EVALUATION OF EARLY SEASON FOLIAR FUNGICIDE APPLICATIONS FOR IMPROVED PLANT HEALTH

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Abstract

Early season fungicide applications were made to cotton to determine if there were any plant health benefits in the absence of disease pressure. Fungicide trials were conducted in Louisiana, Texas, Virginia, Tennessee, and Mississippi. The objective of these studies was to determine if there was a yield increase or economic benefit of applying a fungicide to cotton in the absence of disease pressure and to determine if differences in plant health could be measured. Foliar fungicide applications were applied when cotton reached the 2-4 true leaf stage. Fungicides evaluated included in these studies included Quadris and Priaxor. At 0, 14, and 28 DAT, the following data was collected: plant vigor, plant height, number of nodes, chlorophyll measurements, and leaf area. Lint yield and fiber quality were determined at harvest. For the Louisiana location, differences in lint yield, fiber quality, vigor, plant height, total nodes, chlorophyll amounts, and total leaf area were not found when comparing the two fungicide applications to the untreated check. Also, differences in lint yield were not found at the Texas, Mississippi, Tennessee, and Virginia locations.

Introduction

Fungicides are typically used in cotton to control foliar diseases when the potential for yield loss is significant. However, some suggest fungicides should be used to improve plant health regardless of the presence of disease. This preemptive application is thought to improve the physiological function of the plant and to improve stress tolerance. Modern cotton varieties with high yield potential and new fungicide active ingredients with effects on crop physiology have been given as possible motivations for the increased interest in cotton (Wu and Von Tiedemann, 2001). In particular, based on bioassays and studies conducted under controlled conditions, quinone outside inhibitor (QoI) fungicides have been show to induce physiological and developmental changes in plants, including retardation of senescence due reduced oxidative stress (Gross and Retzlaff, 1997), increased photosynthetic capacity, transient inhibition of respiration, inhibition of ethylene biosynthesis (Grossman et al., 1999), and reduction of stomatal aperture and water loss through transpiration (Nason et al., 2007 and Munkvold et al, 2008). These changes are believed to translate into greater stress tolerance and higher yields. The actual benefits of these applications in commercial cotton fields are uncertain and producers question if spending between $15.00 to $25.00 an acre plus application costs for these fungicides is profitable. The objective of these studies were to determine if there is a yield increase or economic benefit of applying a fungicide to cotton in the absence of disease pressure and to determine if differences in plant health could be measured.

Materials/Methods

The Louisiana trial was planted on May 6, 2016 into a Coushatta silt loam soil at the Dean Lee Research and Extension Center at Alexandria, Louisiana. Seeding rate was 41,000 seed per acre. Variety was Phytogen 499WRF. Row spacing was 38 inches. Plot sizes were 4 rows by 50 feet in length. Experimental design was a randomized complete block. Number of replications was eight. Fungicide applications were applied on May 26, 2016 at the three true leaf stage. Treatments included Quadris at 6 ounces per acre, Priaxor at 6 ounces per acre, and the untreated check. Visual vigor rating were recorded at 0, 14, and 28 DAT. Ten plants per plot were measured to compare plant height, number of nodes, chlorophyll (Spad), and leaf area at 0, 14, and 28 DAT. Harvest date was October 1, 2016. Harvest method was with a two row cotton picker. For lint yield, seed cotton was ginned in a Continental research gin. Fiber quality was determined by sending a grab sample to the LSU fiber laboratory located at Baton Rouge. Also, trials were conducted in Texas (College Station), Virginia (Suffolk), Mississippi (Starkville), and Tennessee (West Tennessee).

Results

For the Louisiana location, differences in lint yield, fiber quality, vigor, plant height, total nodes, chlorophyll amounts, and total leaf area were not found when comparing the two fungicide applications to the untreated check (Tables 1, 2, and 3).

Table 1. Lint yield and fiber quality, Louisiana.

Treatment	Lint (lbs/ac)	Turnout (%)	Mic.	Length (inches)	Strength (g/tex)	Uniform. (%)	Loan Val. (¢/lb)	Lint Val. ($/acre)
UTC	1410 a	40.92 a	4.36 a	1.17 a	34.66 a	84.63 a	54.98 a	775.05 a
Quadris @ 6 oz.	1467 a	41.48 a	4.44 a	1.16 a	34.09 a	84.63 a	54.88 a	804.45 a
Priaxor @ 6 oz.	1459 a	41.80 a	4.48 a	1.16 a	34.51 a	84.86 a	55.00 a	802.76 a
Mean	1445	41.40	4.43	1.16	34.42	84.70	54.95	794.08
P>F	0.4266	0.1971	0.6479	0.5012	0.6146	0.9229	0.3786	0.4486
LSD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS
CV%	6.3	2.25	5.47	2.09	3.45	1.61	0.32	6.38

Means followed by the same letter do not differ significantly at the 0.05 level of probability.

Table 2. Plant vigor, height, and total nodes, Louisiana.

Treatment	Vigor[1,4]	Vigor[2,4]	Vigor[3,4]	Plt. Ht.[1] (cm)	Plt. Ht.[2] (cm)	Plt. Ht.[3] (cm)	Total[1] Nodes	Total[2] Nodes	Total[3] Nodes
UTC	6.8 a	7.8 a	8.0 a	3.23 a	15.35 a	31.50 a	1.94 a	6.96 a	10.80 a
Quadris @ 6 oz.	7.0 a	8.0 a	8.0 a	3.28 a	15.55 a	32.34 a	2.06 a	6.96 a	10.89 a
Priaxor @ 6 oz.	6.8 a	7.8 a	8.0 a	3.26 a	15.26 a	31.75 a	2.04 a	6.83 a	10.73 a
Mean	6.83	7.83	8.0	3.25	15.39	31.86	2.013	6.917	10.804
P>F(P=0.05)	0.3927	0.3927	1.0000	0.9704	0.7204	0.6874	0.3927	0.5864	0.8000
LSD	NS	NS	NS	NS	NS	NS	NS	NS	NS
CV%	5.97	5.21	0.0	13.04	4.76	6.2	9.3	4.36	4.47

Means followed by the same letter do not differ significantly at the 0.05 level of probability.

[1]0 DAT.
[2]14 DAT.
[3]28 DAT.
[4]1=poor, 9=excellent.

Table 3. Chlorophyll and leaf area, Louisiana.

Treatment	Chlorophyll[1]	Chlorophyll[2]	Chlorophyll[3]	Total Leaf Area[1]	Total Leaf Area[2]	Total Leaf Area[3]
UTC	32.74 a	25.64 a	23.84 a	141.991 a	1793.115 a	9095.768 a
Quadris @ 6 oz.	33.40 a	26.24 a	23.31 a	136.113 a	1640.426 a	9191.586 a
Priaxor @ 6 oz.	33.66 a	25.65 a	21.95 a	156.399 a	1607.080 a	9721.367 a
Mean	33.267	25.842	23.033	144.8342	1680.2073	9336.2405
P>F	0.6175	0.4696	0.3569	0.3376	0.2106	0.7137
LSD	NS	NS	NS	NS	NS	NS
CV%	5.74	4.2	11.35	18.81	12.64	17.36

Means followed by the same letter do not differ significantly at the 0.05 level of probability.

[1]0 DAT.
[2]14 DAT.
[3]28 DAT.

For Texas, Mississippi, Virginia, and Tennessee only the results for lint yield are shown. Differences in lint yields at all three location were not found (Table 4).

Table 4. Lint yield results, Texas, Mississippi, Virginia, and Tennessee locations.

Treatment	Texas (lbs. lint/acre)	Mississippi (lbs. seed cot/acre)	Virginia (lbs. lint/acre)	Tennessee (lbs. lint/acre)
UTC	705 a	4145 a	1227 a	1405 a
Quadris @ 6 oz.	752 a	4095 a	1199 a	1388 a
Priaxor @ 6 oz.	726 a	4016 a	1186 a	1312 a
Mean	728	4085	1205	1368
P>F	0.7686	0.9371	0.7774	0.2808
LSD	NS	NS	NS	NS
CV%	15.51	16.72	8.21	7.37

Means followed by the same letter do not differ significantly at the 0.05 level of probability.

Summary

Also, these trials were conducted in 2015 at Louisiana, Texas, Mississippi, and Virginia. In 2014, trials were conducted in Louisiana, Texas, Oklahoma, Mississippi, and Virginia. Differences in lint yield were not found with the exception of the Texas location (2014) where both fungicide treatments increased lint yield over the untreated check (data not shown).

References

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