Cylindrocephalum Rot of Mung Bean Sprouts

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ABSTRACT

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A fungus causing a destructive rot was isolated from mung bean sprouts. Symptoms first appeared as small pink to orange spots on the cotyledons or hypocotyl. Under the moist conditions required for sprouting, the sprouts became slimy and gray. Inoculation with a high spore concentration (4.6×10^5/ml) induced 94% decayed sprouts, whereas decreasing concentrations caused progressively less decay. The test fungus was reisolated from lesions on the sprouts. The fungus was tentatively identified as *Cylindrocephalum* sp.

Mung bean (*Phaseolus aureus* Roxb.) is commonly used for the production of sprouts. Diseases of sprouts are usually not important. Recently, a rapid decay of mung bean sprouts has been reported by several producers in Washington. A fungus was consistently isolated from diseased sprouts. The objective of this study was to identify it and to establish its pathogenicity.

MATERIALS AND METHODS

Isolations were made from seed and diseased tissue using Difco potato-dextrose agar (PDA) and acidified PDA (0.1 ml of 25% lactic acid per 20 ml PDA). Cultural characteristics of the fungus were observed on PDA, Difco oatmeal agar, and Difco Sabouraud dextrose agar.

Pathogenicity of the fungus was tested in sprout inoculation studies. Mung bean seed was obtained from a grower experiencing the decay problem. Sterile 1-L jars with the mouths covered with sterile cotton gauze were used as sprouting chambers. Seeds were treated in one of three ways: 1) surface-disinfected in 1% sodium hypochlorite for 30 min and inoculated with a spore suspension of the test fungus, 2) surface-disinfected but not inoculated, or 3) not disinfected and not inoculated. The treated seeds were then grown in the sprouting chambers until lesions appeared, usually in 5–10 days.

Inoculum was prepared by adding 5 ml of sterile water to a 1-wk-old sporulating colony of the fungus and rubbing with a sterile glass rod. The spore suspension was serially diluted and spore concentration was determined using a hemacytometer and by dilution-plating onto PDA. Twenty milliliters of seeds were soaked in 250 ml of each spore concentration for 12 hr. Uninoculated seeds were soaked in sterile water. All seeds were then drained and sterile water added as needed to keep the germinating seeds moist.

We examined 100 sprouts from each treatment and recorded the number of sprouts with lesions. The fungus was reisolated onto acidified PDA from lesions on sprouts in each treatment. Inoculated seeds were planted in potting soil and grown in the greenhouse to determine the effect of the pathogen on the mature mung bean plant.

RESULTS AND DISCUSSION

A fungus that produced numerous conidia in rounded slimy heads was consistently isolated from diseased sprouts. The same fungus was isolated from seed. The colony was initially salmon-orange (apricot-buff in Ridgeway [6]) and zonate with white and orange bands. The outer zone eventually took on a speckled gray appearance. Colony diameter was 5–6 cm after 10 days at room temperature (about 20 C). Colony and spore characteristics were similar on Sabouraud dextrose agar, oatmeal agar, and PDA.

Conidiophores were short (20–30 μm) and conidiogenous areas had small, indistinct collarettes. Conidia were hyline, ellipsoidal, 11–14 × 3.8–5.2 μm, aggregating in clusters in the conidiogenous region (Fig. 1). According to Gams' key (4), this fungus was similar to an *Acremonium* but the spores were considerably longer than any species included in that key.

L. Sigler, curator of the Mold Herbarium at the University of Alberta, has tentatively identified this fungus as *Colletotrichum*, possibly *C. gloeosporioides*. Although we saw no evidence of acervuli or setae in culture or on the host plant, the broadened concept of *Colletotrichum* adopted by von Arx (7) could include our fungus.

Few diseases of mung beans have been reported. Chamberlain (2) and Dunleavy (3) reported a brown stem rot of mung beans caused by *Cephalosporium gregatum*. The fungus causing the sprout rot differs from *C. gregatum* (now *Phialophora gregata* Gams [4]) both in colony characteristics and spore dimensions.

We are therefore placing the sprout rot fungus in the genus *Cylindrocephalum* Bon. as described in the key of Barnett (1). The type species *Cylindrocephalum aureum* (Corda) Bon. was transferred to the genus *Chalara* (Corda) Rabenh. by Hughes (5) in 1958. However, the genus *Chalara* is distinguished by deep collarettes and endogenously produced

Table 1. Percentage of mung bean sprouts that developed lesions when inoculated with different concentrations of *Cylindrocephalum* sp.[a]

Inoculum concentration (spores/ml)	Sprouts with lesions (%)
Disinfected	
0	2
Not disinfected	
0	4
4.6×10^2	26
4.6×10^3	55
4.6×10^4	74
4.6×10^5	94

[a] Values are an average from two replicates.

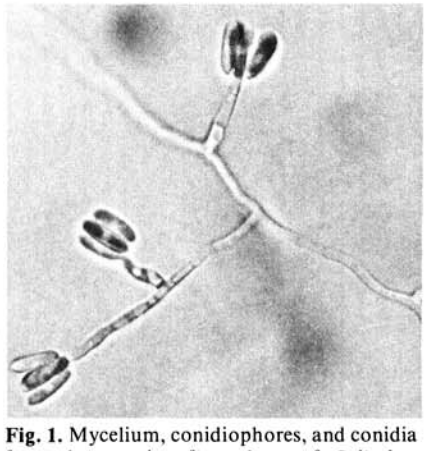

Fig. 1. Mycelium, conidiophores, and conidia from the margin of a culture of *Cylindrocephalum*. The conidia average 11–14 × 3.8–5.2 μm.

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conidia, neither of which is typical of the sprout rot fungus.

When mung bean seeds were inoculated with spores of the fungus and placed in sprouting chambers, sprouts developed characteristic lesions after 3 days and rotted after 5 days. The number of diseased sprouts was related to the amount of inoculum (Table 1). The highest spore concentration induced 94% decayed sprouts, whereas decreasing concentrations caused progressively less decay. The test fungus was reisolated from lesions on the sprouts.

In one experiment, 6% of the sprouts were rotted in the nondisinfected treatment even though no inoculum was added. This, and the recovery of the fungus from several seed lots, indicates that the initial source of inoculum was on the seed. Plants grown in the greenhouse from inoculated seed did not show symptoms.

A high spore concentration is necessary for damaging levels of rotted sprouts to occur. The fungus, introduced from a contaminated seed lot, probably builds up in numbers with successive croppings of sprouts in unsterilized sprouting chambers. Growers are advised to periodically disinfect sprouting containers in 1% sodium hypochlorite for 12 hr to reduce buildup of inoculum.

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