Helminthosporium maydis in Seeds of Minnesota-Grown Field Corn

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ABSTRACT

Helminthosporium maydis was found in a hybrid field corn produced in Minnesota. The seed contained T type cytoplasm for male sterility. Mycelial and conidial characteristics of the isolate are described. Phytopathology 61:427-428.

Additional key words: Zea mays, established.

A dry, commercially processed sample of hybrid field corn (containing T type cytoplasm for male sterility) harvested in Minnesota in 1969 contained 3% of seeds with blackened embryos. The over-all color of the seeds indicated an adequate treatment with captan [*N*-(trichloromethylthio)-4-cyclohexene-1,2-dicarboximide]-dieldrin for protection from soil-inhabiting organisms. After 6 days in the germinator at a daily temp alternation of 20 and 30 C, 13% of the seeds had not germinated and were covered with a dense, felty mass of dark gray mycelium (Fig. 1) indicative of charred ear mold caused by *Helminthosporium carbonum*. Less copious masses of dark, fuliginous mycelium were evident on 3% of the germinated seeds, regardless of the apparent coverage with captan. The dark red pedicels due to heavy accumulations of captan were rarely obscured by the fungus. Seedlings from infected seeds were invariably discolored by a fungal invasion of the coleoptiles, outer leaves, and roots.

The color and structure of the mycelium on the seeds resembled *H. carbonum* as described by Sprague (6) and Ullstrup (8, 9). We assumed the fungus to be *H. carbonum,* since it produced a dense mycelial mass of deep-seated origin within the seeds. Since Noble & Richardson (4) and Sprague (6) did not report the occurrence of *H. carbonum* as a foliar or seed-borne pathogen as far north as St. Paul, Minn., we did not believe our isolate was typical of this fungus. Ullstrup (7) stated that a *Helminthosporium* species (later named *H. carbonum*) was present in the corn belt, whereas *Cochliobolus heterostrophus* Drechs. (*H. maydis*) was probably confined to the south.

Robles (5) found a new form or species of *Helminthosporium* at St. Paul, Minn., with longer more slender spores (115 × 19 μ) than those of a corn belt *H. carbonum* (87 × 21 μ). This fungus, designated *Helminthosporium* "Z", possessed neither the conidial characteristics nor the host range of *H. maydis*.

We soaked the infected seeds of the Minnesota-grown hybrid corn in a 1.5% solution of sodium hypochlorite for 10 min and transferred the seeds directly to a malt-neopeptone or potato-dextrose agar. Fungal colonies grew rapidly at 25 C and produced an irregularly light to moderate olivaceous gray, firm, thick mycelium. Conidia washed from either seeds or pure cultures were longer and more curved than those observed in isolates of *H. carbonum* from barley, corn, oat, rye, and wheat seeds and corn leaves.

Spores of our recent isolate are light yellow, olivaceous or rarely fuliginous, and lighter than conidia of *H. carbonum, H. sorokinianum,* or *H. tetramera* (3). Many are slightly to distinctly curved or lunate, are generally widest near the middle, and taper perceptibly toward the hemispherical basal cell (Fig. 2). A few conidia were sharply curved or hooked near one end, but rarely recurved. The basal or apical cells of a few conidia were noticeably pointed. The non-conspicuous hilum is enclosed by the exospore. Conidia measure 30-112 × 9-19 μ (73 × 14 μ) which agrees closely with Drechsler's (3) measurements for *H. maydis*. Conidial septation varied from 1-11 (7.6) which is typical of

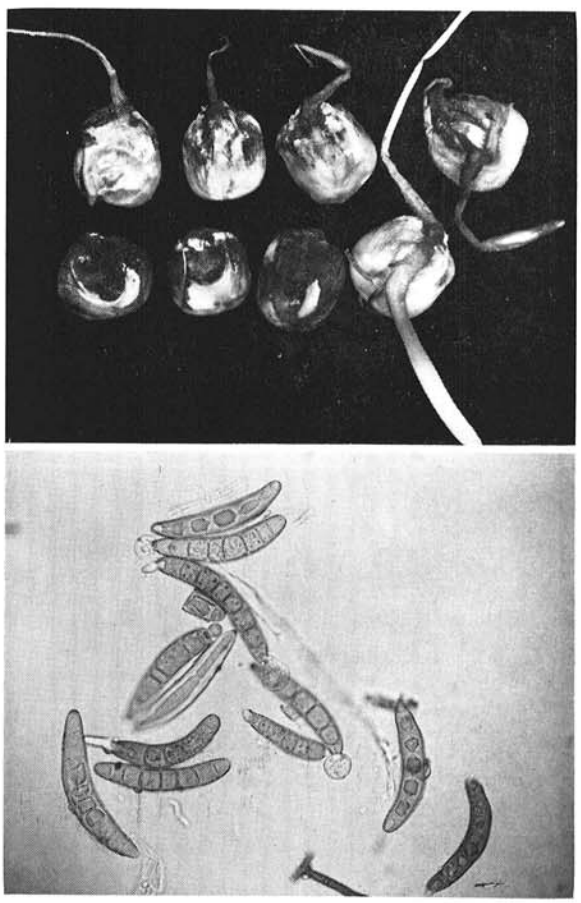

Fig. 1-2. **1)** Mycelium of *Helminthosporium maydis* on seeds and seedlings of hybrid field corn. **2)** Conidia of *H. maydis* produced on Sabouraud medium from an isolate from corn from Minnesota. (×450)

H. maydis. At 25 C germination was 15% in 5 hr and complete in 18-20 hr. Twenty-one per cent of the conidia produced only one germ tube, whereas 79% were bipolar. Total per cent germination decreased as the conidia aged, but the bi- vs. monopolar ratio remained relatively constant. When the New York isolate was mated with a positive isolate of *H. maydis, C. heterostrophus* was obtained (R. R. Nelson, *personal communication*). We must conclude, therefore, that *H. maydis* is the fungus present in the Minnesota corn seed. *Helminthosporium carbonum* has been established in seeds of barley, oats, rye, and wheat (1, 2). We are now attempting to establish the New York isolate of the Minnesota-based *H. maydis* in seeds of small grains.

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