Diseases Caused by Fungi and Fungus-Like Organisms

First Report of *Fusarium armeniacum* Causing Fusarium Head Blight on Soft Red Winter Wheat in Illinois

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In the summer of 2016, while surveying the diversity of the *Fusarium* head blight (FHB) causal agent on soft red winter wheat (*Triticum aestivum*) in Illinois, we identified hundreds of naturally infected plants in five locations. Samples with characteristic symptoms of FHB (bleaching, accompanied by pink/white mycelium) were collected 1 to 3 weeks after anthesis. The collected glumes and developing kernels were surface sterilized and plated on sterile medium. Single-conidia isolates were derived for further work. All isolates were deposited to the USDA-ARS Mycotoxin Prevention and Applied Microbiology Research Unit in Peoria, IL. Among the collection, isolate CMR105 showed characteristics of *Fusarium armeniacum*, growing on potato dextrose agar (PDA) with abundant white mycelia and pigments of orange to pink. The CMR105 macroconidia were prominently curved, long, and tapering with a distinct foot shape typical of *F. armeniacum* (Leslie and Summerell 2006). CMR105 conidia were produced quickly and abundantly compared with typical isolates such as BMR001, which were rare and slow-growing. The translation elongation factor 1- α (*EF1- α*), RNA polymerase 2 (*RPB2*), β -tubulin, and the internal transcribed spacer (*ITS*) genes were sequenced from selected isolates, including CMR105. The resulting DNA sequences were trimmed and aligned using BLAST on the *Fusarium* ID database and NCBI nr database. For all the genes, isolate CMR105 had a 99% or higher similarity to multiple *F. armeniacum* accessions. We then conducted

a phylogenetic analysis using the DNA sequences of three concatenated genes (*RPB2*, β -tubulin, and *ITS*). A maximum-likelihood tree supported that isolate CMR105 is *F. armeniacum*. Koch's postulates were carried out in greenhouse experiments on spring wheat cultivar 'Norm'. At anthesis, a spore suspension of 5×10^4 spores/ml was injected into the central spikelet of wheat heads. Three plants were inoculated per isolate and a mock control consisting of water. The inoculated plants were placed into a mist chamber for 48 h. Symptoms consisting of premature bleaching of multiple spikelets and pink/white coloration were observed 1 week postinoculation. No symptoms were observed on the control. Two weeks postinoculation, kernels from the wheat heads were collected, surface sterilized with 10% bleach, and plated on PDA. The recovered isolates showed similar colony morphology to the inoculum. Similar results were obtained on field inoculations on soft red winter wheat. *F. armeniacum* has been reported from the United States, Australia, South Africa, China, and Argentina (Kommedahl et al. 1979; Nichea et al. 2015). To date, *F. armeniacum* has been reported to cause seed and root rot on soybeans, has been recovered from asymptomatic corn, and more commonly has been found as a soil saprophyte (Ellis et al. 2012; Leslie and Summerell 2006; Nichea et al. 2015). We have shown here for the first time that *F. armeniacum* also causes FHB on wheat in Illinois. In both field and greenhouse assays, our *F. armeniacum* strain was less aggressive than *F. graminearum* strains. Recently, *F. armeniacum* was reported to cause FHB on emmer and spring wheat in New York (Fulcher and Bergstrom 2020). It is important to note that many species of the genus *Fusarium* cause FHB. In this report, we show evidence that *F. armeniacum* is another causal agent of FHB in Illinois and warrants further study and surveillance.

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