TARGET SPOT MANAGEMENT OPTIONS
IN ALABAMA COTTON FOR 2014

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Introduction

Target spot, caused by the fungus Corynespora cassiicola, was first reported by Jones (1961) in cotton in Mississippi and not reported for nearly 40 years until it emerged in the late 2000’s in southwest Georgia cotton (Kemeriat et al., 2011). In the past two years, outbreaks of target spot have occurred in cotton in Alabama (Campbell et al., 2012; Conner et al., 2013), Arkansas (Faske, 2013), Florida (Donahue, 2012), Louisiana, Mississippi (Allen and McIntire, 2013), South Carolina (Mueller, personal communication), North Carolina (Edminsten, 2012), Virginia (Walls et al. 2013). Pathogenicity of the causal fungus in cotton has been confirmed in Alabama by Conner et al. (2013) and Georgia by Fulmer et al. (2012).

Target spot is likely to be a significant threat in the lower to mid-South in intensively managed ‘rank’ cotton with a yield potential of 2.5+ bales/A but is less of an issue in the Tennessee Valley and adjoining cotton production areas. In southwest Georgia, Fulmer et al. (2012) reported 70% premature defoliation and estimated 200 lb lint/A losses. In a 2013 rainfed study in coastal southwest Alabama, a 360 lb lint/A yield loss was recorded for ‘Phytogen 499’ compared with 75 lb lint/A loss for ‘Deltapine 1050’ (Hagan et al., 2013a). In a 2013 study at the same location, target spot-initiated yield declines in ‘Deltapine 1252’ and ‘Phytogen 499’ approached 240 and 400 lb lint/A, respectively, in 3 bale/A cotton (Hagan, personal observation). Sizable target spot-related yield losses were seen in some but not all 2013 Central Alabama cotton field trials. As noted by Edminsten (2012), target spot probably will not be a significant threat in most years to cotton in the Upper South production areas, which would include the Tennessee Valley (i.e., north Alabama), where target spot activity in 2013 was either absent or limited to minimal premature defoliation and no yield loss (Hagan, personal observation). Disease development and subsequent yield loss was also minimal in the 2013 South Carolina cotton crop (Mueller, personal communication).

Extended periods of high temperatures coupled with frequent irrigation or showers are likely to accelerate target spot development beginning in late July through cut out in early to mid-September. Despite frequent showers, the decline in disease severity observed between 2013
compared with 2012 may be attributed to lower temperatures in July and August as compared
with the same period in the previous year. Over the past two years in Alabama, disease
development stopped with the onset of cooler and drier weather patterns in early to mid-
September. Planting date may also impact target spot intensity in cotton. In 2013, early June-
planted Phytogen 499 cotton at the Wiregrass Research and Extension Center in southeast
Alabama suffered light leaf spotting with minimal defoliation by cut out in mid- to late-October.
Cooler and drier fall weather accounts for the near absence of target spot in late-planted cotton.

Production practices that might impact target spot development in cotton include seeding
rate, tillage, and crop rotation. While the impact of seeding rate on target spot has yet to be
examined, late leaf spot in peanut intensifies as seeding rates and stand density increases
(Campbell et al., 2013). Logic dictates that planting strip or no-till cotton into the previous
year’s cotton debris is a recipe for a target spot disaster. So far, however, increased target spot
intensity in cotton has not been linked to conservation tillage or cotton cropping frequency.

Cotton varieties differ considerably in their sensitivity to target spot. Previously, Hagan et
al. (2012) reported that Phytogen 499, and to a lesser extent Phytogen 375 and Phytogen 565,
had higher target spot ratings in 2011 than a number of other cotton varieties. In 2012, Phytogen
499 consistently had among the highest disease intensity ratings and suffered 35 to 85%
premature defoliation depending on study location (Hagan et al., 2013c). In addition, disease
intensity ratings for Phytogen 375 matched that of Phytogen 499 at some but not all 2012 study
sites. In three of four 2012 variety trials, Phytogen 565 had intermediate disease intensity ratings
similar to those previously reported by Hagan et al. (2012) in the previous year. Among the
remaining commercial cotton varieties, Deltapine 1044 had target spot intensity ratings similar to
Phytogen 499 in two trials as compared with one trial for Americot 1511, DynaGro 2570,
FiberMax 1740, and Stoneville 5458. In that same year, the mid- and full-season cotton varieties All-Tex Nitro
44, Croplan Genetics 3787, DynaGro 2610, Deltapine 1048, Deltapine 1050,
Deltapine 1137, Deltapine 1252, and FiberMax 1944 suffered less target spot-
incited leaf spotting and defoliation when compared with Phytogen 499. However,
defoliation levels, as indicated by disease ratings of 5.1 to
6.3, ranged from 25 to over
50% in these varieties. In
2012, Deltapine 1048,
Deltapine 1050, and Deltapine
1137 also suffered less
defoliation than Phytogen 499.

<table>
<thead>
<tr>
<th>Cotton Variety</th>
<th>Target Spot Rating</th>
<th>Boll Count #</th>
<th>Seed Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phytogen 499</td>
<td>6.3 a</td>
<td>64.8 abc</td>
<td>4888 a</td>
</tr>
<tr>
<td>Phytogen 565</td>
<td>5.8 b</td>
<td>75.3 ab</td>
<td>4610 ab</td>
</tr>
<tr>
<td>DPL 1137</td>
<td>5.5 bc</td>
<td>76.3 a</td>
<td>4725 ab</td>
</tr>
<tr>
<td>DPL 1050</td>
<td>4.7 d</td>
<td>60.8 bc</td>
<td>4304 b</td>
</tr>
<tr>
<td>DPL 1252</td>
<td>5.3 c</td>
<td>57.4 c</td>
<td>4332 b</td>
</tr>
<tr>
<td>Fibermax 1944</td>
<td>4.9 d</td>
<td>65.1 abc</td>
<td>4822 ab</td>
</tr>
<tr>
<td>Stoneville 6448</td>
<td>5.5 bc</td>
<td>70.9 abc</td>
<td>4531 ab</td>
</tr>
</tbody>
</table>

Table 1. Target spot ratings, boll count, and yield of commercial cotton varieties under irrigation in Milstead, AL in 2013.
In a 2013 Central Alabama study, highest target spot intensity ratings were noted for Phytogen 499, while Fibermax 1944 and Deltapine (DPL) 1050 suffered the least leaf spotting and premature defoliation (Table 1). Boll counts for Deltapine 1137 were higher than those for Deltapine 1050 and Deltapine 1252. Both the of latter cotton varieties has lower yields but not boll counts than Phytogen 499. In a second Central Alabama variety trial, Deltapine 1050 and Deltapine 1252 had lower target spot ratings than Croplan Genetics CG 3737 but not Phytogen 499 and several additional mid- or full season flex cotton varieties (data not shown). Lint yield of the majority of varieties except for Phytogen 575 and Deltapine 1050 were similar to the highest yielding variety, Phytogen 499. In multiple 2012 trials, lint quality factors were not impacted by target spot intensity (data not shown).

Yield potential and target spot intensity may not necessarily be closely linked. Phytogen 499, the variety that often has the highest disease ratings, also has among the highest yields, while some varieties with lower disease ratings have mediocre yields (Hagan et al., 2012b). Results suggest that many cotton varieties are tolerant to target spot as indicated by the relatively good yields produced despite heavy premature defoliation. Maturity group also seems influence final disease intensity as the early flex varieties tend to have lower target spot ratings but not necessarily higher yields compared with mid- and late flex varieties (Hagan et al., 2012b).

Fungicides are widely used in the southern half of Alabama, Florida Panhandle, and Georgia to protect cotton from target spot-triggered yield loss. Registered fungicides are listed in Table 2. In reality, the recommended two application programs with any registered fungicide does not give a high level of target spot ‘control’ but sufficiently delays disease development for at-risk bolls in the lower and mid-canopy to mature. In the majority of Alabama studies, few differences in target spot activity have been seen between Headline 2.09SC, Quadris 2.08SC, and Twinline (Hagan et al. 2013c). Yield gains with the these fungicides, which are most likely to occur when early to mid-September defoliation levels exceed 50%, typically range

<table>
<thead>
<tr>
<th>Fungicide</th>
<th>Rate/A</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>TWINLINE</td>
<td>7-8.5 fl oz.</td>
<td>Apply before disease development and continue on a 7- to 14-day schedule as needed to control disease. Do not make more than two consecutive applications of Twinline before alternating to a fungicide with a different mode of action.</td>
</tr>
<tr>
<td>Headline SC</td>
<td>6-12 fl oz.</td>
<td>Apply prior to or at early stage of disease development and repeat after 7 to 14 days if conditions favor disease. Make no more than two consecutive applications of Headline SC. See label for additional information concerning resistance management for strobilurin fungicides.</td>
</tr>
<tr>
<td>Quadris</td>
<td>6-9 fl oz.</td>
<td>Apply at early bloom or early stages of disease development and repeat after 14 to 21 days as needed to control disease. Do not make more than two consecutive applications of Quadris. See label for additional information concerning resistance management for strobilurin fungicides.</td>
</tr>
</tbody>
</table>

Table 2. Fungicides registered for target spot control on cotton.
between 100 to 200 lb lint/A in 2.5+ bale/A cotton. At lower defoliation levels, fungicides are unlikely to greatly boost lint yields. Regardless of the location, fungicide-related yield gains are most likely on cotton varieties like Phytogen 499, which often suffer heavier defoliation than DPL 1050 (Hagan et al. 2013a). Yield response of most commercial cotton varieties to fungicide inputs under severe disease pressure is unknown. Given the variation in yield response in the limited number of target spot fungicide studies conducted to date, none of the above fungicides has been shown to consistently give superior disease control or yield gains.

Routine preventative fungicide programs for target spot control in cotton are not recommended, except perhaps for fields in the high risk zone in the southern third of Alabama and Georgia as well as the Florida Panhandle where sizable yield losses have occurred in previous years (Figure 1). Variety reaction to target spot, yield potential, previous disease history, along with irrigation or rainfall status should also be considered when deciding whether or not to invest in a fungicide. In the high risk zone, applications of the fungicides listed above in Table 2 may be made either at or shortly after first bloom or at the first sign of leaf spotting in the canopy, which usually occurs in the 4th week of July. Give favorable weather for further disease development; follow with by a second application after 14 to 21 days. In the mid- and low risk areas, growers are advised to scout cotton for target spot beginning at first bloom and should consider fungicide inputs only if symptoms appear within the late July to mid-August window, when frequent showers are forecast for the next 10 days, and yield potential exceeds 2 bales/A. Focus scouting efforts on target spot sensitive varieties that are prone to heavy defoliation, particularly in cotton behind cotton. Results of a 2013 application timing study in Alabama show that sufficient target spot suppression and yield protection can be obtained with applications of 9 fl oz/A Headline 2.09SC scheduled at first sign of target spot at the end of July as well as rescue treatments initiated at the onset of defoliation in mid-August (Hagan et al., 2014).

**Summary**

Target spot has emerged as a yield-reducing disease of intensively managed, high yield potential cotton. With extended periods of wet and hot July and August weather, target spot-incited yield losses may also occur in all cotton production regions of the South. The risk of sizable yield losses is more likely in cotton varieties, such as Phytogen 499, that are prone to target spot-incited defoliation. Fungicides will prevent some target spot related yield losses,
particularly when defoliation levels in early to mid-September exceed 50%. Typical returns from fungicide inputs on sensitive cotton varieties are usually in the range of 100 to 150 lb lint/A but may run lower or higher depending on the variety, weather, and farm location. When defoliation levels are low, yield gains from fungicide inputs are minimal. Best returns from fungicide inputs will likely be obtained in the ‘high risk’ zone, which includes in the southern third of Alabama, Georgia, and Florida Panhandle. In ‘medium’ and particularly ‘low risk’ zones, producers should base fungicide application decisions on scouting reports, variety sensitivity to target spot, 10-day weather forecasts, and yield potential.

Literature Cited


