



First report of *Talaromyces pinophilus* causing postharvest rot of sugar beet (*Beta vulgaris*) in Minnesota, USA

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In August 2018, sugar beet roots with dark brown to blue lesions were observed (5% incidence) in Moorhead, Minnesota (46.8738° N, 96.7678° W). Infected sugar beet roots were collected and stored in a cold room at 8 ±2°C, with 78% relative humidity. A week later, dark greyish to blue mould was found on 10% of sugar beet root surface. In the second week, blue-green mycelial growth was observed on the surface (Fig. 1).

Infected root tissues were dissected and small pieces (5 mm²) were disinfected using 70% ethanol for 1 minute, flushed thrice with sterile water, air dried, transferred to 50% potato dextrose agar and incubated at 25°C with a 12-hr photoperiod for seven days (Khan *et al.*, 2019). The fungal colony was observed with blue-green velvety and white margins on the periphery (Fig. 2). Conidia were hyaline, globose, and conidiophores densely penicillated (Fig. 3). The morphological characteristics of the fungus suggested a *Talaromyces* species (Yilmaz *et al.*, 2014). Five isolates were developed by the single spore isolation method and genomic DNA was extracted. For the PCR assay, the ITS4/ITS5 primers were used to amplify the ITS genomic region. PCR products were cleaned using an E.Z.N.A® Cycle Pure Kit (Omega Bio-tek, USA) and sent for Sanger sequencing by GenScript (GenScript, Piscataway, USA). A Blastn analysis of the ITS sequences of the five isolates showed 100% alignment with *Talaromyces pinophilus* (*Penicillium pinophilum*), GenBank Accession No. AB455516.1, with an E-value of 0. The amplified sequence (539 bp) was submitted to NCBI (MK757839.1).

A pathogenicity assay was done by spraying a conidial suspension (1 × 10⁶ conidia/ml) on the surface of healthy sugar beet (cv. Marathon) and kept in a cold room at 8°C and 80% relative humidity. Twelve 22-week-old roots with two replications were used. Mock-inoculated sugar beet roots were sprayed with sterile water. Three weeks post-inoculation, all inoculated sugar beet roots were observed to have similar symptoms to those described

previously (Fig. 4). The mock-inoculated beets remained disease free. Microscopic analysis of the fungus isolated from inoculated beets revealed a similar morphology to that used for inoculation, thus fulfilling Koch's postulates.

Recently a *Penicillium*-like *Talaromyces* sp. has been reported to cause sucrose loss in sugar beet piles (Strausbaugh & Dugan, 2017; Strausbaugh, 2018). In this present study, the pathogenicity of *Talaromyces pinophilus* has been demonstrated in sugar beet. This is the first report of *T. pinophilus* causing postharvest rot in sugar beet in the USA.

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Figure 1

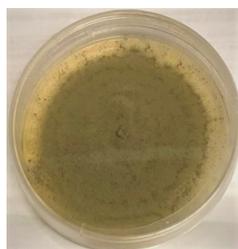


Figure 2



Figure 3



Figure 4

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