Tar Spot – A New Disease of Concern in Irrigated Corn

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Tar spot of corn caused by the fungus *Phyllachora maydis*
Michigan 2017, 40 bu/A loss
Tar spot ascomata, asci and ascospores
Phyllachora maydis
Tar spot confirmations

[Map showing confirmed cases in various states with labels '15' and '16']
Did you see tar spot elsewhere? Or experience significant yield loss?

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2018 Tar spot confirmations – Michigan
11/15/18

★ 50 bu/A losses reported (possibly greater)
Tar spot confirmations
What do we know?

Hock et al. 1995

- Monthly average temp of 63 F – 72 F
- Average RH greater than 75%
- Average of 7h/night of leaf wetness
- 10-20 foggy days per month
- Monthly rainfall total of at least 5.9 inches

Fig. 4 Maize-producing counties vulnerable to tar spot complex (TSC) calculated based on climate similarity indices using historic climatic data from the counties where TSC has been detected. Source: developed by authors.
Tar spot progression (2 week)

Disease first observed July 8, 2018

Aug 24, 2018

Sep 7, 2018
Fungicide trial (image Sep 7)
Fungicide trial (image Sep 7)

Fungicides applied on Aug 10 at R3:
- QoI/Strobularins FRAC 11 [Headline 2.09 SC 12fl oz/A]
- DMI/Triazoles FRAC 3 [Proline 480 SC, 5.7 fl oz/A]
- Premix QoI & DMI FRAC 11 & 3 [Delaro 325 SC, 11 fl oz/A]
Fungicide trial – sprayed @ R3 (Aug 10, photo Sep 7, 2018)
<table>
<thead>
<tr>
<th>Control</th>
<th>DMI (Proline)</th>
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Fungicide trial – sprayed @ R3 (Aug 10, photo Sep 7, 2018)
Tar spot disease severity: Ear leaf and + 2

Disease severity <3% on Aug 10 at time of fungicide application

- DSetarAug24
- DSe2tarAug24
- DSetarSep7
- DSe2tarSep7

Disease severity (%)

Legend:
- Untreated
- QoI (Strobilurin) FRAC 11
- DMI (Triazole) FRAC 3
- Premix QoI/DMI FRAC 11 & 3

P-values:
- P = 0.0309
- P = 0.0008
- P = 0.2985
- P = 0.2875

Comparison:
- a
- b
Hybrid resistance/susceptibility
Early maturity group resistance/susceptibility
Allegan Co., MI

Tar Spot Severity or Greeness (%)

Hyrbrid relative maturity

Tar Spot (%)  LSD = 8

Green (%)  LSD = 13

Chilvers, Byrne, Widdicombe, Singh

MSU Corn performance trials
Yield loss - 2018 Allegan performance trial

**Early maturity group**

\[ y = -0.4766x + 238.01 \]
\[ R^2 = 0.1959 \]

**Late maturity group**

\[ y = -0.6131x + 243.43 \]
\[ R^2 = 0.1388 \]

0.48 to 0.61 bu/A loss for every 1% increase in tar spot severity (i.e. 10% severity 5bu/A loss)
Tar spot on corn silage

Less affected

Severely affected

Image: Sam Katzer
Less affected

Severely affected
### Corn silage: quality (observational)

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<tr>
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<th>“Less affected”</th>
<th>“Severely affected”</th>
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<tbody>
<tr>
<td>Moisture %</td>
<td>52.4</td>
<td>19.0</td>
</tr>
<tr>
<td>Crude Protein %</td>
<td>8.2</td>
<td>7.5</td>
</tr>
<tr>
<td>ADF % (cellulose &amp; lignin)</td>
<td>14.5 (DM)</td>
<td>23.2 (DM)</td>
</tr>
<tr>
<td>aNDF % (cellulose, lignin, hemicellulose)</td>
<td>27.6 (DM)</td>
<td>38.4 (DM)</td>
</tr>
<tr>
<td>Lignin %</td>
<td>1.99 (DM)</td>
<td>3.37 (DM)</td>
</tr>
<tr>
<td>NDF Digestibility (30hr) %</td>
<td>58.1 (NDF)</td>
<td>50.9 (NDF)</td>
</tr>
<tr>
<td>Ethanol Soluble CHO %</td>
<td>7.2 (NFC) 4.2 (DM)</td>
<td>3.5 (NFC) 1.7 (DM)</td>
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<tr>
<td>Starch %</td>
<td>85.6 (NFC) 49.8 (DM)</td>
<td>89.1 (NFC) 42.8 (DM)</td>
</tr>
<tr>
<td>TDN (% DM)</td>
<td>76.5</td>
<td>71.2</td>
</tr>
<tr>
<td>Net Energy Lactation (Mcal/lb)</td>
<td>0.79</td>
<td>0.73</td>
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**Severely affected areas:**
- Too dry to ferment, may catch fire, require 40-60% moisture
- High lignin which is indigestible
- Overall lower quality and energy
- No associated mycotoxins

In severely affected fields may consider bailing dry stover after ear harvest.

M. Chilvers and K. Cassida
Cultural management practices

- Rotation and tillage offers little benefit
- Continuous corn and min. or no-till will increase risk (earlier infection)
- Irrigation favors infection conditions
- 150bu/A under irrigation vs 212bu/A non-irrigated (Jim Schaendorf)
- Limit leaf wetness when possible

- Scout fields
- Under heavy disease
- Consider harvesting early prior to lodging
Scouting for tar spot:
Scouting for tar spot: from the air
Management – many unknowns

- **Diversify hybrids** (i.e. plant > one or two hybrids)
  - Talk to seed salesperson for any info
  - Consider high stalk strength to reduce lodging
- **Avoid where possible planting into corn**
- **Scout**
- **Apply fungicide when?**
  - Disease initiates across field, few lesions on all plants
  - R1 appears to provide some protection
- **Irrigation**
  - Limit canopy moisture
- **Consider harvesting early prior to lodging**