COTTON RESPONSE TO TOPICAL FUNGICIDE APPLICATION

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Abstract

Recently, pyraclostrobin (Headline™) and azoxystrobin (Quadris™) were registered for use in cotton. Both products are labeled for control/prevention of several foliar disease organisms as well as hardlock and bollrot. Previous research has demonstrated that each product is effective against foliar disease organisms; however, yield responses have been inconsistent. In addition, many growers are under increased sales pressure to apply these products for perceived "plant health" benefits regardless of the potential for disease development Therefore, this research was initiated to determine the effect of topical fungicide application on plant growth and development, incidence of hardlock and bollrot, yield, and fiber quality.

Research was conducted in 2007 and 2008 in Arkansas, Georgia, Mississippi, North Carolina, Tennessee, and Texas. Applications of azoxystrobin and pyraclostrobin were made at the following rates and timings: 12 oz/acre at early bloom; 6 oz/acre at early bloom followed by 6 oz/acre two to three weeks later, and 6 oz/acre at early bloom followed by 12 oz/acre two to three weeks later. An untreated check was included for comparison purposes. All agronomic and pest management practices were conducted according to each respective states' extension recommendations. Plots were four rows by 30 to 40 feet in length depending on location and replicated four times. All fungicide applications were made with a CO_2-pressurized backpack sprayer or a tractor-mounted compressed air sprayer. All applications were made at 15 gallons per acre. Plant height and total nodes were determined prior to, two weeks after, and four weeks after each application. Plant height data for each treatment are presented as percent of the untreated check within each replication in order to normalize differences in plant height across different locations. In addition, percent hardlock and bollrot data (combined for analysis) were collected after defoliation and prior to harvest. Plots were harvested with a picker or stripper modified for small plot research. Yield data for each treatment are presented as percent of untreated check within each replication in order to normalize differences in yield between different locations. All data were analyzed using the Proc Mixed procedure using environment as a random effect. Means were separated using Fischer's Protected LSD at $p = 0.05$.

Although minor variations in percent plant height and total nodes existed during the course of the growing season, at four weeks after the final application, no significant differences in percent plant height or total nodes were observed. All fungicide treatments resulted in plant height within 3% of the untreated check with plants averaging 17 to 18

total nodes. Hardlock ranged from 21 to 25% for all treatments including the untreated check with no significant differences present. Minor differences in gin turnout were observed; however, observed differences were minimal and likely of little economic significance. No significant differences in yield (percent of untreated check) were observed due to fungicide application. Yields for all treatments were within 6% of the untreated check. No differences in micronaire (3.9 to 4.1) or uniformity (82.1 to 83%) were observed due to fungicide application. Minor differences in staple length were observed with azoxystrobin at 6 oz/acre followed by 6 oz/acre or 12 oz/acre resulting in significantly greater staple length compared to pyraclostrobin at 6 oz/acre followed by 6 oz/acre or 12 oz/acre (1.17 inches following each azoxystrobin application versus 1.14 inches following each pyraclostrobin application). Fiber strength ranged from 29.9 to 30.9 grams/tex. All treatments, with the exception of azoxystrobin at 6 oz/acre followed by 12 oz/acre, resulted in significant reductions in fiber strength compared to azoxystrobin at 12 oz/acre. No fungicide application resulted in a positive return on investment based upon cotton yield, fungicide cost, and application cost.

In conclusion, azoxystrobin and pyraclostrobin can be effective in reducing foliar disease in cotton (data not shown). However, care must be taken when utilizing azoxystrobin and pyraclostrobin for preventing foliar disease. The onset of foliar disease is often a response to some form of crop stress including poor potassium fertility, drought, poor root development, etc, or some form of all of stresses. In addition, once a foliar disease appears, the utility of a foliar fungicide becomes limited. No differences in plant height, percent hardlock, yield, and selected fiber quality properties were observed. Therefore, application of a fungicide for yield enhancement ("plant health" application(s)) in cotton is not recommended at this time. However, the occurrence of significant yield increases in other research demonstrates the need for further research to determine if a proper utility for foliar fungicide application in cotton exists.