

## TARGET SPOT MANAGEMENT OPTIONS IN ALABAMA

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### Abstract

Target spot consistently causes significant yield loss in Alabama, Florida Panhandle, and Georgia cotton. Management options are limited to selecting a variety with reduced sensitivity to target spot and/or fungicide inputs. Planting a less susceptible variety will likely provide good protection in 'low risk' states such as the Carolinas, Tennessee, and Arkansas where target spot is least likely to cause sizable yield loss. In the latter states, cotton should also be scouted for target spot in July and August and fungicide applications made as needed on the basis of scouting reports. For 'high risk' areas in Alabama, Florida, and Georgia, preventative fungicides are likely to result in sizable yield gains, particularly on intensively managed, target spot sensitive varieties under irrigation or receiving frequent showers.

### Introduction

Target spot, caused by the fungus *Corynespora cassiicola*, was first reported by Jones (1961) in cotton in Mississippi and subsequently not reported for 40 years until it recently reemerged in southwest Georgia (Kemeriat *et al.*, 2011). In the past two years, disease outbreaks 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 South in intensively managed 'rank' cotton with a yield potential of 2.5+ bales/A but less of an issue as one moves further north (Fig.1). In southwest Georgia, Fulmer *et al.* (2012) reported 70% premature defoliation and estimated 200 lb lint/A losses. In a rainfed study in coastal southwest Alabama, a 15% yield loss was recorded for 'Phytogen 499' compared with 5% 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 225 and 300 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 Central Alabama cotton field trials in 2013. As noted by Edminsten (2012), target spot likely will not, however, be a significant threat to cotton in the Upper South cotton production areas. In multiple 2013 field trials in the Tennessee Valley (i.e., north Alabama), target spot was either absent or restricted to moderate leaf spotting with minimal premature defoliation and no yield loss (Hagan, personal observation). Disease development and subsequent yield loss was also minimal in South Carolina cotton in 2013 (Mueller, personal communication).

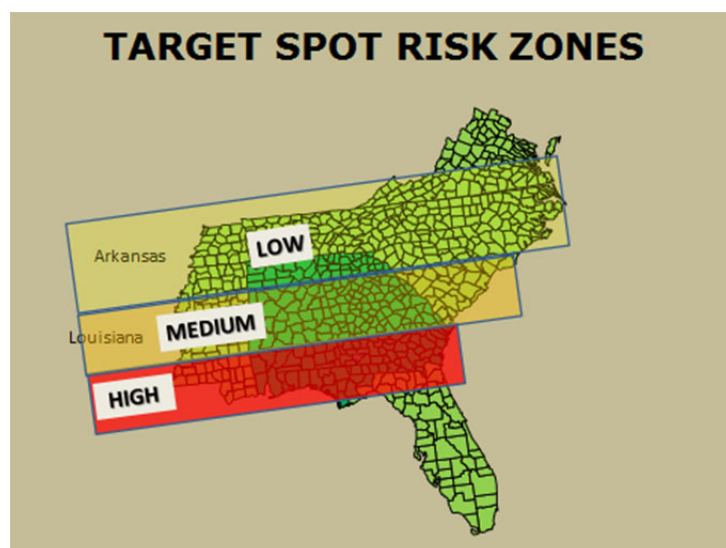


Figure 1. Target Spot Risk Zones.

Extended periods of high temperatures coupled with frequent irrigation or showers is likely to accelerate target spot development from disease onset at canopy closure in late July through mid-September at cut out. Despite frequent showers, the decline in disease severity seen in 2013 compared with 2012 may be attributed to lower prevailing temperatures in July and August as compared with the same period in the previous year. Over the past two years in Alabama, disease development ceased with the shift to fall weather patterns in early to mid-September consisting of cooler temperatures, lower relative humidity, and a sharp decline in

occurrences of convection thundershowers. Planting date may also impact disease severity. In 2013, June-planted cotton at the Wiregrass Research and Extension Center in southeast Alabama suffered light leaf spotting with minimal defoliation through cut out in late October. Again, cooler and drier fall weather probably accounts for the near absence of target spot in late-planted cotton.

Production practices thought to 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 increase (Campbell *et al.*, 2013). Similarly, reducing seeding rates to the minimum to make a good stand may slow target spot development. Logic dictates that planting strip or no-till cotton into the previous year's cotton debris is a recipe for a target spot disaster. To date, however, increased target spot intensity in cotton has not been tied to tillage practices or cotton cropping frequency.

At this point, variety selection and fungicide inputs are the primary options for managing target spot in cotton. 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 with 35 to 85% premature defoliation depending on study location (Hagan *et al.*, 2013c). In addition, disease intensity ratings on Phytogen 375 matched that of Phytogen 499 at some but not all 2012 study sites. In three of

Table1. Target spot ratings, boll count, and yield of commercial cotton varieties under irrigation in Milledgeville, AL in 2013.

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

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 flex 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. 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.

In a 2013 Central Alabama study, highest target spot 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 compared with 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 an 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 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. 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 do not give a high level of target spot ‘control’ but delay disease development for at risk bolls in the lower and mid-canopy to mature. In the majority of Alabama studies, little difference in target spot activity has been seen between Headline 2.09SC, Quadris 2.08SC, and Twinline (Hagan *et al.* 2013c). Yield gains with these fungicides, which are most likely to be seen where defoliation levels in early to mid-September exceed 50%, typically range between 100 to 200 lb lint/A on 2.5+ bale/A cotton and are likely to rise as yield potential increases. At lower defoliation levels, fungicide inputs are unlikely to give sizable yield gains. Regardless of the location, fungicide-related yield gains are most likely on cotton varieties like Phytogen 499, which tend to 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 over the past few years, none of the above fungicides has been shown to consistently give superior yield gains.

Routine preventative fungicide programs for target spot are not recommended, except perhaps fields in the high risk zone where sizable yield losses have occurred in previous years. 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 fungicidal inputs. In the high risk zone, applications of the fungicides listed above in Table 2 may be made either at first sign of leaf spotting in the canopy, which usually is the 4<sup>th</sup> week of July, or at first bloom, then followed by a second application after 14 to 21 days. Unless weather patterns favor rapid disease development as

Table 2. Fungicides registered for target spot control on cotton.

Fungicide	Rate/A	Comments
<b>TWINLINE</b>	<b>7-8.5 fl oz.</b>	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.
<b>Headline SC</b>	<b>6-12 fl oz.</b>	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 with strobilurin fungicides.
<b>Quadris</b>	<b>6-9 fl oz.</b>	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.

they did in the Carolinas in 2012, 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. In these regions, scouting efforts should be focused on those target spot sensitive varieties that are prone to heavy defoliation. 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 as well as rescue treatments made at the onset of defoliation (Hagan *et al.*, 2014).

### Summary

Target spot has emerged as a yield-reducing disease of high yield cotton, particularly in Alabama, the Florida Panhandle, and Georgia. Given favorable weather patterns for in July and August, target spot-incited yield losses may also occur in other cotton production regions of the South. The risk of sizable yield losses is more likely on 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 mid-September exceed 50%. When defoliation levels are low, yield gains from fungicide inputs are minimal at best. Best returns from fungicide inputs will likely be obtained in the ‘high risk’ zone in the southern third of Alabama, Georgia, and possibly, Mississippi.

In the '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.

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