EVALUATION OF EARLY SEASON FOLIAR FUNGICIDE APPLICATIONS FOR IMPROVED PLANT HEALTH IN COTTON

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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, Oklahoma, Virginia, 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. Differences in lint yield at the Oklahoma and Virginia locations were not found; however, both fungicide applications increased lint yields at the Texas location.

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 (1). 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 (2), increased photosynthetic capacity, transient inhibition of respiration, inhibition of ethylene biosynthesis (3), and reduction of stomatal aperture and water loss through transpiration (4,5). 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 + application costs for these fungicides is profitable. The objective of these studies was to: determine if there is an effect on lint yield from applying an early season fungicide application and if differences in plant health can be measured from an early season fungicide application.

Materials/Methods

The Louisiana trial was planted on May 1, 2014 into a clay 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 2 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, 2014 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 ratings (1=poor, 9=excellent) 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 24, 2014. 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 send a grab sample to the LSU fiber laboratory located at Baton Rouge.

Also, trials were conducted in Texas (Brazos Bottom), Oklahoma (Fort Cobb), Virginia (Tidewater), and Mississippi (data not shown). Fungicide applications were made at the 2-4 true leaf stage at the Texas and Virginia locations. For the Oklahoma location, fungicide application was made at the 6-7 true leaf stage.

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).

For Texas, Oklahoma, and Virginia only the results for lint yield are shown. Differences in lint yield at the Oklahoma and Virginia locations were not found; however, both fungicide applications increased lint yields at the Texas location (Table 4).

Table 1. Lint yield and fiber quality, Louisiana, 2014.

Treatment	Lint (lbs/ac)		Turnout (%)		Micronaire		Length (inches)		Strength (g/tex)		Uniform. (%)		Loan Value (¢/lb)		Lint Value ($/acre)	
Untreated Check	1547	a	47.17	a	4.49	a	1.15	a	31.43	a	84.46	a	54.03	a	836.53	a
Quadris @ 6 oz.	1480	a	46.04	a	4.68	a	1.14	a	30.80	a	84.56	a	54.16	a	801.90	a
Priaxor @ 6 oz.	1442	a	46.92	a	4.61	a	1.15	a	31.23	a	84.25	a	54.34	a	783.52	a
Mean	1490		46.71		4.59		1.15		31.15		84.43		54.18		807.32	
P>F	0.4426		0.6751		0.1103		0.3302		0.417		0.875		.6629		.5095	
LSD (P=.05)	NS		NS		NS		NS		NS		NS		NS		NS	
STD DEV	160.89		2.6471		0.168		0.0261		0.936		1.245		.6679		90.4752	
CV%	10.8		5.67		3.65		2.28		3		1.47		1.23		11.21	

Table 2. Vigor, plant height, and total nodes, Louisiana, 2014.

Treatment	Vigor[1] 0 DAT		Vigor[1] 14 DAT		Vigor[1] 28 DAT		Plt. Ht. (CM) 0 DAT		Plt. Ht. (CM) 14 DAT		Plt. Ht. (CM) 28 DAT		Total Nodes 0 DAT		Total Nodes 14 DAT		Total Nodes 28 DAT	
UTC	9	a	9	a	9	a	11.20	a	16.94	a	39.20	a	3.00	a	7.50	a	10.48	a
Quadris @ 6 oz.	9	a	9	a	9	a	11.10	a	16.77	a	37.31	a	2.90	a	7.41	a	10.21	a
Priaxor @ 6 oz.	8.8	a	9	a	9	a	11.05	a	16.96	a	38.21	a	2.95	a	7.45	a	10.61	a
Mean	8.92		9		9		11.22		16.89		38.24		2.95		7.45		10.43	
P>F	0.1335		1		1		.9818		0.922		0.2752		0.91		0.8257		0.1627	
LSD,P=.05	NS		NS		NS		NS		NS		NS		NS		NS		NS	
S. DEV.	0.27		0		0		1.594		1.059		2.2435		0.459		0.282		0.399	
CV%	3		0		0		14.34		6.27		5.87		15.55		3.79		3.83	

Table 3. Chlorophyll and leaf area, Louisiana, 2014.

Treatment	Chlorophyll (Spad) (0 DAT)		Chlorophyll (Spad) (14 DAT)		Chlorophyll (Spad) (28 DAT)		T. Leaf Area (0 DAT)		T. Leaf Area (14 DAT)		T. Leaf Area (28 DAT)	
UTC	35.69	a	38.81	a	39.94	a	330.5	a	2773.4	a	9706.3	a
Quadris @ 6 oz.	37.06	a	37.70	a	40.35	a	294.1	a	2476.6	a	8615.8	a
Priaxor @ 6 oz.	36.03	a	37.90	a	39.09	a	306.3	a	2502.9	a	9069.1	a
Mean	36.26		38.14		39.79		310.29		2584.29		9130.38	
P>F	0.2726		.2038		.2939		.4924		0.196		0.0848	
LSD (P=.05)	NS		NS		NS		NS		NS		NS	
STD DEV	1.696		1.256		1.574		60.67		343.01		900.98	
CV%	4.68		3.29		3.95		19.55		13.27		9.87	

Table 4. Lint yield results, Texas, Oklahoma, and Virginia, 2014.

Treatment	Texas (pounds lint/acre)		Oklahoma[1] (pounds lint/acre)		Virginia (pounds lint/acre)	
UTC	2106	b	1938	a	1821	a
Quadris @ 6 oz.	2426	a	1905	a	1707	a
Priaxor @ 6 oz.	2382	a	1915	a	1844	a
Mean	2305		1919		1791	
P>F	0.00019		0.8911		0.0839	
LSD (P=.05)	138		NS		NS	
STD DEV	86.3		121.37		99.928	
CV%	3.71		6.32		5.58	