Verticillium Wilt of Alfalfa in Wisconsin

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ABSTRACT

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Verticillium wilt of alfalfa, caused by *Verticillium albo-atrum*, was diagnosed in Wisconsin in the summer of 1980. The disease was identified in 16 counties. This is the first report of Verticillium wilt of alfalfa in the north central states.

Additional key words: *Medicago sativa*

Verticillium wilt of alfalfa (*Medicago sativa* L.), caused by *Verticillium albo-atrum* Reinke and Berth. (2,5), has long been a serious disease in Europe and was found in Quebec, Canada, in 1962 (1). The disease was diagnosed in the Pacific Northwest in 1976 (3) and was subsequently found in a large area of British Columbia, Canada (6). Verticillium wilt was not found on alfalfa in surveys of the Middle Atlantic, northeastern, southwestern, and several north central states in the period from 1974 to 1976 (3).

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MATERIALS AND METHODS

In June 1980, symptoms similar to those reported for Verticillium wilt (3) were observed in four alfalfa fields on a single farm in Dane County, WI. We identified the pathogen by surface disinfesting leaflets and green stem sections (5 mm long) from symptomatic plants for 30 sec in a 0.5% sodium hypochlorite solution and plating them on water agar and ethanol-streptomycin agar (4). A *Verticillium* sp. was consistently isolated from portions of both leaflets and stem sections. These cultures were determined to be morphologically and culturally identical to *V. albo-atrum* pathogenic to alfalfa (A. A. Christen, Washington State University, *personal communication*). Although all isolates examined did produce dark mycelial resting structures, the isolates varied in the rate at which they produced resting mycelia. None of the isolates that were examined formed microsclerotia.

We determined the pathogenicity of four *V. albo-atrum* isolates by following the root-dip procedure of Christen and Peaden (2) modified by omitting centrifugation of the spore suspensions. Ten 8-wk-old Vernal and Vertus alfalfa plants grown in a muck soil and sand mixture (2:1) were uprooted, and the roots were rinsed and immersed in a conidial suspension (8×10^6 conidia per milliliter) of each of the isolates for 20 min. Inoculated plants were transplanted into a steamed mix of compost, sand, and peat (1:2:1) and incubated in an environmental chamber at 20 C and 30,000 lux with a 12-hr day.

RESULTS AND DISCUSSION

The plants first expressed symptoms of Verticillium wilt 14 days after inoculation. All the isolates of *V. albo-atrum* that were tested caused symptoms and were reisolated from 100% of the inoculated Vernal plants (susceptible) and from 56–89% of the inoculated Vertus plants (moderately resistant) (Table 1). All the isolates caused similar disease reactions in each cultivar, but Vernal had more infected plants per isolate than did Vertus. In addition, the severity of symptoms was greater on Vernal than on Vertus. *V. albo-atrum* was readily isolated from the necrotic leaflets and from green stem sections of inoculated plants. Many of the infected Vertus plants did not express foliar symptoms.

Our studies showed that the isolates of *V. albo-atrum* from alfalfa were pathogenic to this important forage crop.

Table 1. Pathogenicity[a] of four isolates of *Verticillium albo-atrum* from field-grown alfalfa plants in Wisconsin with wilt symptoms

Isolate	County	No. of plants infected/inoculated	
		Vernal	Vertus
34	Rock	9/9	5/9
32	Iowa	9/9	7/10
25	Columbia	10/10	8/9
3	Dane	10/10	7/10

[a]Vertus is moderately resistant and Vernal is susceptible to *V. albo-atrum*. The pathogen was not isolated from uninoculated Vertus plants, but it was isolated from one of 10 uninoculated Vernal plants.

After its identification at one location, field surveys revealed a widespread occurrence of Verticillium wilt in more than 25 alfalfa fields in Dane County. A statewide survey undertaken late in the summer of 1980 and in 1981 by the Wisconsin Department of Agriculture, Trade and Consumer Protection indicated that Verticillium wilt was present in at least 20 of 45 Wisconsin counties surveyed. Except for Dane County, which was sampled more extensively, between two and six alfalfa fields were surveyed in each county; the number of plants collected per field varied with the apparent disease prevalence. We used sporulation of the fungus on symptomatic plant tissue incubated in moist chambers as the criterion for the presence of *V. albo-atrum*; if present, its identity was verified on potato-dextrose agar.

Verticillium wilt was identified in the following 20 counties in Wisconsin: Calumet, Columbia, Crawford, Dane, Dodge, Grant, Green, Iowa, Jefferson, Kenosha, Kewaunee, La Crosse, Lafayette, Monroe, Rock, Sauk, Sheboygan, Trempealeau, Walworth, and Washington. This is the first report of Verticillium wilt of alfalfa in the north central states, and represents the recognition of another factor contributing to alfalfa stand decline in Wisconsin.

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