

MULTI-YEAR REGIONAL EVALUATION OF ONE AND TWO APPLICATIONS OF FUNGICIDES FOR THE MANAGEMENT OF TARGET SPOT ON TWO COTTON VARIETIES

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Abstract

Target spot, caused by *Corynespora cassiicola*, is a disease of cotton in the Southeastern and Mid-Southern United States. Variability in incidence and severity among years and geographic locations suggests that disease development is driven by extended periods of rainfall, high humidity, and warm temperatures. Following disease onset, premature defoliation can occur as lesions develop and spread upward throughout the canopy, potentially resulting in yield losses. The objective of this multi-year regional project was to evaluate the effectiveness of certain fungicide application programs for managing target spot and protecting cotton yields. Trials were conducted over a period of three years with trials established in four locations across four states (FL, GA, LA, and VA) in 2014, eight locations across seven states (AL, FL, GA, LA, MS, TN, and VA) in 2015, and eight locations across six states (AL, FL, GA, LA, MS, and TN) in 2016. Two varieties hypothesized to vary in susceptibility to target spot, (Phytogen 499 WRF [PHY499] and Delta & Pine Land 1137 B2RF [DPL1137]), and four fungicide treatments (Headline SC 6 fl oz/A, Priaxor 4 fl oz/A, Quadris 2.08 fl oz/A, and Topguard 7 fl oz/A) were evaluated, plus a non-treated control. Fungicide treatments consisted of 1) a single application at disease onset, but no later than five weeks after first bloom, or 2) an application at disease onset followed by a second spray 14 days later. Treatments were applied to field plots in a full factorial, randomized complete block design with two varieties, two application treatments (one or two applications), and five fungicide treatments (four fungicide products plus a non-treated control). Disease onset, incidence, and defoliation were evaluated bi-weekly following the first observations of lesions. Lint yield and quality were assessed following harvest. Target spot onset and severity varied among locations and years. Except in trials with low disease pressure, disease incidence and defoliation was greater on PHY499 than on DPL1137. Fungicides consistently delayed disease development and reduced overall defoliation, but in 2014 and 2015, only a single trial (GA, 2014) had a significant yield response to fungicide applications. In 2016, significant differences in disease incidence and severity, defoliation, and yield were detected between cotton varieties, number of applications, and among fungicide treatments. Defoliation was negatively correlated with yield in some trials, whereas measurements of disease incidence and severity were more variable and poor predictors of yield losses. PHY499 had greater levels of defoliation compared to DPL1137 at all locations in 2016 except one of the GA locations where disease pressure was low. Across all locations, PHY499 had a mean final defoliation rating of 41% compared to 24% for DPL1137 ($P < 0.0001$). Yield differed between the two varieties at five of the eight trial

locations, with DPL1137 producing greater yield at three locations and PHY499 producing greater yield at two. All fungicides reduced defoliation, but overall Priaxor resulted in the lowest levels of defoliation (24% vs 41% for the non-treated control). Averaged across all locations, Priaxor and Headline treatments resulted in a seed yield increase of approximately 200 lb/A compared to the non-treated control, but there was a significant yield response at only three of the eight locations. Overall, two fungicide applications resulted in reduced defoliation compared to one application (30 vs 35%, $P < 0.0001$), but number of applications significantly impacted defoliation at only three of the eight locations and the reduction in defoliation was small. Two fungicide applications resulted in greater yield compared to one application (2,822 vs 2,757 lb/A seed cotton, $P < 0.02$), but yield differed significantly among application treatments at only two of the eight locations (AL and TN). A meta-analysis was conducted to assess the yield response with each fungicide relative to the non-treated control across 16 site-years. Both Priaxor and Headline significantly increased yield regardless of cotton variety (PHY499 or DPL1137), but the response was only a 4-6% yield increase. Results of this multi-year regional trial suggest a single well-timed application of Priaxor will slow down pre-mature defoliation and protect cotton yield during target spot epidemics. However, additional research is needed to determine epidemiological and other risk factors (e.g. variety and plant architecture) associated with target spot development and yield losses in cotton production systems. In addition, the probability of breaking even with a foliar fungicide program in cotton needs to be assessed based on economic and disease risk factors.