible to both isolates obtained from NC 1688. No other known race of *B. corticis* produces a susceptible reaction on Bluecrop, Croatan, Earliblue, and Wolcott. Plants of the blueberry selection NC 1688 also were highly susceptible when inoculated with the two NC 1688 isolates. Numerous large swollen cankers with abundant discoloration developed on succulent stems 3 mo after inoculation. On the basis of these results, the isolates collected from NC 1688 were determined to be a new race, SC-7, of *B. corticis*.

Croatan is one of the major highbush cultivars planted in North Carolina that has resistance to race SC-1 but is susceptible to race SC-4 and SC-7. It is not known how widespread race SC-7 is in commercial plantings, but its existence

creates a serious threat to blueberry production in North Carolina and may affect the possible release of NC 1688 as a new cultivar. A more intensive survey is being conducted to determine the prevalence and severity of this highly virulent race of *B. corticis* on the major cultivars planted in North Carolina.

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