Disease Note

Diseases Caused by Fungi and Fungus-Like Organisms

First Report of *Fusarium equiseti* Causing Seedling Death on Sugar Beet in Minnesota, U.S.A.

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In May 2019, sugar beet (*Beta vulgaris* L.) seedlings with symptoms of wilting and root tip discoloration and necrosis were found in Moorhead (46.5507° N, 96.4208° W), Minnesota, U.S.A. Roots of infected seedlings were surface sterilized with 10% bleach for 15 s, rinsed with sterile distilled water, and cultured on water agar (MA MoorAgar, U.S.A.) for 3 days at 23 ± 2°C. Isolates were transferred to carnation leaf agar (CLA) and incubated at room temperature (22°C) under fluorescent light for 14 days. Abundant macroconidia were produced in sporodochia. Macroconidia were five- to seven-septate, slightly curved at the apex, and ranged from 35 to 110 × 1.2 to 3.8 µm. No microconidia were produced. Chlamydospores with thick, roughened walls were observed in chains or in clumps, and they were ellipsoidal or subglobose. A single spore was transferred from CLA to potato dextrose agar (HiMedia Laboratories, India), produced abundant white mycelium, and was pale brown where the colony was in contact with the medium. The morphological features of the isolates were consistent with *Fusarium equiseti* (Corda) Sacc. (Leslie and Summerell 2006; Li et al. 2015). Genomic DNA (Norgen Biotek, Fungi DNA Isolation Kit no. 26200) of two representative isolates was used for polymerase chain reaction (PCR). The second largest subunit of RNA polymerase (*RPB2*) was amplified by PCR with primers 5f2/7cr (O'Donnell et al. 2010). The amplified PCR product was sequenced and deposited in GenBank (accession no. MW048778). A BLAST search in GenBank and the *Fusarium* MLST database showed 100% sequence alignment

to *F. equiseti* with accessions MK077037.1 and NRRL 25795, respectively. Pathogenicity testing was done using three sugar beet seedlings (Hilleshög proprietary material, Hilleshög Seed, U.S.A.) at cotyledonary stage grown in a pot (4 × 4 × 6 in.) with six replicates. Seedlings were inoculated with *F. equiseti* conidial suspension (10⁴ conidia/ml for 8 min) by the root-dip method (Hanson 2006). Mock-inoculated plants were dipped in sterile water. Inoculated and control plants were placed in the greenhouse at 25 ± 2°C and 75 to 85% relative humidity. One week later, inoculated seedlings showed root tip tissue discoloration similar to those observed in the field, and noninoculated seedlings were symptomless. This study was repeated. The fungus was reisolated from diseased roots and confirmed to be *F. equiseti* based on morphological characters. *F. equiseti* was reported on freshly harvested and stored beet in Europe but was not found to be pathogenic (Christ et al. 2011). Strausbaugh and Gillen (2009) reported the association of *F. equiseti* and root rot of sugar beet but did not report pathogenicity. This pathogen is reported in several crops including edible beans that are grown in rotation with sugar beet in several production areas (Jacobs et al. 2018). The most important *Fusarium* species reported to cause significant economic damage to sugar beet include *F. oxysporum* and *F. secorum* (Secor et al. 2014; Webb et al. 2012). The presence of another pathogenic *Fusarium* species in sugar beet will require monitoring to determine how widespread it is and whether current commercial cultivars are resistant. To our knowledge, this is the first report of *F. equiseti* causing disease on sugar beet seedlings in Minnesota, U.S.A.

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The author(s) declare no conflict of interest.

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