EVALUATION OF FUNGICIDES FOR MANAGEMENT OF ALTERNARIA AND STEMPHYLIUM LEAF SPOT DISEASES J. E. Woodward Texas AgriLife Extension Service Texas Tech University Lubbock, TX R.C. Kemerait, Jr. University of Georgia

Tifton, GA

<u>Abstract</u>

Field trials were conducted to evaluate the performance various fungicide regimes applied to cotton for control of Alternaria leaf spot or Stemphylium leaf spot. Initial applications of the fungicides pyraclostrobin, azoxystrobin, tebuconazole, fluoxastrobin and/or thiophanate methyl were made at first bloom. Low levels of Stemphylium leaf spot were observed over a 7-year period in south Georgia; however, similar levels of leaf spot were observed among all treatments. No foliar disease developed in west Texas. Use of foliar applied fungicides failed to increase lint yields in any of the trials. Furthermore, yields were for programs within a trial where single or multiple applications were made. While Alternaria and Stemphylium leaf spot outbreaks can sporadically occur, results from these studies do not show a benefit to using foliar applied fungicides.

Introduction

Several fungi, including *Alternaria macrospora*, as well as other small spore-type *Alternaria* spp. and *Stemphylium solani*, are known to infect cotton. Diseases caused by these fungi typically affect cotton late in the growing season as a result of humid microclimatic conditions that occur within the dense canopy of mature plants. Furthermore, nutrient deficiencies are believed to exacerbate such leaf spot problems. These pathogens are capable of infecting all *Gossypium* spp. with losses being most severe in *G. barbadense*. In the United States, leaf spots caused by *Alternaria* spp. or *S. solani* are considered to be of minimal importance; however, severe epidemics sporadically occur. Recent outbreaks of Alternaria have been reported in Texas; whereas an increase in the incidence of Stemphylium has occurred in Georgia. Both diseases can result in rapid premature defoliation; however, the impact on yield is unknown. The recent registration of fungicides in cotton coupled with increased lint value has generated interest in the evaluation of fungicide use in cotton. The objective of this research was to evaluate the use of foliar-applied fungicides for foliar diseases affecting cotton.

Materials and Methods

A total of 24 small or large plot field trials were conducted to assess the performance of varying rates of the fungicides pyraclostrobin (Headline), azoxystrobin (Quadris), tebuconazole (Folicur), fluoxastrobin (Evito) and/or thiophanate methyl (Topsin M). Initial applications were made at approximately first bloom with one to three subsequent applications being made on approximately 2-week intervals. Treatments were arranged in a randomized complete block design with a minimum of four replications. Data were analyzed using analysis of variance and means were separated using Fisher's Protected LSD ($P \le 0.05$).

Results and Discussion

West Texas: In all, sixteen trials were conducted evaluating the performance of azoxystrobin or pyraclostrobin in cotton. Disease pressure was absent or extremely low in all trials. Lint yields were not affected by the application of either fungicide in 10 trials (Fig. 1). Sequential applications did not improve yields over either the control or single fungicide application. Irrigation capacity ranged from dryland (trials 1-4), moderate (5-8) and high (trials 9 & 10). This was done to increase the potential for leaf spot as a result of drought stress or dense canopy cover. Increasing rates of pyraclostrobin had no affect on cotton lint yield (Fig. 2); however, higher irrigation capacity greatly affected yield (trials 1-3 versus 4-6).

<u>South Georgia</u>: Appreciable levels of Stemphylium leaf spot ($\leq 15\%$) were observed in all trials conducted in south Georgia. While fungicide treated plots tended to have numerically lower leaf spot ratings, there was no statistical

difference in disease incidence among any of the treatments (Figs. 3, 4 and 5). The use of multiple applications did not affect disease control. Additionally, foliar applications of potassium had no effect on the severity of leaf spot when comparing treatments (Fig 6.). Cotton yields were similar for all treatments over the seven-year period.

Summary

Results from these studies did not show a benefit to using foliar applied fungicides. Sporadic outbreaks of Alternaria and Stemphylium leaf spot do occur in the United States, often resulting from potassium deficiencies, drought, heavy boll load or other stress conditions. Disease development generally occurs late in the growing season allowing little time for significant yield loss to occur. If the onset of disease occurs early in the growing season applications may be warranted; however, considerations regarding initial application timings may need to be addressed.

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Figure 1. Effect of azoxystrobin or pyraclostrobin on lint yield of cotton in 10 trials conducted in west Texas.



Figure 2. Effect of increasing rates of pyraclostrobin on lint yield of cotton in six trials conducted in west Texas.



Figure 3. Effect of foliar applied fungicides on Stemphylium leaf spot severity in four trials conducted in south Georgia (2004-2007).



Figure 4. Effect of foliar applied fungicides on cotton yields in four trials conducted in south Georgia (2004-2007).



Figure 5. Effect of foliar applied fungicides on Stemphylium leaf spot severity (top) and seed cotton yields (bottom) in south Georgia (2010).



Figure 6. Effect of foliar applied fungicides and foliar potassium on Stemphylium leaf spot severity (left) and cotton lint yields (right) in south Georgia (2011).