Root Rot of Chicory Caused by *Phymatotrichum omnivorum* and *Phytophthora cryptogea*

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ABSTRACT

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Phymatotrichum omnivorum and *Phytophthora cryptogea* were identified as the causal agents of root rot of chicory in Arizona in 1979.

Roots of chicory (*Cichorium intybus* L.) contain inulin, which can be converted to sugar. The potential of this plant as an alternative crop to sugar beets (*Beta vulgaris* L.) was tested under field conditions in Arizona in 1979 by the Amstar Corp., Spreckles Sugar Division. Two separate field plots, A and B, were planted in February and April, respectively, in Chandler, AZ. In July, circular patches (3–5 m in diameter) of dead and wilted plants were observed in plot A. In plot B, dead and wilted plants occurred randomly throughout the plot.

Roots of dead and wilted plants were in various stages of decay, and two distinct types of root rot were noted. From plot A, diseased roots exhibited a firm, cortical decay along the entire length of the taproot. Typical buff-colored, hyphal strands were abundant on the root surface, and white to tan spore mats characteristic of *Phymatotorichum omnivorum* were present on the soil surface beneath the canopy of wilted and dead plants. Hyphal strands, removed from the infected roots and examined microscopically, possessed lateral acicular branches, which serve for positive identification of *P. omnivorum*. This is the first report of this disease on chicory under field conditions. The fungus has been reported as a pathogen of artificially inoculated chicory plants in Texas (1).

In plot B, roots of wilted and dead plants had a soft, watery rot that had progressed from the root tip to the plant

Fig. 1. Root rot of chicory caused by *Phytophthora cryptogea*.

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crown (Fig. 1). A *Phytophthora* sp. was consistently isolated on water agar from root tissue excised from the advancing margin of decay. Pathogenicity was determined by placing a 6-mm-diameter disk of a 1-wk-old, V-8 agar culture of the fungus on a wounded and unwounded site on each of six healthy chicory roots. Wounds were inflicted before inoculation by puncturing the taproot several times with a sterile dissecting needle. Inoculated roots and appropriate controls were then placed in a moist chamber and incubated at 28 C. Root rot symptoms, typical of those observed in the field, developed only on inoculated wounded and unwounded sites after 5–6 days. Reisolations consistently yielded pure cultures of the *Phytophthora* sp.

Cultural studies showed that the *Phytophthora* isolate from chicory had cardinal growth temperatures (on V-8 agar) of 10, 28, and 39 C. Sporangia and hyphal swellings formed readily on mycelium growing from V-8 agar disks placed in sterile distilled water at 28 C for 24 hr. Typical sporangia were ovoid to slightly pyriform and nonpapillate. Internally proliferating sporangia were frequently observed. Size of sporangia ranged from 20–40 × 35–50 μm (mean of 35 × 43 μm). Oospores were not found.

The chicory isolate was identified as *P. cryptogea* Pethyb. & Laff., mating type A2. *P. cryptogea* has been reported as the cause of root rot of chicory (*C. intybus* L. var. *foliosum*) in France (2). The French isolate, however, had a maximum temperature tolerance of 35 C for growth. High-temperature isolates of *P. cryptogea*, morphologically identical to the Arizona chicory isolates, have also been recovered from infected safflower roots in Arizona by Klisiewicz (3). As pointed out by him (3), climatic adaptation may account for the different temperature tolerances between isolates from diverse geographic regions.

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LITERATURE CITED

1. Ezekiel, W. N., and Neal, D. C. 1930. Report of the cotton-root-rot conference at Temple, Texas. Phytopathology 20:889-894.
2. Forlot, P., Harranger, J., Payen, J., and Schwinn, F. J. 1966. *Phytophthora cryptogea* Pethybr. et Laff., nouvel agent de la pourriture des endives (*Cichorium intybus* L., var. *foliosum* Hegi) en cours de forcage. Phytopathol. Z. 56:1-18.
3. Klisiewicz, J. M. 1977. Identity and relative virulence of some heterothallic *Phytophthora* species associated with root and stem rot of safflower. Phytopathology 67:1174-1177.