

A First Detection Success Story: Corn Tar Spot Identified for the First Time in the United States by Collaborative Efforts of NPDN and USDA-APHIS Fungal Identification Labs

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Introduction

Tar spot of corn, caused by the fungus, *Phyllachora maydis* Maubl, was first identified in the United States in 2015 on corn foliage submitted to the Purdue Plant and Pest Diagnostic Laboratory (PPDL) from two counties in northwest Indiana and three counties in north-central Illinois. Infected leaves exhibited characteristic symptoms and signs of corn tar spot (1,2,3), including small, irregular, bleached to brown lesions with protruding spore-producing structures (ascomata) (Figs. 1,2). Official morphological (Figs 3a,b) and molecular confirmation of the causal fungus, *P. maydis*, was provided by the United States Department of Agriculture-Animal Plant Health Inspection Service in Beltsville, MD (6). A concerted effort to inform the public (5) and a call for additional samples was conducted by both the PPDL and the University of Illinois Plant Clinic; these efforts led to an increased number of detections in both states (Figs. 4a;4b). It is suspected the fungus may have been introduced into the United States via wind-blown inoculum from Central America or Mexico. It is not known whether this fungal pathogen will overwinter in Midwestern fields thus heightened surveillance for the presence of corn tar spot will be encouraged during the 2016 growing season.

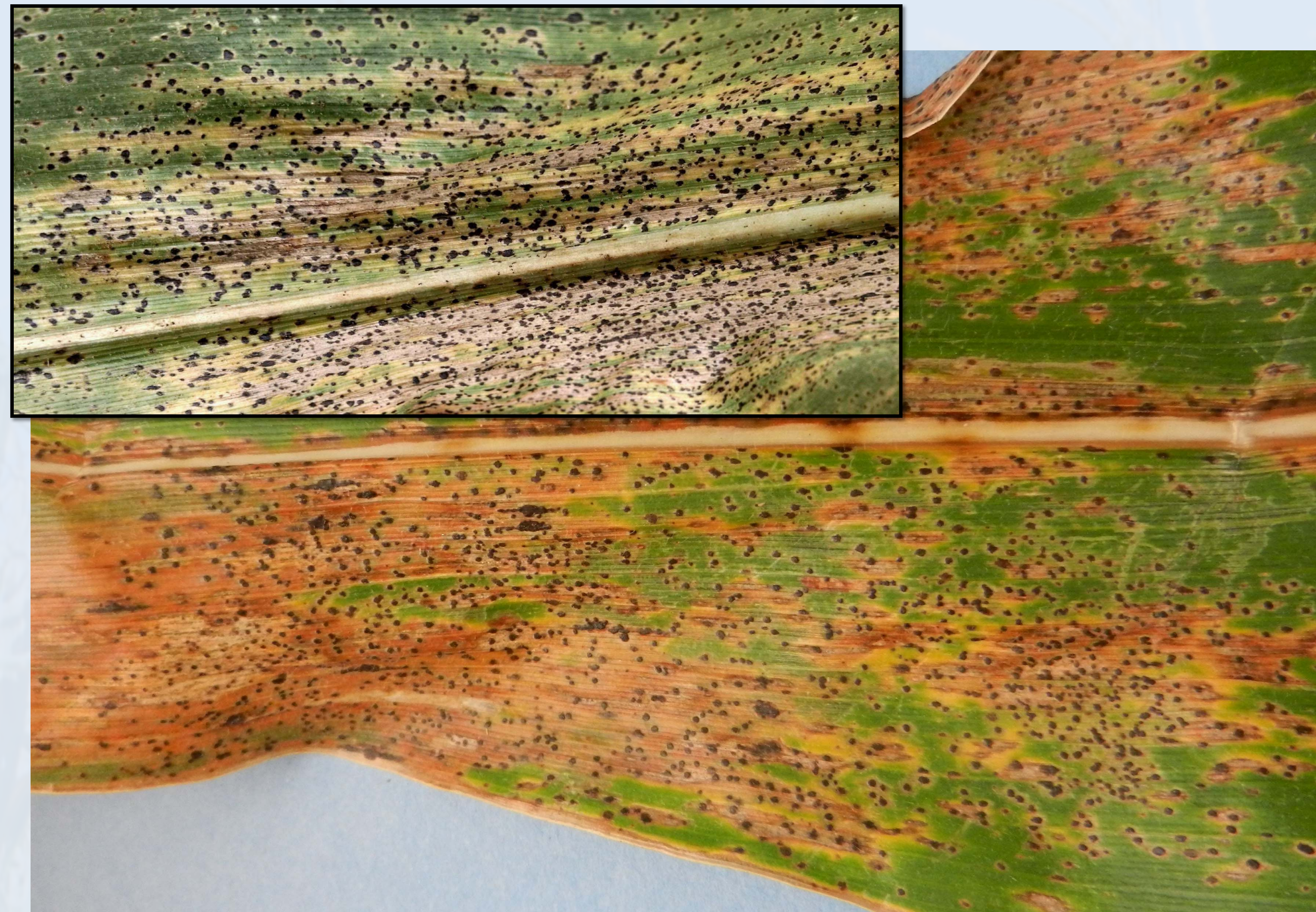


Figure 1. Corn leaf infected with *Phyllachora maydis*



Figure 2. Characteristic symptoms of corn tar spot in the field

Symptoms

Infected leaves exhibited oval to irregular bleached to brown lesions on leaves in which black, protruding spore-producing structures (ascomata) were formed. Lesions with numerous ascomata coalesced to cause large areas of blighted leaf tissue (Figs.1, 2). Symptoms and signs of tar spot were also observed on husks. Symptoms observed were similar to published descriptions and images. (1,2,3)

Impact

The majority of information on tar spot originates from Mexico and Central America where the disease is prevalent. Literature (1,2,3) notes that *Phyllachora maydis* alone is not known to cause economic damage in these areas, but the presence of *P. maydis* with another fungus, *Monographella maydis*, can result in a disease complex and subsequent yield loss. *Monographella maydis* was not detected in any of the U.S. samples, and no associated yield loss was documented in IN and IL fields with the disease.

It is not known whether this fungal pathogen will overwinter in the United States. Coordinated survey efforts in 2016 will provide important epidemiological information for this first documented confirmation of *P. maydis* in the United States.

Distribution of Corn Tar Spot in the United States

Phyllachora maydis, causal agent of corn tar spot, was observed only in Indiana and Illinois in 2015. It is suspected that spores of the tar spot fungus arrived from a weather event that originated in Mexico. The tar spot fungus is not known to be seed-borne. The presence of *P. maydis* was confirmed from corn foliage in a total of 13 IL and 7 IN counties. (Figs. 4a,b).

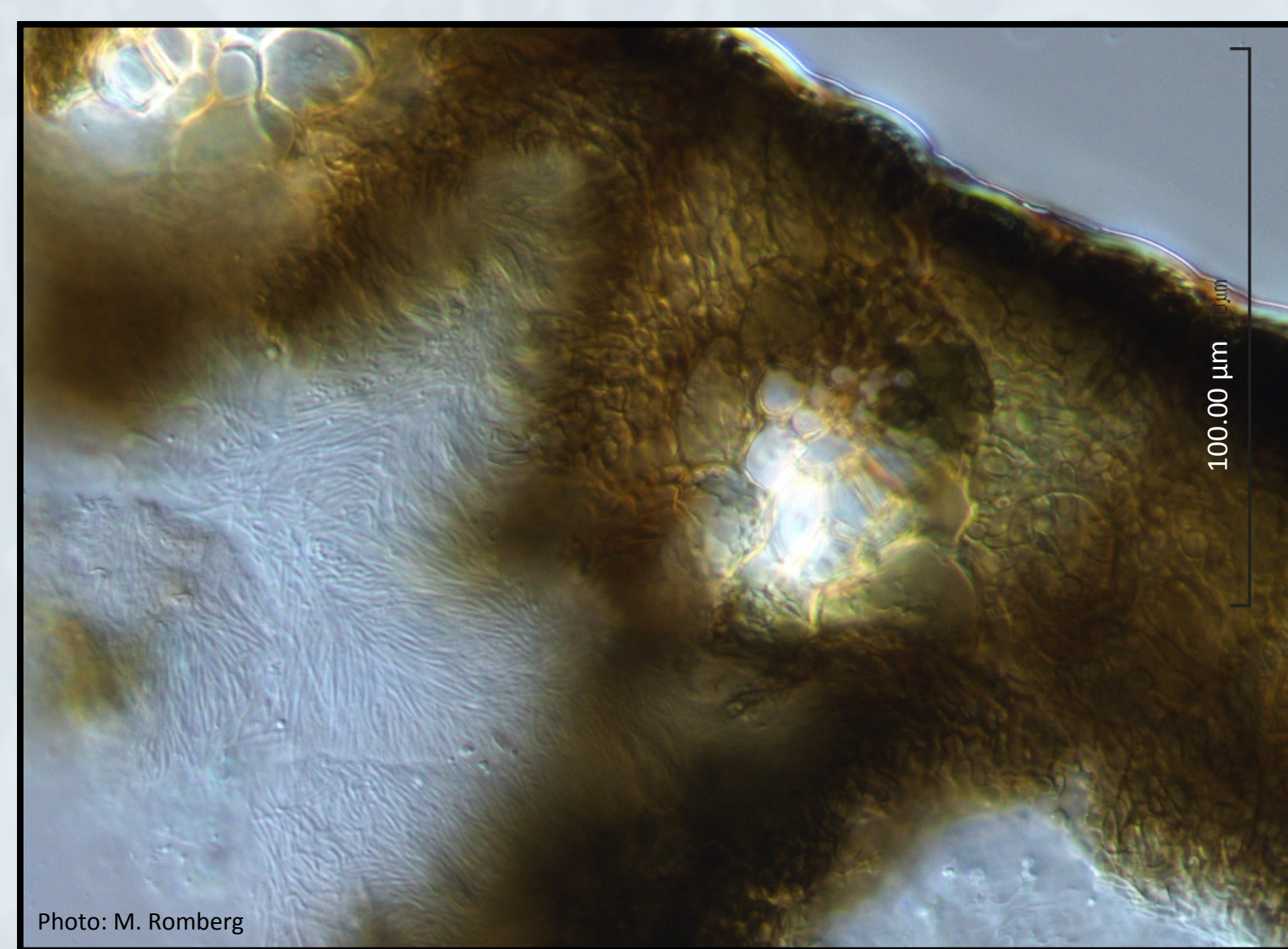


Figure 3a. Asexual (mitotic spore) state of *P. maydis* (= *Linochora*)

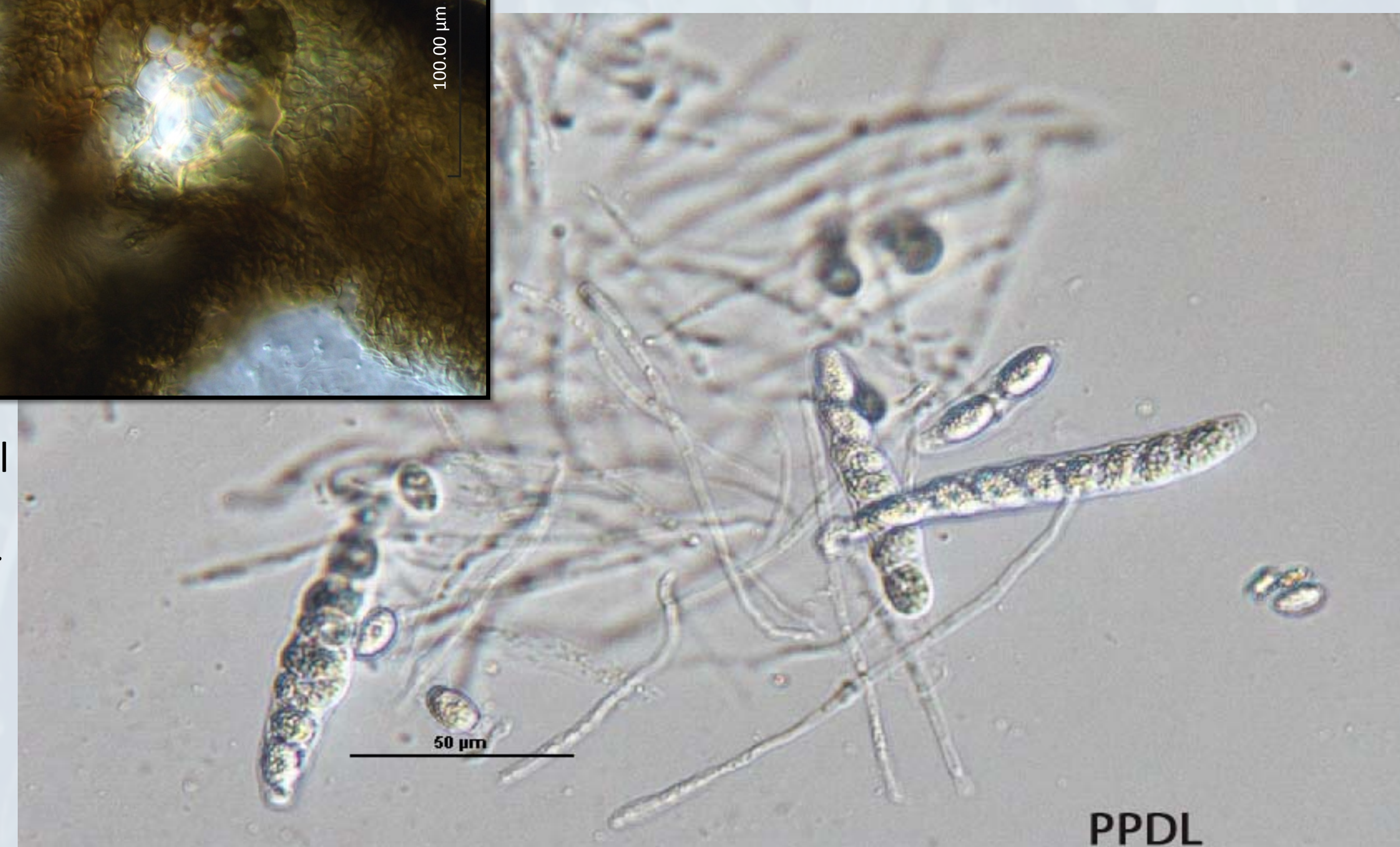


Figure 3b. *Phyllachora maydis* Maubl asci and ascospores

Identification

The causal agent of the foliar spotting on corn foliage was determined to be *Phyllachora maydis* Maubl, using morphological confirmation via microscopic examination (Figs. 3a,b) with comparison to published descriptions of the fungus (4).

Sequencing was performed following DNA extraction directly from ascomata on leaves and molecular amplification of internal transcribed spacer regions generated using ITS4 and ITS5. The sequence of *P. maydis* resulting from the original Indiana sample was submitted to GenBank (accession KU184459) (6). No *P. maydis* accessions previously existed in GenBank.

Figure 4a. (below): Map of IL showing counties in 2015 with confirmed presence of corn tar spot.

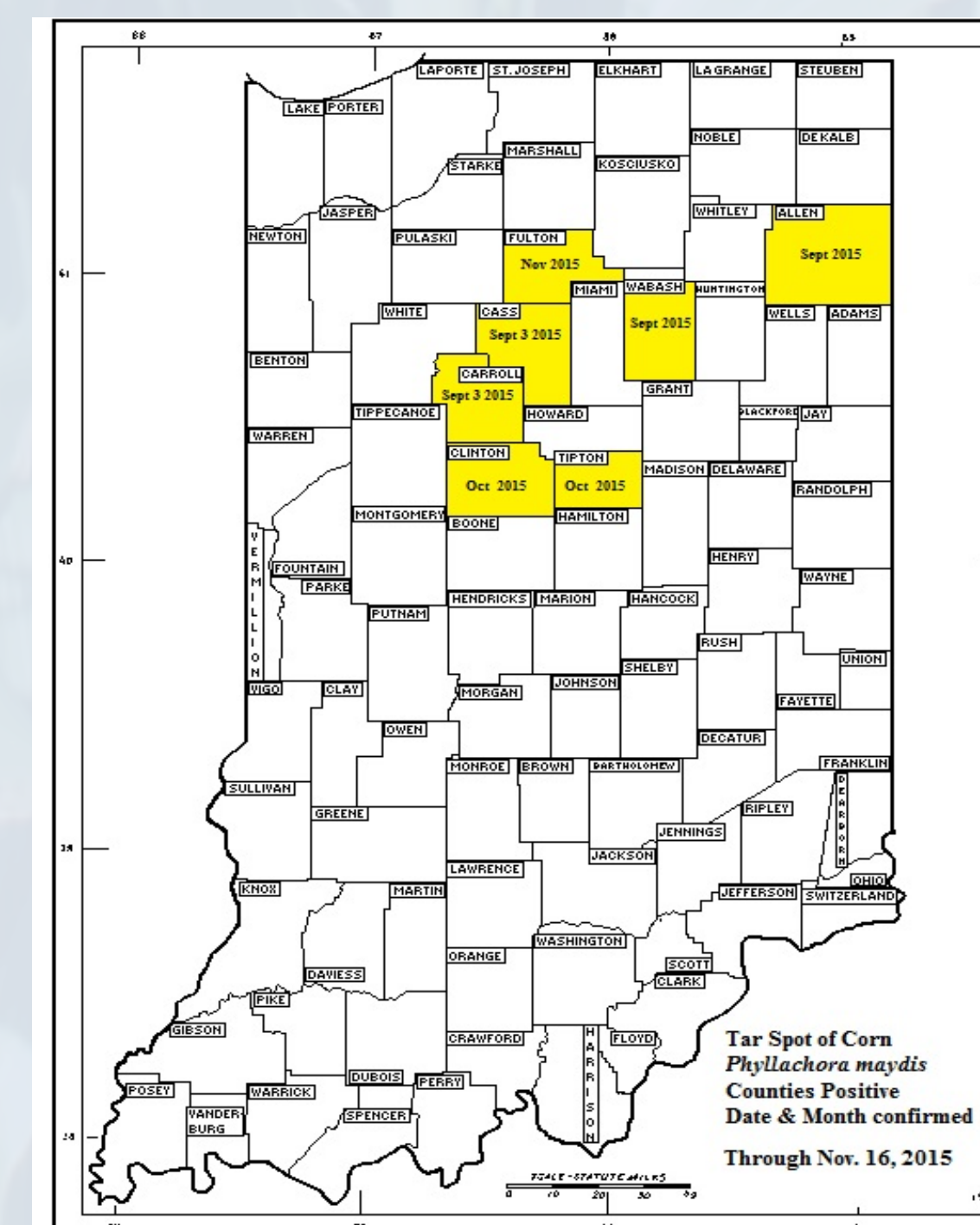
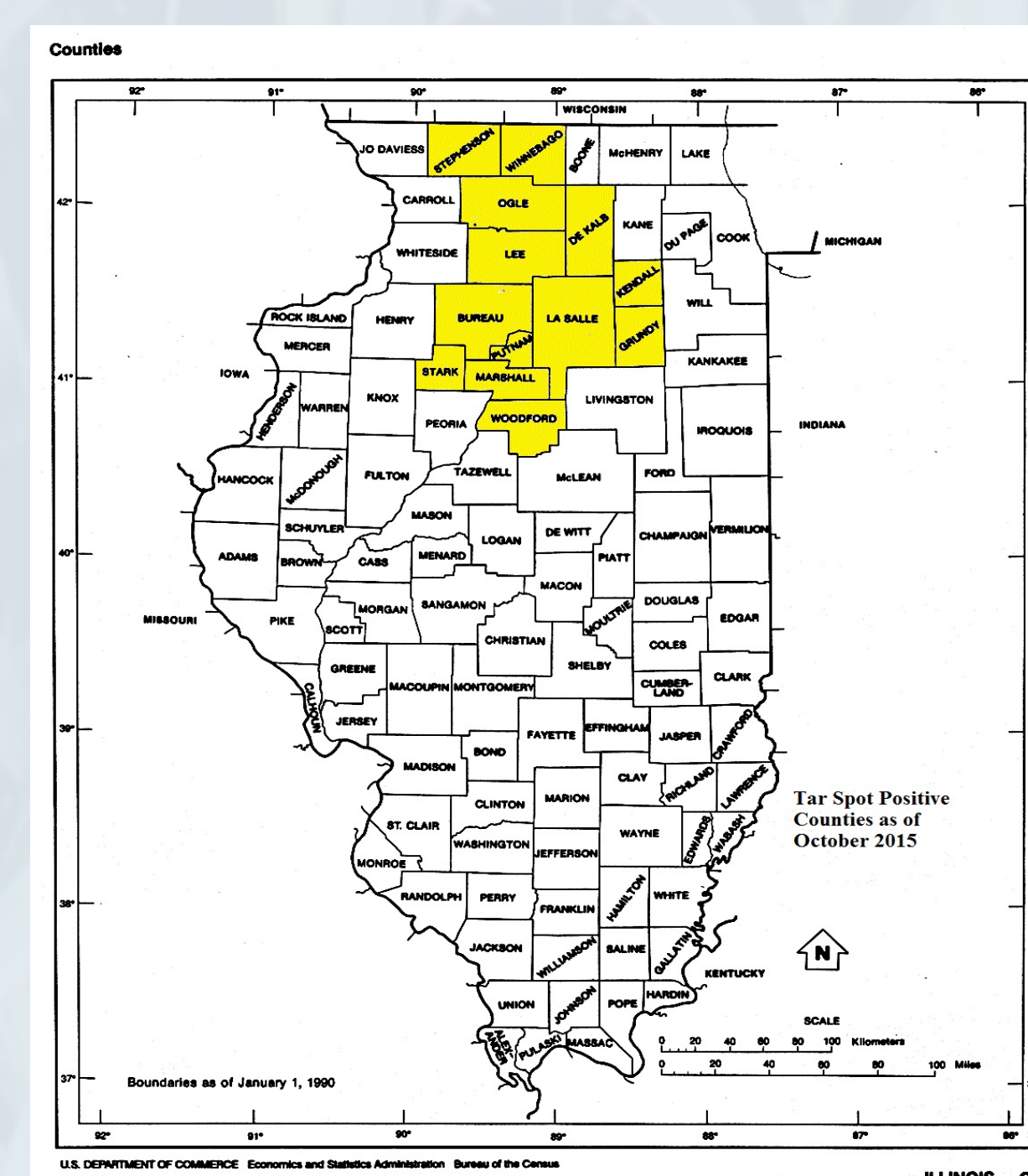


Figure 4b. (above) Map of IN showing counties in 2015 with confirmed presence of corn tar spot.

References

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<http://apsjournals.apsnet.org/doi/pdfplus/10.1094/PDIS-12-15-1506-PDN.2016>