Reciprocal Pathogenicity of Glomerella cingulata Isolated from Betula pendula and Malus sylvestris

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European white birch (*Betula pendula* Roth), an increasingly popular landscape tree, is marketed as "clumped birch" in which two or three seedlings are grown close together. A severe foliar infection with attendant defoliation occurred on this tree in recent years during late summer in the Virginia highlands. Repeated isolations consistently yielded a *Gloeosporium,* indistinguishable from one that we isolated from bitter rot lesions of apple (*Malus sylvestris* Mill. 'Stayman') fruits at Blacksburg. The purpose of this study was to confirm both the identity of the birch fungus and its pathogenic relationship to the bitter rot pathogen, *Gloeosporium rufo-maculans* Berk. (*Glomerella cingulata* [Stonem.] Spauld. & v. Schrenk).

Leaf spots on birch (Fig. 1-A) were evenly distributed, subcircular to angular, dark brown with a pale center and sometimes surrounded by a yellow

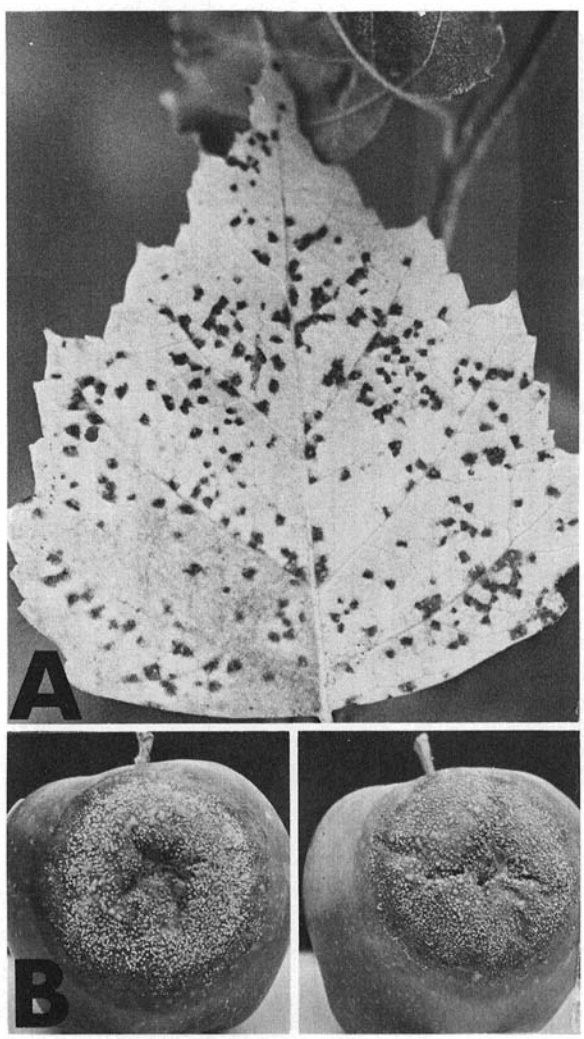

Fig. 1. Foliar and fruit lesions caused by *Glomerella cingulata* on European white birch and apple fruits. **A)** Anthracnose lesions on birch as produced by either isolate; and **B)** bitter rot of Stayman apple fruits that followed inoculation by both isolates (left, from apple and right, from birch).

halo, lighter on the abaxial surface, and averaged 2.0 mm in diameter. Acervuli were devoid of setae, a peculiar feature of *Colletotrichum*. Conidia were continuous, hyaline, ovate, obovate, and cylindrical and measured 10.0 to 17.5 × 5.0 to 6.25 μm. This fungus was similar morphologically to *Gloeosporium betularum* Ell. & Mart. on *Betula nigra* (3) and to *Gloeosporium rufo-maculans* (4). Our isolates from birch and apple grew well on potato-dextrose agar, producing a white aerial mycelium at first. Later, this became grayish-green, and a purple mycelial pigment was observed in the agar when petri plates were reversed. Conidia were produced, but neither the perfect stage nor primordial structures thereof was observed.

Stayman apple fruits were inoculated with both isolates 1.0 mm beneath the cuticle and allowed to incubate at 27 C for 12 days. Typical bitter rot lesions developed (Fig. 1-B). We inoculated the birch in the greenhouse by atomizing spores (4.0×10^6/ml) from each isolate onto leaves from cuttings maintained at 100% relative humidity at 24 C for 3 days after inoculation. One week after inoculation, typical anthracnose lesions similar to those in Fig. 1-A were produced by both isolates. *Gloeosporium* was reisolated from apple fruit and birch foliar lesions.

The broad spectral pathogenic nature of species of *Gloeosporium* and *Colletotrichum* and of *Glomerella cingulata* was evaluated recently by von Arx (1) and von Arx & Müller (2), who placed many of these polyphagous forms into synonomy with *Glomerella cingulata*, based upon similar morphology. Stipes & Winstead (5) reported the cross-infectivity of several morphologically similar isolates of *Glomerella cingulata* that were isolated from taxonomically diverse hosts.

The similar central tendencies of the morphological and pathogenic attributes of our isolates from birch and apple suggest that they are closely related or identical strains of *Glomerella cingulata*. This study, in addition to previous work (1), further suggests that this species has a relatively broad base of genes for pathogenicity, and that consideration of control of bitter rot and anthracnose should include an awareness of these attributes.

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