Title First report of fludioxonil-resistant isolates of *Fusarium* spp. causing potato seed-piece decay

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Abstract

Potato (*Solanum tuberosum* L.) diseases incited by *Fusarium* spp. include postharvest dry rot and seed-piece decay. Fusarium seed-piece decay is commonly controlled by preplant applications of chemical seed treatments. However, isolates of *Fusarium* spp. resistant to benzimidazole fungicides have been reported (2,4). In the spring of 2007, samples of cut seed tubers (cvs. Shepody and Russet Burbank) showing extensive symptoms of decay were received from three seedlots in Prince Edward Island (PE) and one seedlot in Saskatchewan (SK), Canada. All seed tubers had been treated with fludioxonil (Maxim Potato Seed Protectant [PSP], 0.5% fludioxonil) following cutting and then stored for 10 to 14 days prior to planting. Using standard isolation protocols (4), the 19 potato tuber pieces examined from PE and 2 from SK yielded 21 *Fusarium* isolates for further study. Five isolates (including both isolates from SK) were identified as *Fusarium sambucinum* Fuckel and the remaining 16 isolates were identified as *F. coeruleum* (Libert) Sacc. (3). To confirm identifications, isolates were compared with two known standards of each of *F. sambucinum* and *F. coeruleum* identified by K. Seifert (Agriculture and Agri-Food Canada, Ottawa, ON) by DNA sequencing of the partial β-tubulin gene or the translation elongation factor 1-α (http://fusarium.cbio.psu.edu/; [1]). These standard isolates were also used as fludioxonil-sensitive controls in amended agar assays for chemical sensitivity. Agar plugs (5 mm in diameter) taken from the margins of 7-day-old cultures of the *Fusarium* isolates were transferred to petri dishes containing ½-strength potato dextrose agar amended with 0, 0.1, 1.0, 10.0, or 100.0 mg/liter of fludioxonil. Fludioxonil (Maxim PSP, 0.5% a.i.) was prepared as a stock solution in sterile distilled water and added to the molten agar after autoclaving. Culture incubation and mycelial growth measurements were performed as described previously (4). Measurements from four replicate petri dishes per concentration of fludioxonil were taken. Calculated EC_{50} values (fludioxonil concentration inhibiting pathogen growth by 50%) were obtained. The trial was repeated three times. The two standard isolates of *F. sambucinum* were sensitive to fludioxonil, with mean EC_{50} values of 0.002 (±0.002 standard error [SE]) and

0.005 (±0.002 SE) mg/liter. The two standard isolates of *F. coeruleum* were also sensitive to fludioxonil, with mean EC_{50} values of 0.17 (±0.005 SE) and 0.19 (± 0.005 SE) mg/liter. All other tested isolates of *F. sambucinum* and *F. coeruleum* were resistant to fludioxonil and showed no growth inhibition even at 100 mg of fludioxonil per liter. To our knowledge, this is the first report of resistance to fludioxonil in isolates of *Fusarium* spp. causing potato seed-piece decay. Since the isolates of *F. sambucinum* were also resistant to thiophanate-methyl and thiabendazole (data not shown), multiclass (benzimidazole and pyrrole) resistance was also documented.