CORN MARKETING PROGRAM
CMPM
OF MICHIGAN

2017 Research Report

Gibberella Ear Mold, Seedling Damping Off and Root Rot, and Responding to Emerging Diseases

Dr. Martin Chilvers
Field Crops Pathologist
Michigan State University

Gibberella ear mold

150 Fusarium isolates have been collected from corn grain or ear samples from Michigan. The intent of this project is for Masters student Mikaela Breunig to determine which species of Fusarium are causing ear mold in corn and head blight in wheat, the isolates chemotype (i.e. which mycotoxins they are producing), and the isolates fungicide sensitivity to inform management practices.

In a CMPM funded project to Maninder Singh we have assisted and sprayed six field sites that received a Proline fungicide treatment during silking to determine efficacy of this management practice. Dr. Singh's graduate student is currently processing the grain samples for insect damage, DON quantity a yield. My graduate student is assisting with ear mold identification.

Seedling damping off and root rot

We conducted a trial to dial in rates and strains of Rhizoctonia inoculum, this will aid in the screening of fungicide seed treatments and germplasm for improved Rhizoctonia management.

Screening of Pythium, Rhizoctonia, and Fusarium isolates continues to idenfity the major players of stand loss and root rot in corn. Data are currently being assembled for a manuscript describing the Pythium species recovered from corn in Michigan.

A corn stalk rot trial was conducted with Bayer to examine new fungicide treatments for anthracnose stalk rot managent. Unexpected stand loss was observed in one hybrid, both Colletotrichum and Pythium were recovered from diseases seedlings. Stalk rot assessments and Pythium species identification will determine if stand loss was due to one disease over the other.

Figure: 2017, corn stalk rot trial, inoculated with 4ml/ft of Colletotrichum graminicola. Obvious stand loss was incurred in this hybrid.

Responding to emerging diseases

Tar spot

The following paragraph is a draft of our multistate report for tar spot of corn. This report will be of value in documenting which pathogen species are present and the amount of damage the disease is doing, and may assist with federal support for additional research.

> Leaf lesions typical for those reported for tar spot of corn caused by Phyllachora maydis were observed in commercial corn hybrids (Zea mays) in various states. In 2016, symptoms were observed in Jones county, Iowa, in Green and Iowa counties, Wisconsin, and in Allegan county Michigan. In 2017, symptoms were observed in Grant and Lafayette counties, Wisconsin and again in Allegan county Michigan. Leaf signs and symptoms included ascomata, often surrounded by a narrow tan halo, on both healthy and necrotic tissue. Disease severity and incidence varied from field to field. Some fields had very few infected plants (<1%) and some infected leaves only had a single ascoma, while in 2017 one field in Michigan had up to 90% infected plants with up to 80% disease severity on individual leaves. Morphological characters from all examined leaves from all locations were similar. Ascomata contained numerous paraphyses, with asci containing ascospores. DNA was extracted from pieces of leaf tissue containing ascomata. Both strands of the internal transcribed spacer (ITS) region of the ribosomal RNA gene were sequenced. Sequences were identical, and matched with 90% query cover and 97% sequence homology to GenBank deposit Accession No. KU184459.1. A representative sequence was deposited GenBank Accession No. XXXXX. Koch's postulates were not performed given the obligate nature of the pathogen. Significantly, this report documents the first confirmation of Tar spot on corn in three states surrounding Indiana and Illinois, where it was first reported in 2015. The economic impact of this disease is not known, however disease did occur late in the season.

The amount of tar spot disease that we observed in a couple of Allegan county fields was alarming in 2017. We will closely monitor surrounding fields in 2018 with the hopes of establishing a fungicide management trial, should tar spot develop.

We also developed a YouTube video to aid agronomists and farmers in the identification of tar spot disease.

Southern rust

We have been keeping and eye on reports and scouting for other diseases of potential threat including, southern rust, Goss's wilt and bacterial leaf streak. In 2017 we did confirm southern rust of corn in a couple of counties. It was most likelly not at levels that would have had a substantial impact on yield, but this disease has not been reported in Michigan before.

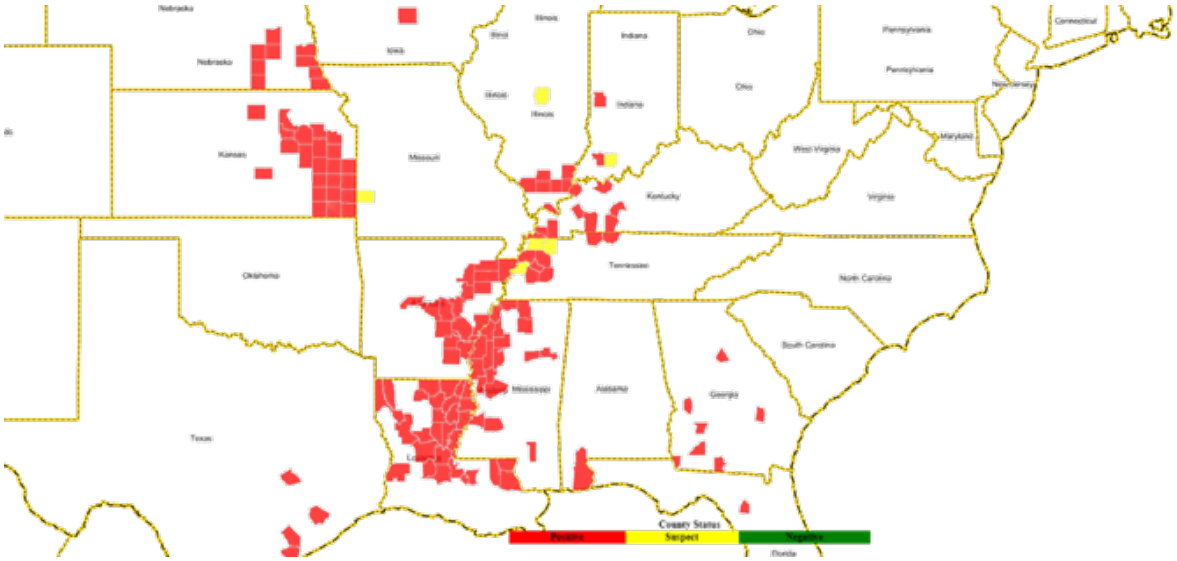

Figure: Distribution of corn southern rust as of July 24, 2017.

Grower, CCA, and industry education

Presentations:

1. Field crop disease management update. Agribusiness meeting, MSU Pavilion, East Lansing, MI. Dec 20, 2017. 320 participants.
2. Tar spot. Michigan Farmer
3. Corn tar spot now in 5 states. Brownfield Ag News. Interview by Mark Dorenkamp. Oct 11, 2017.
4. YouTube: Tar spot of corn. Oct 9, 2017
5. Research update: Defending Michigan corn from yield robbing diseases. Michigan Corn: Between the rows. Fall, 2017.
6. Mycotoxins in corn. Brownfield Ag News. Michigan Farm Radio Interview. Interview by Mark Dorenkamp. Sep 25, 2017.
7. MSU soybean variety performance trial tour. Soybean and corn disease discussion. Allegan, MI. 20 participants
8. Soybean, and corn disease update. Alma, MI. Aug 30, 2017. 30 participants
9. Southwest Michigan Row Crops Field Day 2017, Vicksburg, MI. Aug 2, 2017. 36 participants
10. Mycotoxin issues in Michigan. East Lansing, MI. Jun 13, 2017 55 participants
11. Field crop disease update. Corey Seed Crop Shop. Fenton, MI. Mar 16, 2017. 55 participants
12. IPM, Sanilac. Feb 23, 2017. 102 participants
13. IPM, Dowagiac. Feb 22, 2017. 54 participants
14. IPM, Dundee. Feb 21, 2017. 68 participants
15. IPM, Saginaw. Jan 13, 2017. 92 participants
16. IPM, Mt. Pleasant. Jan 12, 2017. 62 participants
17. New and emerging corn diseases. Michigan AgriBusiness Association (MABA). Lansing, MI. Jan 10, 2017. 90 participants
18. Fantastic Fungicides! SouthWest Agricultural Conference. Ridgetown, ON, Canada. Jan 4-5, 2017. 3 sessions total of 270 participants

Extension articles:

1. Chilvers, M.I., McCoy, A., Byrne, J. Oct 10, 2017. Corn tar spot confirmed in Michigan. MSUE News for Ag
2. Chilvers, M.I. Jul 18, 2017. Corn disease management decisions. MSUE News for Ag
3. DiFonzo C., Chilvers, M.I. Jul 13, 2017. Time to scout and manage WBC in southern MI. Fast Fonz Facts

Additional Outputs Related to Corn Pathology:

1. Noel, Z.A., Rojas, A.J., Jacobs, J.L., Chilvers, M.I. In Preparation. Development and evaluation of a high-throughput fungicide sensitivity assay for oomycetes. Phytopathology (this work included Pythium strains from corn, and provides relevant information for the corn-soybean rotation)

2. Noel, Z.A., Wang, J. Chilvers, M.I. Submitted Jun 20, 2017. Guidelines for accurate EC50 estimation for fungal and oomycete plant pathogens. Plant Disease (this work included Pythium strains from corn, and provides relevant information for the corn-soybean rotation)

3. Romero, L.M., Aime, M.C., Chilvers, M.I., Wise, K.A. Accepted July 17, 2017. Genetic diversity of Stenocarpella maydis in the major corn production areas of the United States. Plant Disease

4. Rojas, J.A, Jacobs J., Napieralski, S., Karaj, B., Bradley, C.A., Chase, T., Esker, P., Giesler, L., Jardine, D., Malvick, D. Markell, S., Nelson, B., Robertson, A., Rupe, J., Smith, D., Sweets, L., Tenuta, A., Wise, K., Chilvers, M.I. 2017. Oomycete species associated with soybean seedlings in North America – Part I: Identification and pathogenicity characterization. 107:280-292 (this work also included Pythium strains from corn, and provides relevant information for the corn-soybean rotation)

5. Rojas, J.A, Jacobs J., Napieralski, S., Karaj, B., Bradley, C.A., Chase, T., Esker, P., Giesler, L., Jardine, D., Malvick, D. Markell, S., Nelson, B., Robertson, A., Rupe, J., Smith, D., Sweets, L., Tenuta, A., Wise, K., Chilvers, M.I. 2017. Oomycete species associated with soybean seedlings in North America – Part II: Diversity and ecology in relation to environmental and edaphic factors. 107:293-304 (this work also included Pythium strains from corn, and provides relevant information for the corn-soybean rotation)