What caused this issue?

Most of this damage is a result of infection and colonization by a group of fungal species called Diaporthe. This group is implicated in diseases such as stem canker, pod and stem blight (Figure 2), and Phomopsis seed decay (Figure 3) (next page). Excessive rains at the end of August and throughout September and October resulted in a large amount of pod infection by Diaporthe. These infections combined with delayed harvest allowed for extensive seed colonization by these fungi. This resulted in Phomopsis seed decay which has led to visually damaged seed and the germination issues we are now seeing. To learn more about this group of fungi and the diseases they cause, visit the Crop Protection Network (CPN) website on pod and stem blight and Phomopsis seed decay by clicking here. You can also download a PDF version of the CPN fact sheet on the same subject by clicking here.

How Do I manage this Problem at Planting in 2019?

Soybean seed producers should try to clean seed to achieve less than 20% damaged seed in a seed lot. Multiple cleaning steps might be needed to achieve this level. While testing germination now is recommended, remember that testing germination again next spring
We also recommend that as a farmer, you double check the percent germination on every seed lot prior to planting and adjust your seeding rates accordingly. Here are our recommendations for soybean seeding rate based on yield potential and white mold risk: The Soybean Seeding Rate Conundrum.

If I’m a Seed Producer, What Should I Do to Prevent this Problem Next Year?

Foliar fungicide applications during the growing season could reduce the damage from Diaporthe. Some work has demonstrated that fungicide applications between the R3 to the R5 growth stages might be useful in reducing damage. This might help improve seed quality, but not necessarily improve yield. For a list of fungicide products with efficacy ratings for soybean, take a look at this additional publication from the CPN by clicking here.

The Effect of Tar Spot on Corn Hybrids in Wisconsin in 2018

Damon Smith, Department of Plant Pathology, University of Wisconsin-Madison, Brian Mueller, Department of Plant Pathology, University of Wisconsin-Madison, Joe Lauer, Department of Agronomy, University of Wisconsin-Madison, Kent Kohn, Department of Agronomy, University of Wisconsin-Madison, Thierno Diallo, Department of Agronomy, University of Wisconsin-Madison

and potentially just prior to delivery will also help you to understand the germination rate and determine if other management strategies need to be employed such as fungicidal seed treatments.

Seed treatments can help improve the germination rate of seed damaged by Diaporthe. However, you will need more than metalaxyl or mefonoxam active ingredients in your seed treatment. Metalaxyl and mefonoxam are good against Phytophthora and Pythium, but not effective against other organisms, like Diaporthe. Seed treatments with Phomopsis on the label have an additional fungicide (either a DMI or SDHI). Page 157 of the publication A3646 – Pest Management in Wisconsin Field Crops has a table of some of the seed treatments with Phomopsis on the label. Also available is the seed treatment efficacy table from the Crop Protection Network (CPN). You can download that publication by clicking here.

Tar Spot signs and symptoms on a corn leaf

It was a challenging year for farmers, practitioners, and extension personnel. This fall and winter has been consumed with questions and meetings trying to evaluate all of the disease issues of 2018, especially on corn. The topic of main concern has been tar spot and what the data are telling us in terms of managing this problem moving forward.
If you want to know more about the disease, you can read my previous post on the subject or watch my short video.

This full report is attached at the end of the newsletter. Or you can view it on at >> [https://badgercropdoc.com/2018/12/19/effect-tar-spot-corn-hybrids-wisconsin-2018/](https://badgercropdoc.com/2018/12/19/effect-tar-spot-corn-hybrids-wisconsin-2018/)

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**Glyphosate Resistance Confirmed in Common Ragweed from Columbia County, Wisconsin**

Joe Zimbric (Graduate Research Assistant) and Dave Stoltenberg (Professor), Department of Agronomy, University of Wisconsin-Madison

Common ragweed (Ambrosia artemisiifolia) is a widely distributed weed species in Wisconsin. In a survey of 64 soybean fields located in 10 counties from southwest to east-central Wisconsin, we found that common ragweed was among the most abundant broadleaf weed species, present in 53% of all fields (Fickett et al. 2013). Globally, occurrence of herbicide resistance in common ragweed currently totals 37 unique cases of resistance to one or more herbicide sites of action (Heap 2018) including acetolactate synthase (ALS) inhibitor resistance in Wisconsin (Butts et al. 2015).

Among these 37 unique cases for common ragweed, resistance to glyphosate (Group 9 EPSP synthase inhibitors) or ALS inhibitors (Group 2) have been the most common (Heap 2018). However, the most recent reports have been cases of multiple resistance to glyphosate, ALS inhibitors, and protoporphyrinogen oxidase (PPO) inhibitors (Group 14). In 2010, multiple resistance to glyphosate and the ALS-inhibitor cloransulam was confirmed in a population found in a Minnesota soybean production system. In 2016, multiple resistance to cloransulam and the PPO-inhibitor fomesafen was confirmed in a population from Michigan. More concerning is three-way resistance (glyphosate, ALS- and PPO-inhibitors) which has been found in populations from a number of eastern states.

To our knowledge, the sole instance of confirmed herbicide resistance in Wisconsin common ragweed is a population from Brown County resistant to cloransulam (Butts et al. 2015). However, a common ragweed population located in Columbia County was reported in 2017 that was suspected of being resistant to glyphosate.

Field histories suggested that this population had survived repeated exposure to glyphosate over several years in a long-term corn-soybean rotation.

We conducted research during 2018 to confirm and quantify suspected glyphosate resistance in this common ragweed population and also determine if the population showed multiple resistance to the ALS-inhibitor cloransulam and PPO-inhibitor fomesafen.

Seeds were collected in September 2017 from suspected glyphosate-resistant (R) and -sensitive (S) plants. We conducted dose-response experiments under greenhouse conditions on the UW-Madison campus following standard methods for herbicide resistance testing.

**Glyphosate Resistance Confirmed**

The results of our experiments confirmed glyphosate resistance in the common ragweed population from Columbia County (Figures 1 and 2). The population showed a 4-fold level of glyphosate resistance based on the glyphosate rate that reduced shoot biomass 50% compared to non-treated plants, and over 20-fold level of resistance based on the rate that reduced shoot biomass 90%. Even at the 10X rate of glyphosate, many of the
Resistance management strategies are key to reduce the selection for herbicide-resistant weeds, and if present, to reduce their persistence and spread. These strategies include:

* Understanding the biology of weeds present and using a diversified approach to managing those weeds with the intent to prevent weed-seed production.

* Using weed-free crop seed and planting into weed-free fields.

* Scouting fields routinely to aid in identifying potential weed management issues.

* Using appropriate cultural practices that increase crop competitiveness with weeds.

* Using multiple herbicide sites of action at the labeled rates and at recommended weed heights.

* Cleaning equipment after use to prevent spread of weed-seed from field to field.

More information on herbicide resistance management can be found at https://iwilltakeaction.com/weeds and http://wssa.net/wssa/weed/resistance/.

References


2018 Wisconsin Field Crops Pathology Fungicide Tests Summary Now Available

Damon Smith, Extension Field Crops Pathologist, Department of Plant Pathology, University of Wisconsin-Madison; Brian Mueller, Assistant Field Researcher, Department of Plant Pathology, University of Wisconsin-Madison

Each year the Wisconsin Field Crops Pathology Program conducts a wide array of fungicide tests on alfalfa, corn, soybeans, and wheat. These tests help inform researchers, practitioners, and farmers about the efficacy of certain fungicide products on specific diseases. The 2018 Wisconsin Field Crops Fungicide Test Summary is now available. These tests are by no means an exhaustive evaluation of all products available, but can be used to understand the general performance of a particular fungicide in a particular environment. Keep in mind that the best data to make an informed decision, come from multiple years and environments. To find fungicide performance data from Wisconsin in other years, visit the Wisconsin Fungicide Test Summaries page. You can also consult publication A3646 – Pest Management in Wisconsin Field Crops to find information on products labeled for specific crops and efficacy ratings for particular products. Additional efficacy ratings for some fungicide products for corn foliar fungicides, soybean foliar and
seed-applied fungicides, and wheat foliar fungicides can be found on the Crop Protection Network website.

Mention of specific products in these publications are for your convenience and do not represent an endorsement or criticism. Remember that this is by no means a complete test of all products available. You are responsible for using pesticides according to the manufacturers current label. Some products listed in the reports referenced above may not actually have an approved Wisconsin pesticide label. Be sure to check with your local extension office or agricultural chemical supplier to be sure the product you would like to use has an approved label. Follow all label instructions when using any pesticide. Remember the label is the law!

2019 IPM Field Scout Training Class

Bryan Jensen, UW Extension and IPM Program

A friendly reminder that the Madison Field Scout Training Classes will be held on the UW Madison Campus from January 7-11, 2019. The course is designed to provide profession development including the skills necessary for proper pest identification, crop scouting techniques as well as provide complimentary baseline information for people preparing for the state CCA exam. Additional information such as crop growth and development, pest life cycle, pest damage symptoms and economic thresholds will be covered. Pest control recommendations, although discussed, will not be highlighted in detail during this course. Crops covered will include, corn, alfalfa, soybean and wheat. Click here for the course syllabus.

Non-student registration fee is $225/person but does not cover campus parking. Online registration (preferred) for the Field Crop Scout School can be made at the PAT Store. Checks should be made payable to University of Wisconsin-Madison and sent to Bryan Jensen, Dept. of Entomology, 1630 Linden Dr., Madison, WI 53706.

For more information on this course, please contact Bryan Jensen at:

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Wondering What is in Your Bt Trait Package?

Bryan Jensen, Dept. of Entomology

Keeping up with the different Bt proteins found in both new and old trait packages does not have to be difficult. Dr. Chris DiFonzo, Extension Entomologist at Michigan State University, has updated her Handy Bt Trait Table. Kudos to Chris and contributor Dr. Pat Porter (Texas A&M University) for taking the time and effort to help us all out. This table greatly simplifies the selection process. It is on my “must read” list.

UW/UWEX Plant Disease Diagnostic Clinic (PDDC) Update December 14

Brian Hudelson, Sue Lueloff, John Lake and Ann Joy

The PDDC receives samples of many plant and soil samples from around the state. The following diseases/disorders have been identified at the PDDC from December 8, 2018 through December 14, 2018.

The 12/14/18 PDDC Wisconsin Disease Almanac (i.e., weekly disease summary) is now available at:


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WCM-127
The Effect of Tar Spot on Corn Hybrids in Wisconsin in 2018

Damon Smith, Department of Plant Pathology, University of Wisconsin-Madison
Brian Mueller, Department of Plant Pathology, University of Wisconsin-Madison
Joe Lauer, Department of Agronomy, University of Wisconsin-Madison
Kent Kohn, Department of Agronomy, University of Wisconsin-Madison
Thierno Diallo, Department of Agronomy, University of Wisconsin-Madison

If you are like me, you are probably wishing 2018 would just go ahead and get it over with. It was a challenging year for farmers, practitioners, and extension personnel. This fall and winter has been consumed with questions and meetings trying to evaluate all of the disease issues of 2018, especially on corn. The topic of main concern has been tar spot and what the data are telling us in terms of managing this problem moving forward. I’m not going to re-hash what tar spot is and what causes it here. If you want to know more about the disease, you can read my previous post on the subject or watch my short video. I will say that the epidemic was significant and in some locations in Wisconsin, hit yields reasonably hard. I am getting a number of questions about hybrid resistance to tar spot. Is there any? What hybrids are resistant? Well, let’s take a look at a little data.

The Hybrid Performance Trials

The epicenter of the 2018 epidemic in Wisconsin was definitely in the Southwestern part of the state. Areas around Cuba City to Platteville were hit hard and early. As part of the Wisconsin Hybrid Performance Trials a test plot was evaluated for tar spot near Montfort, WI. Details of the implementation, data acquisition and other information pertaining to the Wisconsin Hybrid Performance Trials can be found by clicking here. In addition to the data that was described there, we evaluated tar spot severity and canopy greenness and related that information to grain yield. Those data are below.
Acquiring the Data

Disease ratings for this location were performed on two dates. For the early (98-106 day) relative maturity (RM) trial we rated tar spot severity on the ear leaves on 8/31/2018. For the late RM trial (104-113 day) we rated tar spot severity on 9/4/2018. In addition to taking tar spot data, we also determined the canopy greenness as the relative percentage of canopy still green on that rating date. Many have observed that as tar spot severity increased, corn plants tended to dry faster. The greenness score was meant to understand the level of senescence relative to the tar spot severity level. Yield was determined as described in the details of the hybrid performance trials. We then used standard mixed-model analysis of variance to determine differences in tar spot severity, canopy greening, and yield. We also looked at the relationship of tar spot severity to yield using linear regression. This latter analysis was meant to understand the yield reductions relative to the tar spot severity across hybrids at this location.

The Results

For both the early RM trial (Figure 1) and the late RM trial (Figure 2) there were significant differences in tar spot severity among hybrids tested.

**Early** RM Hybrid Trial - Montfort, WI (8/31/2018)

![Figure 1. Tar Spot Severity and canopy greenness for early RM hybrids at Montfort, WI in 2018.](image-url)
Some hybrids do appear to be relatively resistant with severity ratings averaging 10-20%. However, other hybrids seems quite susceptible with severity ratings near 50%. No particular brand had hybrids that were more resistant than the other brand. Each hybrid varied in its level of resistance within brand. Also, note that no hybrid was completely devoid of disease. There appears to be no complete resistance to tar spot, but definitely some partial resistance in some hybrids.

Canopy greenness was generally negatively correlated with increasing tar spot severity. What was interesting is that as tar spot severity (area of the ear leaf covered by tar spot, spots) increased to 50%, canopy greenness often fell almost to 0%! Indeed, tar spot does seem to induce early senescence, especially in hybrids that aren’t as resistant.

Figures 3 and 4 show yield data from both the early RM (Figure 3) and late RM (Figure 4) trials for each of the same hybrids from the figures above. Hybrids are in the same order, and in both cases, there does seem to be some general yield reduction from low tar spot severity to high tar spot severity. But how much?
Yield in **Early** RM Hybrid Trial - Montfort, WI

<table>
<thead>
<tr>
<th>F-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.78</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

Figure 3. Yield from the early RM trial at Montfort, WI in 2018.

Yield in **Late** RM Hybrid Trial - Montfort, WI

<table>
<thead>
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<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.06</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

Figure 4. Yield from the late RM trial at Montfort, WI in 2018.
Our subsequent linear regression analysis (Figure 5) shows that there was clearly a trend toward lower yield as tar spot severity increased. For the early RM trial the fit of our line is better than for the late RM trial, however, the slope of the line indicates that there was a general reduction in yield as tar spot severity increased. For the early RM trial as tar spot severity increased by 10%, yield was reduced by about 7.8 bushels/acre, however, yield potential in this trial was almost 254 bushels/acre. In the late RM trial yield potential was 262 bushels/acre, but for every 10% increase in tar spot severity, yield was reduced by 13.5 bushels/acre.

Clearly there is some error in fitting our lines here and some “noise” in the data. This is most likely due to some differences in RM rating among companies and inherent genetic differences. However, there does seem to be a trend that as tar spot increases, grain yield in corn can be reduced. At this particular location, if we extrapolated our estimates out, at high ear leaf severity (45-50%), yield was reduced by 40-60 bushels/acre.

Yield Loss – Montfort, WI Hybrid Evaluation

![Graph showing yield loss with tar spot severity](image)

*High severity (45-50% ear leaf severity) led to estimated yield reductions of 40—60 bu/a

Figure 5. Yield relative to increasing tar spot severity for the early and late RM trials at Montfort, WI in 2018.

The Take Home

Some corn hybrids are more resistant than others to the tar spot pathogen. Resistance is not tied to a particular brand. That is to say, when it come to tar spot, every hybrid has to stand on its own. Strong resistance in corn hybrids in the trial above wasn’t common and immunity did not exist. As you make seed selections for 2019, push your seedsman to show you data from other trials for a particular hybrid where tar spot was a problem. Check other states data if you have to. For example, Dr. Martin Chilvers at Michigan State University conducted similar tar spot ratings on hybrids tested in Michigan. You can find the results of these hybrid evaluations by clicking here. Look for hybrids that gave a consistent response across multiple locations. Realize, even the best hybrid will still get some tar spot if the weather is favorable for the disease. Fungicides might be warranted to further reduce tar spot once you have chosen a resistant hybrid.

There are fungicides that do a decent job of reducing tar spot severity. The 2018 Wisconsin Field Crops Pathology Fungicide Tests Summary includes several trials where the efficacy of tar spot was evaluated. You can find those trials by clicking here. While there does seem to be some good choices in fungicide products, timing of application will be critical. It seems that fungicide applications that most closely coincided with the
onset of the tar spot epidemics in a particular location, gave the best results. Thus, the performance of a fungicide will only be as good as the application timing relative to the start of the epidemic. To assist in making recommendations to spray, we are working on a tar spot prediction tool. Look for details of this tool next summer and be sure to follow Wisconsin Crop Manager News and Badercropdoc.com to get the latest updates and recommendations.