Relationship between Flower/Fungal Development in Blackberry Infected with *Cercospora rubi*

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Rosette disease is a major limiting factor in blackberry (*Rubus ursinus* Cham. & Schlecht.) production in the southeastern United States. It is caused by the fungus *Cercospora rubi* (Wint.) Plakidas. Rosette completes its life cycle above ground and in association with aerial portions of susceptible plants, such as blackberry. Disease development and control are strongly influenced by the interaction of inoculum development and host susceptibility (Walker, 1969).

C. rubi infection occurs in early spring (April to June) (Plakidas, 1937) when flower buds; infected the previous year, open and disseminate fungal spores. This study was undertaken to determine the relationship between flower development and fungal mycelium development and sporulation in blackberry infected with *C. rubi*.

During the period when 90% of flowering occurred (April to May), five stages of flower development were identified and assigned a

numerical rating: 1) tight bud, 2) bud swell, 3) bud showing first white, 4) full bloom, and 5) petal fall. Twenty rosette-infected floral buds representing the five stages were randomly collected from plants throughout the field. Buds were preserved in formalin-aceto-alcohol solution and prepared for fixed slides. Semipermanent slides were prepared using free-hand sections of flower structures. Structures were cut with a razor blade under a dissecting microscope and suitable sections were transferred directly to a drop of either water or cotton blue dye on a microscope slide. Fixed slides were prepared as outlined by Berlin and Mikshe (1976). Sections (15 nm thick) were made with a rotatory microtome and mounted on microscope slides. Mounted sections were stained with a modified Johansen's quadruple stain (Johansen, 1940). After staining, cover glasses were cemented on microscope slides with Fisher's permanent mounting medium (resin dissolved in toluene). Plant materials used were collected from 8-year-old 'Cheyenne' plants in a commercial plantation located on Sunshine Berry Farms, Macon, Miss. Buds were examined for the presence and development of *C. rubi*. A numerical rating was assigned to the four identified stages of mycelium development: 1) mycelium present, 2) young conidia, 3) mature conidia, and 4) shedding of conidia.

Fungal mycelium development coincided with flower bud development (Fig. 1). Spor-

ulation (shedding of conidia) of *C. rubi* occurred at full bloom (stage 4) and petal fall (stage 5). Buds examined under the microscope showed that fungal growth development and time of sporulation coincided with floral bud development as previously observed by Cook (1911) and Plakidas (1934, 1937). We believe that most primary inoculum development occurs during this time.

In addition, the study of semipermanent and fixed slides of floral structures agreed with Plakidas' (1937) findings because we detected the fungal mycelium growing on stigmas, styles, and anthers (Fig. 1, stages 3, 4). The mycelium was also found growing around the ovaries and carpellary walls surrounding the ovules (Fig. 1, stages 1 and 2). Our study confirms previous observations that the fungus does not penetrate host cells (Plakidas, 1937).

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Fig. 1. Fungal development stages [1) mycelium present, 2) young conidia, 3) mature conidia, and 4) shedding of conidia] in relation to stages of flower development [1) tight bud, 2) bud swell, 3) bud showing first white, 4) full bloom, and 5) petal fall].

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