Occurrence of *Stenocarpella macrospora* Causing Ear Rot in Corn in the United States

**Martha P. Romero Luna,** Department of Botany and Plant Pathology, Purdue University, West Lafayette, IN 47907; **Carl A. Bradley,** Department of Plant Pathology, University of Kentucky Research and Education Center, Princeton 42445; **Heather M. Kelly,** Department of Entomology and Plant Pathology, University of Tennessee, Jackson 38301; and **Kiersten A. Wise,** Department of Botany and Plant Pathology, Purdue University, West Lafayette, IN 47907

Accepted for publication 19 May 2016. Published 15 June 2016.


Diplodia ear rot of corn (*Zea mays*) is primarily caused by the fungus *Stenocarpella maydis* in the United States, and can reduce yield and grain quality by lowering test weight, reducing grain fill, and damaging kernels (Fig. 1). *Stenocarpella macrospora* is a closely related fungus that is present in the United States but primarily associated with Diplodia leaf streak, which causes narrow lesions on corn leaves (Fig. 2). Although *S. macrospora* is recognized as a major ear rot pathogen in South America and South Africa (Casa et al. 2006), it has infrequently been associated with ear rot in the United States, and has not been documented as an ear rot pathogen in the United States since 1952 in Virginia (Roane and Roane 1994). In 2014 and 2015, corn ears displaying Diplodia ear rot symptoms and signs were collected across the major corn production areas of the United States to study pathogen diversity of *S. maydis*. Isolates were obtained from samples by disinfecting moldy or symptomatic kernels using a protocol described by Romero and Wise (2015). Microscopic examination of resulting pycnidia and conidia was initially used to distinguish between *S. maydis* and *S. macrospora* based on conidia size and number of septae (Sutton and Waterston 1966a, 1966b; Fig. 3). Isolate identification was confirmed using species-specific primers targeting the internal transcribed spacer (ITS; GenBank Accession No. KP164561), previously designed for conventional PCR (Romero and Wise 2015). All methods for DNA extraction and PCR assays were the same as described in Romero and Wise (2015). These assays determined that one ear

**FIGURE 1**
Corn ear covered with white mold, which is a typical sign of Diplodia ear rot.

**FIGURE 2**
Diplodia leaf streak caused by *Stenocarpella macrospora*.

Corresponding author: Kiersten A. Wise. Email: kawise@purdue.edu.

doi:10.1094/PHP-RS-16-0023
© 2016 The American Phytopathological Society
out of eleven corn ears collected from Gibson County, TN, in 2014, and one ear out of fifteen ears collected from Pope County, IL, in 2015 were infected with *S. macrospora* instead of *S. maydis*. These findings represent approximately 7% and 9% of the total sample size of collected ears from each state, respectively, and are the first reports of this ear rot in Illinois and Tennessee. This is also the first confirmation of *S. macrospora* causing ear rot in the United States in over 60 years.

Although we detected two occurrences of *S. macrospora* causing ear rot in our two-year survey, the distribution and occurrence of *S. macrospora* could be wider than currently documented. Identification of Diplodia ear rot in the field is challenging since both species of *Stenocarpella* produce a brown discoloration on kernels and a white cottony mycelium on colonized ears, (Fig. 4) and many crop scouts and consultants that diagnose ear rot in the field may not be aware that *S. macrospora* can cause ear rot. It is important to determine *S. macrospora* distribution since there is evidence that *S. macrospora* is more aggressive than *S. maydis* and can colonize corn ears more quickly under controlled conditions (Latterell and Rossi 1983). Past researchers have indicated that *S. macrospora* could threaten corn production in areas with warm and humid conditions (Latterell and Rossi 1983), and this fungus is known to produce mycotoxins, although no mycotoxins have yet been reported in U.S. commercial grain samples with Diplodia ear rot (Casa et al. 2006).

The Illinois confirmation of *S. macrospora* occurred in a field with a history of Diplodia leaf streak, and *S. macrospora* was present on corn leaves at the time of the ear sample collection. Although no association has been reported between presence of Diplodia leaf streak and ear infection, *S. macrospora*-infected leaves and residue may serve as inoculum for ear infection. Therefore, areas where Diplodia leaf streak regularly occurs may also be at greater risk for ear rot caused by *S. macrospora*.

Although current management practices for Diplodia ear rot include selecting less-susceptible hybrids and minimizing inoculum through crop rotation and tillage, it is not known if hybrid resistance against ear rot caused by *S. maydis* in the United States is also effective against ear rot caused by *S. macrospora*. Our findings indicate that suspected Diplodia ear rot samples should be diagnosed using morphological and/or PCR-based methods to distinguish between *S. maydis* and *S. macrospora* rather than basing diagnosis on visual inspection of symptoms and signs. Additional and more extensive sampling will help
determine the distribution and frequency of ear rot caused by *S. macrospora* in the United States.

**LITERATURE CITED**


