# Root Rot of Sugar Beets Caused by *Pythium deliense*

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**ABSTRACT**

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A new root rot of sugar beets was observed in Arizona in 1981. The causal organism was identified as *Pythium deliense*.

Root rot of mature sugar beets (*Beta vulgaris* L.) in Arizona has previously been associated with *Sclerotium rolfsii* Sacc., *Macrophomina phaseolina* (Tassi) Goid., *Phymatotrichum omnivorum* (Shear) Dug., *Rhizopus arrhizus* Fischer, *Erwinia carotovora* subsp. *atroseptica*, and *Pythium aphanidermatum* (Edson) Fitzp. On 5 July 1981, numerous 10-mo-old sugar beets in a 40-ha field in Sacaton, AZ, were observed in various stages of wilt, and many were dead. By 15 July, 60% of the sugar beets in the southern portion (ca. 15 ha) of the field were dead (Fig. 1A). Taproots of wilted and dead plants were in various stages of decay. Internal, diseased taproot tissues exhibited a marbled brown to black discoloration that progressed inward from secondary root infections (Fig. 1B). The internal symptoms resembled those caused by *Pythium aphanidermatum*. Isolations from internally decayed root tissue, however, yielded pure cultures of *Pythium deliense* Meurs. Identification was based on morphological and cultural characteristics according to Middleton (6).

Cultural studies showed that *P. deliense* had cardinal growth temperatures of 10, 35, and 42 C and exhibited a slightly rosette growth habit on V-8 agar. Simple to moderately branched, lobate sporangia and aplerotic oospores (mean diameter of 15.1 $\mu$m) formed readily in 1-day-old water agar cultures at 28 C (Fig. 2A and B). Oogonial stalks and oogonia were conspicuously curved

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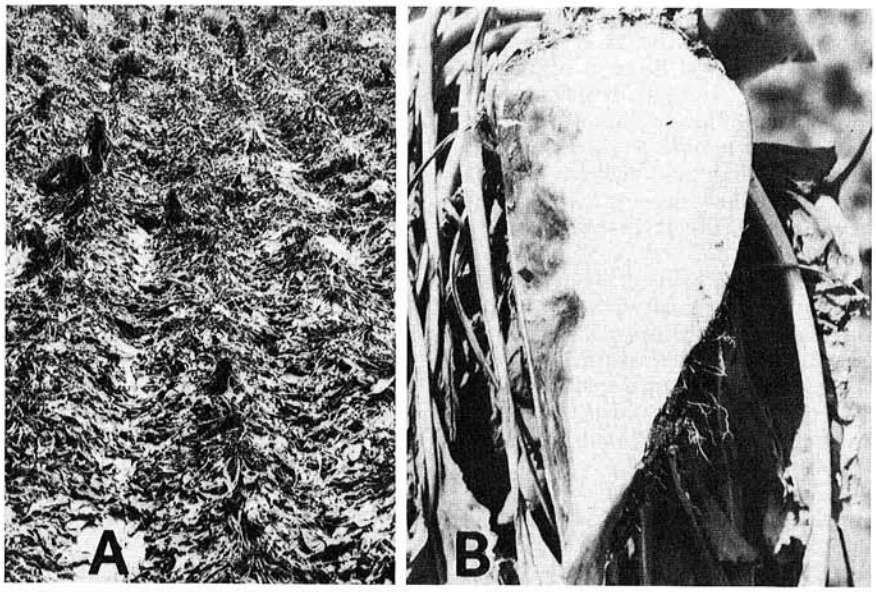


**Fig. 1.** *Pythium deliense* root rot of sugar beets: **(A)** Severe root rot in a commercial field. **(B)** Internal root disease symptoms.

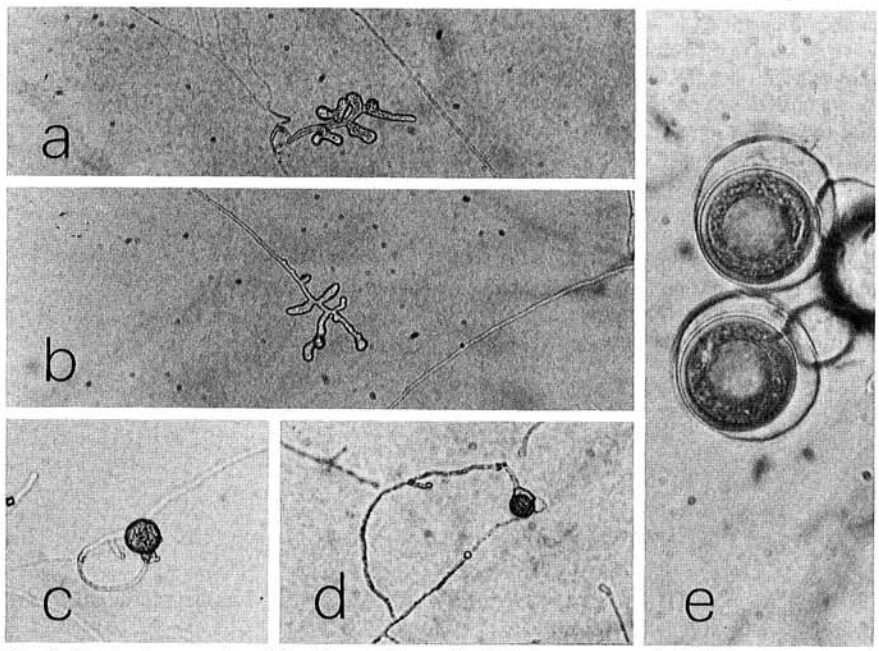


**Fig. 2.** Photomicrographs of *Pythium deliense*: **(A,B)** Lobate sporangia (×100). **(C,D)** Curved oogonial stalks (×100). **(E)** Aplerotic oospores (×1,000).

toward straight antheridial stalks bearing clavate, terminal or intercalary, antheridial cells (Fig. 2C and D). The latter morphological features are diagnostic for *P. deliense*.

Pathogenicity was determined by placing a 5-mm-diameter disk of a 24-hr-old V-8 agar culture of the fungus on a wounded and unwounded site on each of six healthy 8-mo-old sugar beet taproots that were collected from a production field 8 hr before inoculation. Wounds were inflicted prior to 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 within 2 days. Reisolations consistently yielded pure cultures of *P. deliense*.

Indigenous populations of *P. deliense* have been reported in Australia (8), and diseases associated with this fungus have been recorded on sugarcane in Puerto Rico (4) and Taiwan (10); on ginger (2), mung bean (9), *Tephrosia vogelii* (7), and Piper beetle (1) in India; and on tobacco in Sumatra (5), and Bulgaria (3). To our knowledge, this is the first report of *P. deliense* as a pathogen of sugar beets and the first published report of the fungus in North America. *P. deliense*, however, was isolated in 1975 from soil collected from a dry-wash bed in a nonagricultural area near Tucson (*unpublished data*). These results suggest that *P. deliense* may be indigenous to Arizona.

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