

Disease Note

Diseases Caused by Fungi and Fungus-Like Organisms

First Report of *Fusarium venenatum* Causing Foot and Root Rot of Wheat (*Triticum aestivum*) in Germany

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Field experiments were established in the 2018/19 and 2019/20 growing seasons at the experimental station in Neu-Eichenberg, Hessen, Germany, to examine the suitability of multiple wheat cultivars for intercropping with pea and the effect of mixtures on diseases. Approximately 600 wheat tillers (BBCH 49-61, depending on the year and cultivar) were sampled in each year and assessed for severity of foot (lower stem) rot symptoms. Fungi from plants with *Fusarium*-like symptoms exhibiting reddish-brown discolorations on the stems were isolated following the methods described in Šišić et al. (2018). Surface-disinfected (3% NaOCl for 10 s) wheat stems and roots were cut into three 1-cm-long pieces and placed on Coons' agar (Coons 1916). Following 7 to 12 days of incubation under constant blacklight blue fluorescent light, pure cultures were generated on potato dextrose and synthetic nutrient-poor agar (Nirenberg 1976) using the hyphal tip transfer technique, and the resulting colonies were examined microscopically. Based on morphology, ~15% of all *Fusarium* isolates recovered belonged to a distinct taxonomic unit and were initially identified as *Fusarium sambucinum*-like (Leslie and Summerell 2006). The identity of 16 randomly selected isolates (GenBank accession nos. MW085924 to MW085939) was confirmed by sequencing a portion of the translation elongation factor 1-alpha gene region (O'Donnell et al. 1998). BLAST analysis in the FUSARIUM-ID (Geiser et al. 2004) and the NCBI databases revealed >99 to 100% identity match with the *Fusarium venenatum* accession numbers NRRL 22196, FRC R-09186, and MRC 2394. Pathogenicity tests were conducted on wheat cultivar Torborzo using six *F. venenatum* isolates. Inoculum was prepared using a sterile sand-millet

mix infested with six agar plugs of each of the isolates. Once fully colonized, the inoculum was mixed with sterilized sand in a 1:7 ratio (by volume) and transferred to 300-ml pots, and four surface-sterilized wheat seeds (5 min, 70% alcohol) were sown in each pot. Noninoculated controls were amended with sterilized inoculum. The experiment was conducted in a greenhouse in a completely randomized design with five replicates. Disease symptoms were assessed after 4 weeks. All isolates induced reddish-brown discolorations on the lower stems similar to those observed in the field-grown plants. In addition, the infected plants developed dark brown to black discolorations on the crowns and roots and showed clear signs of stunted root growth. These symptoms were further accompanied by chlorosis (yellowing) of the lower leaves starting from the leaf tip. All isolates were successfully reisolated from the infected wheat plants but not from the controls. To the best of our knowledge, this is the first report of *F. venenatum* causing foot and root rot of wheat in Germany. Results from field and greenhouse inoculation experiments indicate that *F. venenatum* may be an important pathogen of wheat in Germany. Further studies on distribution and relative abundance of the species in the *Fusarium* foot and root rot complex of wheat in Germany are warranted. In addition, it is important to note that our results contrast the results from previous studies (Farr and Rossman 2021), which reported *F. venenatum* primarily as a soil saprophyte and presumably nonpathogenic fungus in its nature. Our findings, thus, also warrant the need to further investigate pathogenic potential of this species and the role it may play on other common rotational crops in Germany.

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