Management Strategies for Bacterial Blight in Cotton

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Bacterial blight

- *Xanthomonas citri* subsp. *malvacearum* (*Xcm*)
- Pathogen has been reported in almost every country where cotton is grown
  - Bacterium is known to be seedborne (internal and external)
  - Capable of surviving in the soil on crop debris
  - Plants are susceptible throughout the growing season
  - Infections can take place on foliage and bolls

- Yield loss of 34% following inoculation
  - 35-59% in field epidemics (1950) pre acid delinting
  - Currently, negligible losses have occurred; however, sporadic outbreaks do occur
Bacterial blight

- Pathogen can survive fairly well under arid conditions
- Disease development is highly dependent on environmental conditions
  - High humidity is required for infections to take place
    - In Texas, we see the disease during the middle to later part of the season: dense canopy, rainfall events or high irrigation capacity
  - Abrasion from blowing sand increases disease incidence early in the season
Bacterial blight or Angular leaf spot
Bacterial blight

Angular leaf spot

Vein necrosis

Leaf necrosis

Blackarm
Bacterial blight on cotton bolls
More recent and common symptoms
More recent and common symptoms
Bacterial blight
Bacterial blight management options

• How do I manage Bacterial blight
  – Variety selection
    • Diversification: DO NOT plant the entire farm to a single variety
  – Crop rotation
  – Residue management
  – Irrigation type

• There are no corrective measure
  • Fungicide applications are ineffective
  • Antibiotics are not labeled and cost prohibitive
Breakdown of cotton varieties susceptible to Bacterial blight Texas
Variety reaction Bacterial blight by brand name for Texas

- **All-Tex**: Susc 4, Res 2
- **Croplan Genetics**: Susc 2, Res 1
- **Deltapine**: Susc 3, Res 1
- **DynaGro**: Susc 2, Res 2
- **Fibermax**: Susc 5, Res 6
- **NexGen**: Susc 5, Res 3
- **Phytogen**: Susc 5, Res 3
- **Stoneville**: Susc 6, Res 4
Recent varieties with at least partial resistance to Bacterial blight

- FM 1830GLT, FM 2334GLT, FM 1900GLT, FM 2007GLT, FM 1888GL, FM 1953GLTP
- NG 3500XF, NG 3640XF, NG 3699B2XF, NG 4545B2XF, NG 4689B2XF
- PHY 223WRF, PHY 490W3FE, PHY 300W3FE, and PHY 243WRF
Effect of crop rotation on Bacterial blight

- Crop rotation – non-host crops that fit existing production systems
  - Resistant cotton varieties
  - Corn
  - Sorghum
  - Soybean
  - Peanut
**Effect of tillage on Bacterial blight**

<table>
<thead>
<tr>
<th>Tillage method</th>
<th>Severity (% leaf area affected)</th>
</tr>
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<tbody>
<tr>
<td>Conventional</td>
<td>33.0 a</td>
</tr>
<tr>
<td>No-till (mixed spp.)</td>
<td>24.0 a</td>
</tr>
<tr>
<td>No-till (rye)</td>
<td>11.5 b</td>
</tr>
</tbody>
</table>

- No differences in disease incidence were observed
- Incidence was somewhat correlated with stand (biomass)
  - Rye has a higher C:N ratio and persisted longer
50% rye
33% winter pea
10% vetch
7% radish
Bacterial blight management options

• Irrigation management
  – Limit use of overhead irrigation, reduce splash
  – Use of LEPA (low elevation precision application) systems are more efficient in delivering irrigation water
A new player? “The game is afoot”
Symptoms expression is first observed during flowering, intensifying during boll fill.

Increased water demand.

Coincides with time when temperatures increase and rainfall is limited.
8.0 lbs of lint were lost for every 1% defoliation at Floydada
9.7 lbs of lint were lost for every 1% defoliation at Ropesville
11.3 lbs of lint were lost for every 1% defoliation at Plainview
Verticillium Wilt Recommended Varieties

- All these varieties have good combinations of high yield, low wilt, and low defoliation
- NG 3500XF and NG 4545B2XF
- PHY 243WRF
- Possibly (want more testing): NG 3640XF and NG 3699B2XF
- Older varieties: FM 2484B2F, ST 4747GLB2, and FM 2322GL
RKN Variety Performance (irrigation effect across varieties)

- Low: 909
- Mod: 1161
- High: 1239
Table 1. Effect of variety and irrigation level on lint yield and revenue under moderate nematode pressure at AG-CARES, 2016

<table>
<thead>
<tr>
<th>Variety</th>
<th>Low (5.1&quot;)</th>
<th>Base (6.6&quot;)</th>
<th>High (8.2&quot;)</th>
<th>Variety mean</th>
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<tbody>
<tr>
<td>ST 4946</td>
<td>1,151 a</td>
<td>1,453 a</td>
<td>1,579 a</td>
<td>1,394</td>
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<tr>
<td>FM 2011</td>
<td>1,079 ab</td>
<td>1,332 b</td>
<td>1,567 a</td>
<td>1,326</td>
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<tr>
<td>NG 1511</td>
<td>971 bcde</td>
<td>1,358 ab</td>
<td>1,384 abc</td>
<td>1,238</td>
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<tr>
<td>FM 1911</td>
<td>900 cdef</td>
<td>1,257 b</td>
<td>1,448 ab</td>
<td>1,202</td>
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<tr>
<td>DP 1747</td>
<td>1,019 abcd</td>
<td>1,297 b</td>
<td>1,243 bcd</td>
<td>1,186</td>
</tr>
<tr>
<td>DP 1558</td>
<td>1,038 abc</td>
<td>1,277 b</td>
<td>1,239 cd</td>
<td>1,185</td>
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<tr>
<td>DP EXP 1</td>
<td>1,033 abcd</td>
<td>1,116 c</td>
<td>1,179 cd</td>
<td>1,109</td>
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<tr>
<td>PHY 417</td>
<td>870 def</td>
<td>1,084 cd</td>
<td>1,207 cd</td>
<td>1,054</td>
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<tr>
<td>PHY 427</td>
<td>910 cde</td>
<td>1,126 c</td>
<td>1,098 d</td>
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<tr>
<td>PHY 499</td>
<td>905 cde</td>
<td>1,050 cde</td>
<td>1,086 d</td>
<td>1,014</td>
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<tr>
<td>FM EXP 2</td>
<td>740 f</td>
<td>991 de</td>
<td>1,108 d</td>
<td>946</td>
</tr>
<tr>
<td>FM EXP 1</td>
<td>809 ef</td>
<td>693 e</td>
<td>1,042 d</td>
<td>848</td>
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<tr>
<td>Trial mean</td>
<td>934</td>
<td>1144</td>
<td>1236</td>
<td>--</td>
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<tr>
<td>LSD(0.05)</td>
<td>163</td>
<td>114</td>
<td>206</td>
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</tbody>
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Fusarium wilt
Fusarium wilt

- Previous studies
  - Emphasis on nematode resistant varieties
    - DP 174RF, ST 5458B2F, PHY 367WRF,
    - ST 4946GLB2, FM 2011GT,
    - PHY 417WRF, DP 1454 NRB2RF...
Fusarium wilt variety response

Fusarium wilt incidence (%)

LSD = 7.0
Fusarium wilt Race 4 (El Paso)