EPIDEMIOLOGY OF APPLE LEAF SPOT*

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ABSTRACT

Apple leaf spot (ALS) caused by *Colletotrichum* spp. is a major disease of apple (*Malus domestica*) in Southern Brazil. The epidemiology of this disease was studied in experiments carried out in the counties of Passo Fundo and Vacaria, State of Rio Grande do Sul, from February 1998 to October 2000. The disease was found in all the six apple orchards sampled in the growing seasons of 1997/98 and 1998/99. The fungus isolates associated with ALS fit the characteristics of *C. gloeosporioides* (75%), *C. acutatum* (8%), and *Colletotrichum* sp. (17%). The pathogen overwintered in dormant buds and twigs but not in dropped leaves or fruit mummies. Two sprays of copper oxychloride (at 0.3%) reduced the fungus initial inoculum by 65-84.6% in buds and 85.6-93.7% in twigs, but had no effect on the early season progress of the disease. Disease severity increased proportionally to elevation of temperature from 14 to 26-28 C. At 34 °C, however, infection was completely inhibited. The duration of leaf wetness required for infection ranged from two hours at 30 C to 32 h at 16 °C. The relationship of temperature (*T*) and leaf wetness (*W*) to disease severity (*Y*) was represented by the model equation $Y = 0.00145[((T-13)^{1.78})((34.01-T)^{1.09})] * 25/[1+14 \exp(-0.137W)]$, $R^2 = 0.73$ and $P < 0.0001$. Currently, this information is being used to manage the disease and to validate a forecast system for ALS.

Additional key words: *Colletotrichum*, disease forecast, disease management.

RESUMO

Epidemiologia da mancha foliar da macieira

A mancha foliar da macieira (*Malus domestica*), causada por *Colletotrichum* spp., é uma das principais doenças da macieira no Sul do Brasil. Estudos sobre sua epidemiologia foram conduzidos em Passo Fundo e Vacaria, RS, no período de fevereiro/1998 a outubro/2000. A doença foi encontrada nos seis pomares amostrados em 1998 e 1999. Isolados do fungo obtidos a partir de lesões em folhas e frutos corresponderam às espécies *C. gloeosporioides* (75%), *C. acutatum* (8%) e *Colletotrichum* sp. (17%). O patógeno sobreviveu em ramos e gemas dormentes, mas não em folhas caídas ao solo e frutos mumificados. O tratamento de inverno com duas aplicações de oxycloreto de cobre (0,3%) reduziu o inóculo do patógeno em gemas (65 a 84,6%) e ramos (85,6 a 93,7%), mas não diminuiu o progresso inicial da doença. A severidade da mancha foliar da macieira aumentou à medida que a temperatura ambiente foi elevada de 14 para 26-28 C. A 34 °C, entretanto, a infecção foi completamente inibida. A duração do molhamento foliar requerido para infecção variou de duas horas a 30 C para 32 h a 16 °C. A relação da temperatura (*T*) e do molhamento foliar (*W*) com a severidade de doença (*Y*) foi representada pela equação $Y = 0{,}00145[((T-13)^{1{,}78})((34{,}01-T)^{1{,}09})] * 25/[1+14 \exp(-0{,}137W)]$, $R^2 = 0{,}73$ e $P < 0{,}0001$. Atualmente, estas informações estão sendo utilizadas para manejo da mancha foliar da macieira e para validação de um sistema para sua previsão.

INTRODUCTION

Apple leaf spot (ALS), also named *Glomerella* or *Colletotrichum* leaf spot, is a major disease of apple (*Mallus domestica* Borkh.) in Brazil. The importance of this disease results from its wide distribution (Leite *et al*., 1988; Bonetti *et al*., 1999), the high amount of damage (50 to 75%) (Cerezine *et al*., 1992; Muller *et al*., 1993), and the numerous fungicidal sprays (10 to 12/season) needed for its control (Cerezine *et al*., 1992).

The ALS is caused by species of the genus *Colletotrichum*, especially *C. gloeosporioides* (Penz.) Penz. & Sacc. (teleomorph *Glomerella cingulata* (Stonem.) (Spauld. & Schrenk) (Leite *et al*., 1988; Bonetti & Katsurayama, 1999; Sanhueza, 1999). Great variation in both pathogenicity and cultural/morphological features of *Colletotrichum* isolates causing ALS have been reported (Bonetti & Katsurayama, 1999), so that some questions regarding the etiology of the disease still remain unclear.

The control of ALS is difficult because of rapid disease development. Its incubation period can be as short as two days

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