Auburn University Crops:
Cotton Research Report 2014

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Auburn, AL

In cooperation with the Alabama Cooperative Extension System
(Alabama A&M University and Auburn University)

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Acknowledgements

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I. Cotton Variety Trials

Enhancing Cotton Variety Selection through On-Farm Evaluations, 2014

C. D. Monks

Project Cooperators: Dale Monks and Charles Burmester, Professor and Extension Specialist, resp., Auburn University, ACES; Christy Hicks, Rudy Yates, Kim Wilkins, Tyler Sandlin, and Ricky Colquitt, Extension Agents, ACES

On-farm Producer Cooperators: Philip Barber, Kevin Holland, David Womack, Robert & John Ingram, and Jay Minter

Project #03-328AL, Enhancing Cotton Variety Selection in on-farm trials, was conducted in 2014. Cotton varieties were supplied by: Delta and Pine Land, Bayer, and Phytogen seed companies. On-farm trials were planted, maintained, and harvested by cooperating producers. Varieties included were either Roundup Flex or glytol-tolerant and plots were initiated during May, 2014. The trial in Macon County was planted but suffered inclement weather early in the production season. Emergence was delayed to the extent that the trial was replanted to a single variety. These trials are planned for 2015 with a possibility of additional locations.

County	Regional agent	Contact information
Dallas	Rudy Yates	yatesrp@auburn.edu
Macon	Christy Hicks	agnewcd@auburn.edu
Escambia	Kim Wilkins	wilkikj@aces.edu
Shelby	Ricky Colquitt	colqurw@auburn.edu

Yield and fiber quality tables are also available for the 2014 on-farm trials at www.alabamacrops.com.

2014 On-farm cotton variety performance & fiber quality, Dallas Co. Alabama.

Producer cooperator: **Jay Minter**

Investigators: **Dale Monks, Rudy Yates, Jon Brasher & Kathy Glass**

Alabama Coop. Ext. System & Auburn University

Planting date: May 22, 2014 in 4, 36-inch rows; harvested in November

Cultural: Irrigated; 2013 crop- peanut; plot length ranged from 2190 to 2609 ft.

	Seed cotton	Lint		Fiber quality		
Variety*	**yield**	**turnout**	**yield**	**Micronaire**	**Length**	**Strength**
	(lbs/acre)	(%/100)	(lbs/acre)		(32^{nd} inch)	(g/tex)
PHY 499 WRF	3579	0.463	1655	4.7	37.1	33.6
PHY 339 WRF	3535	0.445	1573	4.5	38.4	32.4
DP 1137 B2RF	3273	0.474	1551	4.3	38.1	32.1
PHY 333 WRF	3342	0.463	1546	4.5	37.1	29.1
PHY 375 WRF	3340	0.449	1500	4.0	39.0	33.5
ST 4747 B2RF	3357	0.446	1498	4.3	37.4	30.8
ST 5289 GLT	3303	0.447	1477	4.7	36.2	29.4
DP 1321 B2RF	3291	0.445	1464	4.6	37.1	29.1
PHY 575 WRF	3402	0.426	1451	4.3	35.5	28.6
ST 6448 GLB2	3322	0.435	1445	4.8	37.4	33.2
DP 1252 B2RF	3154	0.456	1439	4.8	36.5	29.8
ST 1535 B2RF	3327	0.431	1434	4.2	39.0	33.2
ST 4946 GLB2	3321	0.430	1428	4.7	37.4	32.0
ST 5032 GLT	3024	0.439	1328	3.8	37.4	31.5

*Samples were hand cleaned & ginned on a 10-saw gin; therefore, turnout is high relative to commercial gins with multiple cleaners.

***On-farm cotton variety trials were conducted from support from cotton producers, the Alabama Cotton Commission, Cotton Inc. & seed company germplasm donations.*

2014 On-farm cotton variety performance & fiber quality, Escambia Co. Alabama.

Producer cooperators: **David Womack & Kevin Holland**

Investigators: **Dale Monks, Kim Wilkins, Jon Brasher & Kathy Glass**

Alabama Coop. Ext. System & Auburn University

Planting date: May 28, 2014 in 36 inch rows; harvested in November

Cultural: Non-irrigated; 6 rows/plot; 2013 crop- peanut; plot length- 1750 ft.

	Seed	**Lint**		**Fiber quality**		
Variety*	**cotton yield**	**turnout**	**yield**	**Micronaire**	**Length**	**Strength**
	(lbs/acre)	(%)	(lbs/acre)		(32^{nd} inch)	(g/tex)
PHY 333 WRF	3635	0.423	1539	4.7	38.4	31.8
PHY 499 WRF	3820	0.401	1533	4.2	39.7	30.7
DP 1321 B2RF	3552	0.421	1494	5.1	37.8	32.2
DP 1137 B2RF	3397	0.428	1453	4.8	38.4	30.4
PHY 575 WRF	3358	0.427	1435	4.6	38.4	35.4
ST 5032 GLT	3577	0.399	1427	4.3	41.6	35.1
PHY 339 WRF	3449	0.411	1416	4.4	38.7	33.1
DP 1252 B2RF	3143	0.446	1401	5.1	38.4	31.6
ST 4946 GLB2	3306	0.420	1389	5.1	38.1	35.2
ST 5289 GLT	3245	0.425	1379	4.7	37.1	32.1
ST 1535 B2RF	3081	0.446	1374	4.5	38.4	30.8
ST 4747 B2RF	3339	0.408	1361	4.7	39.0	31.4
PHY 375 WRF	3199	0.417	1334	4.7	38.7	33.3

*Samples were hand cleaned & ginned on a 10-saw gin; therefore, turnout is high relative to commercial gins with multiple cleaners.

***On-farm cotton variety trials were conducted from support from cotton producers, the Alabama Cotton Commission, Cotton Inc. & seed company germplasm donations.*

2014 On-farm cotton variety performance, Shelby Co. Alabama.

Producer cooperator: Phillip Barber

Investigators: Dale Monks, Ricky Colquitt, Jon Brasher & Kathy Glass

Alabama Coop. Ext. System & Auburn University

Planting date: May 2014 in 38 inch rows; harvested in November

Cultural: Non-irrigated; 4 rows/plot; 2013 crop- cotton; plot length- 2805 ft.

	Seed cotton	**Lint**		**Fiber quality**		
Variety*	**yield**	**turnout**	**yield**	**Micronaire**	**Length**	**Strength**
		(%)	(lbs/acre)		(32^{nd} inch)	(g/tex)
DP 1212 B2RF	2570	0.444	1142	5.4	35.2	30.1
DP 1252 B2RF	3047	0.485	1479	4.9	33.28	29.2
DP 1321 B2RF	2755	0.463	1276	4.9	34.56	27.8
PHY 333 WRF	2826	0.474	1339	4.4	36.16	29.9
PHY 339 WRF	2869	0.459	1317	4.2	36.48	28.4
PHY 375 WRF	2795	0.462	1292	4.6	34.56	26.7
PHY 427 WRF	2713	0.452	1227	4.4	33.92	30.3
PHY 499 WRF	2907	0.472	1372	4.5	35.2	31
PHY 575 WRF	2621	0.442	1158	4.6	35.84	30.2
ST 4747 B2RF	2914	0.452	1317	4.4	35.84	28.8
ST 4946 GLB2	2974	0.451	1341	5	34.56	29.3
ST 6448 GLB2	3099	0.456	1412	4.8	37.44	29.6

*Samples were hand cleaned & ginned on a 10-saw gin; therefore, turnout is high relative to commercial gins with multiple cleaners.

***On-farm cotton variety trials were conducted from support from cotton producers, the Alabama Cotton Commission, Cotton Inc. & seed company germplasm donations.*

Breeding Cotton for Yield and Quality in Alabama

D. B. Weaver

Summary of work done: Continuous cotton breeding has been conducted at Auburn University since 2001. Much of our work has been centered on multiple objectives, but the primary purpose of the work reported on here is development of cotton germplasm and cultivars with improved yield and fiber quality traits, and development of cotton germplasm with improved resistance to biotic stresses, particularly reniform nematode. In 2014 as part of our cultivar development efforts we evaluated 28 advanced experimental lines for yield and fiber properties in advanced tests at two locations, Tallassee and Prattville. These lines were previously selected for testing by evaluation for fiber quality as plant rows in 2012 and for yield and fiber quality in multi-row replicated tests in 2013. A summary of the performance of the best of these lines (Table 1) shows that the top five entries have very good performance compared with check cultivars.

Table 1. Performance of top 5 experimental lines and check cultivars in advanced tests at two locations (28 entries, and 2 checks) in 2014.

Entry	Lint yield	Gin turnout	Q1	Q2
	(lb/A)	%	(score)	(score)
ACX080082074	1534	40.5	58.2	67.5
ACX080077082	1500	41.6	46.7	64.3
ACX090083051	1485	42.6	60.2	69.0
ACX090076038	1470	41.2	51.5	62.5
ACX090081043	1429	44.2	44.0	59.0
Fibermax 958	1291	43.3	42.5	61.7
Deltapine 393	1264	41.4	41.5	60.2
Test mean	1328	41.0	57.9	67.3
LSD	184	0.7	9.6	6.2

Fiber quality, as measured by the Q1 and Q2 quality index scores, have improved compared to previous years in these top-yielding lines and reflects our increased emphasis on fiber quality as an early selection criterion.

Fifty-six lines were evaluated in two preliminary yield tests at the same two locations (Tables 2 and 3).

Table 2. Performance of top 5 experimental lines and check cultivars in preliminary test A at two locations (28 entries, and 2 checks) in 2014.

Entry	Lint yield	Gin turnout	Q1	Q2
	(lb/A)	%	(score)	(score)
ACX090087076	1485	40.6	64.3	67.7
ACX090085057	1425	42.7	57.2	66.0
ACX090091083	1387	45.1	44.0	66.3
ACX090091037	1346	45.3	58.0	69.0
ACX090087079	1341	42.3	60.8	66.0
Fibermax 958	1306	43.5	46.7	63.8
Deltapine 393	1485	41.4	59.3	66.5
Test mean	1243	42.2	57.0	66.4
LSD	193	1.7	9.9	7.0

Table 3. Performance of top 5 experimental lines and check cultivars in preliminary test B at two locations (28 entries, and 2 checks) in 2014.

Entry	Lint yield	Gin turnout	Q1	Q2
	(lb/A)	%	(score)	(score)
ACX090090089	1460	44.8	62.0	66.3
ACX090090098	1419	45.4	62.7	66.0
ACX090086008	1406	44.3	56.0	67.0
ACX090090026	1394	43.7	54.7	66.8
ACX090088097	1384	41.5	50.3	73.2
Fibermax 958	1343	43.3	46.0	62.2
Deltapine 393	1302	41.4	56.8	67.5
Test mean	1282	42.7	56.8	67.0
LSD	167	1.14	7.8	5.1

All these tests have also been evaluated for fiber quality. Many of the top yielding entries also had excellent fiber quality. F_2, F_3, and F_4 generations of various populations were grown at Tallassee, and $F_{4:5}$ progeny rows were grown, selected and submitted for fiber quality analysis. Crosses were made. These are to create new populations for future work. Most crosses involved advanced experimental lines from Auburn and other public programs, and newly released sources of resistance to reniform nematode, including BAR-41. Complete yield and fiber quality data are now available from the 2013 Regional Breeders Testing Network at 11 yield locations across the cotton belt. Auburn experimental lines ranked 5th, 21st, 22nd, and 27th in the 34-entry test (31 experimental lines plus 3 checks). The best of these lines, AU51038, had an average yield of 1582 lbs lint/acre. Fiber quality of these lines was greatly improved over previous years and lines, a result of our concerted effort in selecting for fiber quality. Complete data on performance of these lines, and from tests conducted in 2014, should be available soon.

In addition to our work to develop conventional cotton cultivars, we have also been working to evaluate and incorporate resistance to reniform nematode, using various sources of resistance recently released cooperatively by USDA and other state agricultural experiment stations. Advanced lines developed from crosses between BARBREN-713 (resistance derived from *G. barbadense*) and adapted genotypes were tested in the greenhouse, microplots and in both nematode-infested and noninfested field trials at the Tennessee Valley Research and Extension Center in Belle Mina, AL. These lines were also evaluated for presence or absence of molecular markers associated with resistance to evaluate the contribution of each gene. A complete summary of that work is attached to this report and has been published in Proceedings of the Beltwide Cotton Conferences. Other populations are in less-advanced stages of development, using later-generation releases as sources of resistance to reniform nematode.

2014 Alabama On-Farm Cotton Variety Trials

W. Birdsong, Extension Agronomist

Houston Co. WRF vs GL / LL Varieties in an Ignite System			
Variety	**Rep 1,2 Average**	**Rep 3,4 Average**	**Average (lint/ac)**
PHY 333WRF	789	815	802
ST 4747 GLB2RF	803	711	757
ST 6448 GLB2RF	748	715	731
PHY 499 WRF	728		728
FM 1944 GB2RF	768	685	727
PHY 575 WRF	783	663	723
PHY 495 W3RF	767	664	715
ST 4946 GLB2RF	757	645	701
PHY 339 WRF	765	627	696

The Houston Co. trial was dryland and was planted May 28, 2014 and harvested October 20, 2014. All yields were weighed on calibrated boll buggy and calculated from the micro gin turn out from Auburn University. Plot lengths ranged from 350 to 800 feet. Width of each plot was 18 feet (6 – 3 foot rows).

FM - Fiber Max, ST - Stoneville, PHY – Phytogen, B2 – Bollgard 2 gene, RF – Roundup Flex, W- Widestrike, GL – New Glytol Technology, W3 – Widestrike 3 gene

Houston Co. Conventional vs Technology Varieties			
Variety	**Rep 1**	**Rep 2**	**Average**
PHY 495 W3RF	729	595	**662**
PHY 499 WRF	646	663	**655**
ST 6448 GLB2	637	596	**617**
DP 1137 B2RF	627	604	**616**
DP 1050 B2RF	620	601	**611**
DP 12R 224 B2RF	599	621	**610**
UA 222	609	593	**601**
ST 4946 GLB2	550	617	**584**
AM UA 48	579	573	**576**
CT LINWOOD	543	600	**572**
UA 103	550	557	**554**
CT 210	499	602	**551**
CT 212	522	545	**534**
CT 110	554	475	**515**

The Houston Co. trial was dryland and was planted May 28, 2014 and harvested October 20, 2014. All yields were weighed on a calibrated boll buggy and calculated from the micro gin turn out from Auburn University. Plot lengths ranged from 1000 to 1500 feet. Width of each plot was 18 feet (6 – 3 foot rows)

FM - Fiber Max, ST - Stoneville, PHY – Phytogen, B2 – Bollgard 2 gene, RF – Roundup Flex, W- Widestrike, GL – New Glytol Technology, W3 – Widestrike 3 gene

Henry Co. Conventional vs Technology Cotton Varieties			
Variety	**Rep 1**	**Rep 2**	**Average (lint/ac)**
PHY 499 WRF	633	628	631
ST 4747 GLB2RF	491	570	531
DP 12R 224 B2RF	473	592	526
UA 222	459	578	519
CT Linwood	532	502	517
ST 4946 GLB2RF	448	583	516
CT 212	519	511	515
FM 1944 GLB2RF	550	480	515
CT 110	446	537	492
CT210	466	479	473
DG 2355 B2RF	490	435	463
UA 48	392	480	436

The Henry Co. test was dryland and was planted June 14, 2014 and harvested December 5, 2014. All yields are calculated from the micro gin turn out from Auburn University. Weighed on calibrated boll buggy. Plot lengths ranged from 722 to 1433 feet. Width of plot – 4 – 3 foot rows (12 ft) planted as such: tech, conventional, tech, conventional.

FM - Fiber Max, ST - Stoneville, PHY – Phytogen, B2 – Bollgard 2 gene, RF – Roundup Flex, W- Widestrike, GL – New Glytol CT – Cold Tolerant (seed Source Genetics), Cropland genetics, DG - Dynagrow

Geneva Co.			
Variety	**Rep 1**	**Rep 2**	**Average (lint/ac)**
DP 1252 B2RF	899	1024	961
DP 1137 B2RF	911	915	913
DP 1321 B2RF	816	984	900
PHY 333 WRF	886	905	896
PHY 499 WRF	835	869	852
DP 1454 B2RF	786	882	834
DP 1050 B2RF	826	809	817
PHY 575 WRF	812	785	798
AM 5315 B2RF	802	784	793
DG 2610 B2RF	728	826	777
DG 3464 B2RF	721	818	769
PHY 339 WRF	797	738	767
DP 12R224 B2RF	776	752	764
ST 4747 GLB2RF	657	788	722
ST 6448 GLB2RF	696	733	714
AM 1511 B2RF	741	647	694
DG 12353 B2RF	702	676	689
FM 1944 GLB2RF	702	674	688
ST 4946 GLB2RF	646	613	629
AM 1550 B2RF	614	611	613
DG 13883 B2RF	537	664	600
DG 2355 B2RF	567	618	593

The Geneva Co. test was a dryland test planted May 9, 2014 and harvested October 24, 2014. All yields were weighed on a calibrated boll buggy and calculated from the micro gin turn out from Auburn University. Plot lengths ranged from 1300 to 1700 feet. Width of plot – 6 rows

FM - Fiber Max, ST - Stoneville, PHY – Phytogen, B2 – Bollgard 2 gene, RF – Roundup Flex, W- Widestrike, GL – New Glytol Technology, W3 – Widestrike 3 gene, Cropland genetics, DG - Dynagrow

Dale Co.			
Variety	Rep 1	Rep 2	Average (lint/ac)
PHY 333 WRF	1272	1179	1226
ST 4946 GLB2RF	1230	1200	1215
ST 4747 GLB2RF	1201	1225	1213
FM 1944 GLB2RF	1217	1162	1189
PHY 495 W3RF	1149	1197	1173
PHY 499 WRF	1199	1144	1172
DP 1321 B2RF	1042	1085	1064
DP 1137 B2RF	1059	1028	1043
DP 12R224 B2RF	1112	971	1041
DG 2355 B2RF	900	968	934

The Dale Co. test was planted June 5, 2014 and harvested November 7, 2014 This test was irrigated and yields were weighed on a calibrated boll buggy and calculated from the micro gin turn out from Auburn University. Plot lengths ranged from 628 to 858 feet. Width of plot – 6 rows

FM - Fiber Max, ST - Stoneville, PHY – Phytogen, B2 – Bollgard 2 gene, RF – Roundup Flex, W- Widestrike, GL – New Glytol Technology, W3 – Widestrike 3 gene, Cropland genetics, DG - Dynagrow

Houston Co. Al. Conventional Large Block Trial			
Variety	Rep 1, 2 av	Rep 3, 4 av	Average (lint/ac)
PHY 499 WRF	660	808	734
UA 222	486	752	619
UA 48	498	727	613
UA 103	414	688	551
CT 210	415	625	520
CT 110	426	581	504
CT 212	381	614	498
CT 310	422	564	493

This dryland test was planted May 15, 2014 and harvested November 14, 2014. Yields were weighed on calibrated boll buggy and calculated from the micro gin turn out from Auburn University. Plot lengths ranged from 1000 to 1500 feet. Width of each plot was 18 feet (6 – 3 foot rows)

PHY – Phytogen, CT – Cold Tolerant, SeedSource Genetics, UA – Seed Source Genetics
W – Widestrike Technology, RF – Roundup Flex

Headland Block trial – Seeding Rate * Variety (?)		
	Low Range 1.7 seed per foot	**High Range 3.0 seed per foot**
Variety	**Average Lint/ac**	**Average Lint/ac**
PHY427 WRF	1190	1138
DP 1252 B2RF	1113	1028
DP 1137 B2RF	1093	1212
PHY 499 WRF	1045	1101
PHY 375 WRF	1038	1128
ST 4946 GLB2RF	951	1234
PHY 339 WRF	944	998
DP 1050 B2RF	906	1105

This irrigated test was planted May 27, 2014 and harvested November 12, 2014. Yields were weighed on calibrated boll buggy and calculated from the micro gin turn out from Auburn University. Plot length and width was 210 and 6 ft. respectively.

Large Block Cotton Variety Trial – Headland

Variety	Rep 1	Rep 2	Average Lint / ac
PHY 495 W3RF	1245	1431	1338
ST 4946 GLB2RF	1189	1278	1234
PHY 333 WRF	1126	1307	1217
DP 1137 B2RF	1213	1211	1212
ST 4747 GLB2RF	981	1369	1175
PHY 427 WRF	1160	1115	1138
DP 12R 224 B2RF	1074	1191	1133
PHY 375 WRF	1095	1160	1128
DP 1050 B2RF	1089	1120	1105
PHY 499 WRF	1089	1113	1101
DP 1454 B2RF	871	1304	1088
DP 1321 B2RF	981	1126	1054
DP 1252 B2RF	1081	975	1028
ST 6448 GLB2RF	873	1130	1002
PHY 339 WRF	1045	951	998
AM 1551 B2RF	892	1070	981
DG 2355 B2RF	863	1021	942
DG 12353 B2RF	832	987	910

This irrigated test was planted May 27, 2014 and harvested November 12, 2014. Yields were weighed on calibrated boll buggy and calculated from the micro gin turn out from Auburn University. Plot lengths and width were 210 by 6 ft respectively.

FM - Fiber Max, ST - Stoneville, PHY – Phytogen, B2 – Bollgard 2 gene, RF – Roundup Flex, W-Widestrike, GL – Glytol, Cropland genetics, DG - Dynagrow

II. Cultural Management

Impact of Seed Meter and Placement Technology on Planter Performance

J. Fulton, K. Balkcom, J. Shaw, S. Virk, A. Poncet, G. Pate, and M. Hall

Objective

To investigate seed metering and the ability of down pressure technology to enhance seed placement and planting depth.

Results

Test Stand Evaluations of Different Cotton Meter Setups:

- Significant difference does exist between the John Deere Standard meter setup and the JD ProMax40 and Precision Planting eSet. The John Deere Standard cotton seed plates and meter can be inconsistent at times under field conditions and can be sensitive to changes in seed size.
- **No significant difference** was found between John Deere ProMax 40 and Precision Planting eSet meter setups for cotton seed. In both cases, only single hole, flat (*not* hill-drop) plates were evaluated.
- Our testing indicated for best field results to run the vacuum gauge on the high side of the recommendations provided by the manufacturer:
    - *Precision Planting eSet, cotton plate – 18 to 20 inches of water*
    - *John Deere ProMax 40, flat plate – 12 to 18 inches of water*

Field Results for Planting Depth and Downforce

- Row-unit Downforce (or Margin commonly termed) can significantly influence final seeding depth.
- For 0.5" seeding depth, too much applied downforce (>125 lbs of additional down force over the row unit) placed cotton seeds 0.60 to 0.68 inches although the same planter setup was used, indicating varying seeding depth based on field conditions.
- Emergence timing and final live cotton plant populations were influenced by seeding depth.
- We will continue this research in 2015.

Improving Soil Quality

PROJECT LEADERS: C. C. Mitchell and G. Huluka
COOPERATORS: Extension Agronomy Team, Extension Commercial Horticulture Team

OBJECTIVE: (1) develop a reasonable soil quality/soil productivity index that can be used on routine soil samples, (2) make producers aware of soil quality and how it influences productivity and sustainability and (3) adopt practices that will increase the soil quality index over time.

2014 ACTIVITIES/ACCOMPLISHMENT:

- Ms. Tabby Bosarge, graduate research assistant, began work on this project in August 2013, as the focus of her M.S. degree program
- Addition support was obtained from the Alabama NRCS office to help fund Ms. Bosarge's assistantship.
- In 2014, over 150 paired soils (300+ samples) were collected and analyzed for (1) routine soil test, (2) soil organic C, (4) soil respiration, (5) mineralization N, (6) EC, and (7) micronutrients and metals. Over 20 preliminary estimates of soil quality were returned to Alabama farmers through their county extension agents.
- 20+ meetings were held throughout Alabama in which soil quality issues were presented via Powerpoint presentation
- 1125 individuals received training in soil quality issues.
- A final, proposed version of the SQI report follows. The new Alabama SQI is planned to be released as early as the summer of 2015.
- Through collaboration with the state office of NRCS, certain established NRCS production standards have been adopted to include as interpretation practices in association with the proposed Alabama Soil Quality Index:

Factor	Comment on report	NRCS practice
If SQI>80	Continue with existing practices	
If P value = VL or L	Consider using animal manures to build soil P (PP4)	PP4
If SOM= <1.0%	Consider residue and tillage management and cover crops	PP2, PP3, SP3, SP7
If N mineralized > 50 lb/a	Consider reducing commercial N applied by 30 to 50 lb. N/acre	
If aggregate stability is moderate or less	Soil compaction and runoff is a hazard. Consider reduced or no-till, high residue management, use of cover crops, and mulching. Consider in-row subsoiling or strip tillage.	PP1, PP2, PP3, SP7, SP2
If EC>1.60	WARNING. . . SALT BUILDUP COULD DMAGE CROPS.	
If one metal is VH	**CAUTION. Zn, Cu, Cd, Pb, or** Cr is very high. This could be an indication of contamination from micronutrient fertilizers, manures or some other application. Metals cannot be removed from the soil. Keep soil pH above 6.0 to reduce metal uptake by plants.	
If 2 or more metals are VH	**WARNING.** This soil has been contaminated from excessive metal application either from fertilizers or some other application; Metals cannot be removed from the soil. Keep soil pH above 6.0 to reduce metal uptake by plants.	
If SQI< 50	Your total soil quality index is low. Use one or more of the following primary practices to help improve the soil quality index. Re-test your soil in 3 years to determine if the practices are helping. You may be eligible for assistance from your local Soil and Water Conservation District Office or USDA-NRCS office.	(list of NRCS Primary and Secondary practices)

Example of proposed SQI report for a Tennessee Valley cotton field.

Factor84	Values					Max. value	Your Score	BMP recommended
Soil CEC/soil group	<4.6 (Grp 1)	4.7-9.0 (Grp 2)	9.0- 15.0 (Grp.3)	>15,0 (Grp 4)				
	2	4	5	5		5	5	
Soil pH_w	<5.0	5.1-5.8	5.9-7.0	7.0-8.0	>8.0			
	0	10	15	10	5	15	15	
P RATING	VL/LOW	MEDIUM	HIGH	VERY HIGH	EXTREMELY HIGH			
	0	5	10	5	0	10	10	
K RATING	VL/LOW	MEDIUM	HIGH	VERY HIGH	EXTREMELY HIGH			
	0	3	5	3	2	5	5	
Base saturation	<10%	11-25%	26-50%	50-75%	>75%			
	0	3	6	10	8	10	10	
Soil O.M.(%)	<0.5	0.6-1.0	1.1-2.0	2.1-3.0	>3.0			
	0	5	15	20	25	25	15	
N mineralized (lb/a)	<10	11-20	21-30	31-50	>50			
	0	1	2	3	5	5	3	
Soil respiration	VeryLow	Low	Moderate	High	Very High			
	0	1	2	3	5	5	2	
Aggregate stability	No aggregates	Weak	Moderate	Good	Very strong aggregates			
	0	2	4	6	8	8	4	
EC (1:2) Mmho/cm	<0.40	0.40-0.80	0.81-1.60	1.61-3.20	>3.20			
	3	5	3	2	0	5	5	
Metals	Two or more metals "very high"		One metal is "very high"		All metals low or high			
	-10		-5		7	7	7	
TOTAL SOIL QUALITY INDEX						100	84	

Conservation Practices to Improve Soil Quality

There will be two sets of practices recommended to improve soil quality:

(1) A PRIMARY PRACTICES that would be recommended in all situations.

(2) A SUPPORTING PRACTICE that would be recommended depending upon specific site situations and conditions (soil type, slope, operations goals and needs, etc.).

Primary Practices (PP)

1. Conservation crop rotation (328) http://efotg.sc.egov.usda.gov/references/public/AL/tg328.pdf
2. Residue and Tillage Management "No-till/strip till" (329) http://efotg.sc.egov.usda.gov/references/public/AL/tg329.pdf
3. Cover crops (340) http://efotg.sc.egov.usda.gov/references/public/AL/tg340.pdf
4. Nutrient management (590) http://efotg.sc.egov.usda.gov/references/public/AL/tg590.pdf
5. Integrated Pest Management (595) http://efotg.sc.egov.usda.gov/references/public/AL/tg595.pdf

Supporting Practices (SP)

1. Contour Farming (330) http://efotg.sc.egov.usda.gov/references/public/AL/tg330.pdf
2. Deep Tillage (324) http://efotg.sc.egov.usda.gov/references/public/AL/tg324.pdf
3. Forage and Biomass Planting (512) – for sod based rations http://efotg.sc.egov.usda.gov/references/public/AL/tg512.pdf
4. Irrigation water Management (449) http://efotg.sc.egov.usda.gov/references/public/AL/tg449.pdf
5. Contour Buffer Strips (332) http://efotg.sc.egov.usda.gov/references/public/AL/tg332.pdf
6. Filter Strips (393) http://efotg.sc.egov.usda.gov/references/public/AL/tg393.pdf
7. Mulching (345) http://efotg.sc.egov.usda.gov/references/public/AL/tg484.pdf
8. Terrace (600) http://efotg.sc.egov.usda.gov/references/public/AL/tg600.pdf

Complete list of conservation practices http://efotg.sc.egov.usda.gov/toc.aspx?CatID=321

"Continued Support of Long-term Research – The Old Rotation"

C. Mitchell, D. Delaney, and K. Balkcom

The "Old Rotation" experiment (circa 1896) is the oldest, continuous cotton study in the world and the third oldest field crops experiment in the U.S. on the same site. With the renewed interest in "cover crops", we are now claiming that this may be the oldest "cover crop" study in the U.S. The complete history of this experiment was published in 2008 in the centennial issue of Agronomy Journal (*C.C. Mitchell, D.P. Delaney and K.S. Balkcom. 2008. A historical summary of Alabama's Old Rotation (circa 1896): The world's oldest, continuous cotton experiment. Agron. J 100:1493-1498*). We were invited to do a presentation and 2 posters at the annual American Soc. of Agronomy meetings in Long Beach, California, in November. The Old Rotation was also featured during this year's "East Alabama Crops Tour" in August. It is beginning to get more international attention. Many students are using this study for special-problem research and soils from the Old Rotation have been shared with researchers in Ohio, Louisiana and Texas. The Old Rotation is the basis for the soil quality project being conducted.

Corn and cotton yields reflect N availability more than any other factor. There was a response to irrigation in 2014 by cotton, corn and soybean. An interesting observation has been that wheat yields, although not irrigated, seems to always be higher where NO irrigation was applied the previous year.

Crop yields on the OLD ROTATION in 2014.											
Plot No.	Description	Vetch dry matter (lb/a)		Wheat (bu/a)	Corn (bu/acre)		Cotton lint (lb/acre)		Soybean (bu/acre)	
		Irrigated	Non-irrigated		Irrigated	Non-irrigated	Irrigated	Non-irrigated	Irrigated	Non-irrigated
1	no N/no legume	0	0				432	732		
2	winter legume	3728	3234				1126	1089		
3	winter legume	4143	2891				1333	1155		
4	cotton-corn	3473	3043				1859	1539		
5	cotton-corn + N	4078	3388				1765	1539		
6	no N/no legume	0	0				460	460		
7	cotton-corn	5161	6571		192	152.0	corn	corn		
8	winter legume	4425	4310				1943	1117		
9	cotton-corn + N	4431	4319		200	162.0	corn	corn		
10	3-year rotation	0	0				1427	1070		
11	3-year rotation	5319	5213	83.9*	210	194.0	corn	corn		
12	3-year rotation	0	0				soy	soy	51.5	37.1
13	cont. cotton/no legume +N	0	0				1624	1417		
	Mean	4345	4121		205.0	178.0	1582	1275		

*Wheat is not irrigated but these yields were from the half that was not irrigated the previous year; the half that was irrigated produced 72 bu/acre.

Mean irrigated and non-irrigated lint yields across all treatments since 2003 in the Old Rotation			
Year	Lint yield (lb/acre)		Prob>F
	Irrigated lint yield	non-irrigated	
2003	861	952	NS
2004	1182	898	***
2005	750	895	** negative
2006	1102	1137	ns
2007	1221	544	***
2008	1264	602	***
2009	897	1097	*** negative
2010	926	721	**
2011	1121	886	***
2012	1611	1131	***
2013	1387	1338	NS
2014	1624	1417	**
12-yr Mean	1227	918	**

"Continued Support of Long-term Research – Cullars Rotation"

C. Mitchell, D. Delaney, and K. Balkcom

The Cullars Rotation (circa 1911) is the oldest, continuous soil fertility study in the Southern U.S. This study is non-irrigated and yields reflect growing conditions during the season. Note the dramatic yield response to added K by cotton. Highest cotton yields (1267 lb. lint/acre) were produced on the treatment receiving a complete fertilizer plus micronutrients (boron). No added P (Plot 2) dramatically reduces wheat and corn yields more than cotton yields. Soybean yields are equally affected by P and K deficiencies. All fertilizers are applied to the cotton and wheat crops. The Cullars Rotation Experiment is an excellent site to see dramatic nutrient deficiencies compared to healthy crops each year. This type of comparison does not exist anywhere else in the USA. A poster was presented at the Amer. Soc. of Agronomy meetings featuring nutrient movement in these plots over the past 30 years.

Crop yields on the CULLARS ROTATION in 2014.

Plot	Treatment description	Clover dry wt.		Wheat	Corn	Cotton lint	Soybean
		-lb/acre-	Total N fixed (lb/a)	-bu/acre-	-bu/acre-	-lb/acre-	-bu/acre-
A	no N/+legume	2036	82	29.4	101.7	1070	37.8
B	no N/no legume	0	0	22.2	61.3	807	39.0
C	Nothing added	0	0	4.2	6.1	0	0.0
1	no legume	0	0	66.0	147.4	1004	38.3
2	no P	680	52	35.6	45.8	760	10.7
3	complete	3772	97	63.8	148.2	1004	38.5
4	4/3 K	3753	78	69.7	146.0	854	38.9
5	rock P	2863	95	55.9	138.1	1042	40.3
6	no K	1309	63	61.4	30.6	0	15.2
7	2/3 K	2626	153	69.7	131.6	967	36.7
8	no lime (pH~4.9)	0	0	0.0	21.3	0	0.4
9	no S	3355	110	64.4	139.9	1183	33.5
10	complete+ micros	4088	123	61.6	128.0	1267	38.5
11	1/3 K	3000	99	68.0	139.5	657	30.2
	Mean of all treatments	3187	87	61.6	135.6	939	37.6

S.E. Alabama Cover Crops and Tours

W. Birdsong

Purpose: To increase exposure and demonstrate the benefits of cover crops to improve soil structure and the benefits that can be achieved through such production systems.

Demonstrations: Planting of rye this past fall was established with cooperative growers in these regions. Some demonstrations have other cover crops in addition to the rye that was provided by this grant. Meetings will be held this spring, 2015, with different Agronomists in the designated respective regions of the Southern half of the state.

1. S.W. Alabama (Kim Wilkins) –
2. S.E. Alabama (Brandon Dillard) – Brannon Bros Farm, Hartford, Al
3. S.E. Alabama (William Birdsong) – Thomas Kirkland, Headland, Al
4. East Central Al (Christy Hicks) –
5. West Central (Rudy Yates) –

Dates of future meetings will occur this spring; most likely during late March. Fertilizing the cover crops is occurring or will be soon occurring to enhance the biomass expected from this rye cover crop.

III. Fertilizer Management

Impact of Sampling Depth on Phosphorus Soil Analysis and Fertilizer Recommendations for Cotton

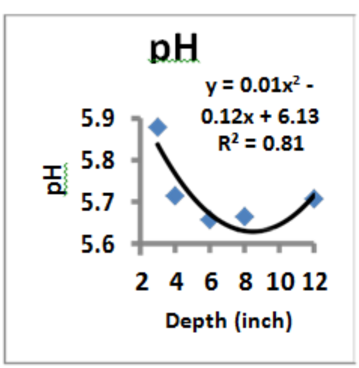
G. Huluka and C.C. Mitchell

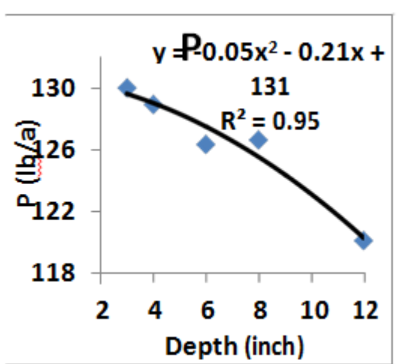
Introduction: Phosphorus is one of the essential primary macronutrients that is inherently deficient in soils. Data from Auburn University Soil Testing lab show that more than 50% of Alabama soil samples sent to the need phosphorus fertilizer applications for optimum plant growth. Soils are recommended to be sampled at 2-3 inches depth for established pastures, hayfields, and lawns and, 6-8 inches for field/row crops. Our objective was to sample soils at
0-3, 0-4, 0-6, 0-8 and 0-12 inch depths and establish a critical range value for cotton/or other row crops under different P treatments and cultural practices.
We collected soil samples from different fields including The Old Rotation and the Cullars Rotation long-term field experiments.

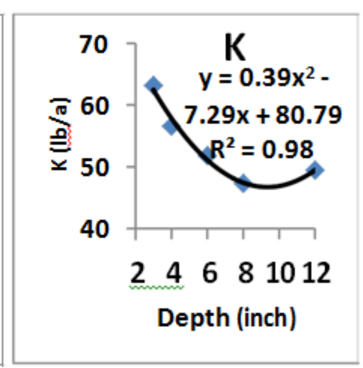
Preliminary results of extractable P in different soil depths indicated:

1. In general, extractable P in the 0-3 inch depth was higher than the other lower depths.
2. Extractable P values were affected by soil type, pH, P treatments, crop rotation and cultural practices.
3. For soils that had a "low P" rating, extractable P decreased with increasing sampling depth.
4. There was no significance difference for extractable P in soils that had "high P" rating with depth.
5. Tillage, P fertilizer placement and pH affected extractable P in topsoil.
6. In general, important soil parameters such as pH, K, Mg, Ca and CEC were affected by depth and usually decreased as depth increased (see Figures below **average data**).

Recommendations: Continue collecting soil and yield data to ascertain the current findings







Irrigated and Dryland Cotton Response to Foliar Potassium and Timing

C. Hicks, C. H. Burmester and S. Scott

The trial was conducted at E.V. Smith Field Crops Unit. The objective of this trial was to determine irrigated and non-irrigated cotton response to foliar applied potassium and also determine the application timing that facilitates the best yield. The initial soil test indicated high K of 172 pounds per acre. Deltapine 1321 was planted on May 23. Plots received liquid 28-0-0-5 at 60 pounds per acre on June 26 and granular 0-0-60 at 40 pounds per acre on June 27. The initial foliar K application was made 1 week before first bloom and then weekly for 3 weeks at a rate of 3 pounds per acre. The second foliar K program was applied 1 week after first bloom and then weekly for 3 weeks at a rate of 3 pounds per acre. Each plot was 4 rows by 30 feet. The two inner rows were harvested for yield data. Treatments were applied with a CO_2 backpack sprayer that delivers 18 GPA using TTI11003 nozzles.

Figure 1.

Treatment	Rate	Timing	Dryland Lint Yield lbs/ac	Irrigated Lint Yield lbs./ac
KNO_3	3 pounds/ac	1 week before 1st bloom then weekly for 3 weeks	1749a	1672a
KNO_3	3 pounds/ac	1 week after 1st bloom then weekly for 3 weeks	1579a	1656a
UREA	.88 pounds/ ac	1 week before 1st bloom then weekly for 3 weeks	1700a	1662a
UREA	.88 pounds/ac	1 week after 1st bloom then weekly for 3 weeks	1699a	1665a
Check	N/A	N/A	1768a	1621a

LSD P=.10

Figure 2. *Inches of rainfall and irrigation*

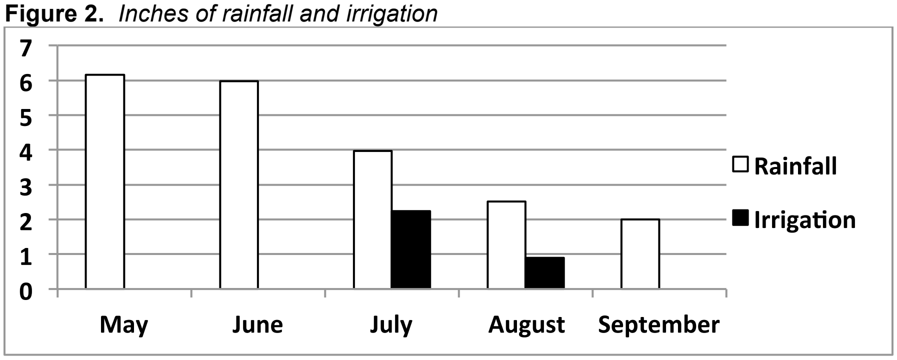


Figure 3. *Classing Information from USDA-AMS, Macon, Georgia*

Treat-ment	Timing	Turn Out Irr[1]	Turn Out Dry[2]	Mic Irr	Mic Dry	Str Irr	Str Dry	Len Irr	Len Dry	Unif Irr	Unif Dry
KNO_3	1 week before 1st bloom	.438a	.475a	4.15a	4.3a	33.13a	32.03a	1.145a	1.1a	83.60a	83.53a
KNO_3	1 week after 1st bloom	.435a	.443a	3.90a	4.3a	31.95ab	31.15a	1.130a	1.108a	83.98a	82.95a
UREA	1 week before 1st bloom	.44a	.448a	4.08a	4.33a	31.65ab	30.90a	1.113a	1.095a	83.40a	83.33a
UREA	1 week after 1st bloom	.44a	.448a	4.18a	4.20a	30.60b	30.95a	1.128a	1.108a	83.20a	83.25a
Check	N/A	.44a	.443a	4.18a	4.30a	31.38ab	30.70a	1.155a	1.105a	84.80a	83.00a

[1]Indicates irrigated
[2] Indicates Dryland
LSD P=.10

Summary: This trial received 20.63 inches of rain from May thru September. The irrigated plots received a total of 3.15 inches of water in addition to the 20.63 inches of rain. This is illustrated in Figure 2. There are no significant yield differences in the plots (Figure 1). This could be due to rainfall being adequate for root uptake and the soil K being high.

There was a significant difference in strength. The irrigated KNO_3 plots when timing of application was 1 week before 1st bloom was significantly better than all other plots. This is illustrated in Figure 3.

Potassium Rates for New Generation Cotton Cultivators- Year 2 Report

A. **Investigators:** D. Weaver and B. Guertal, Professors

B. **Experiment Design:**

The experiment was conducted at the Plant Breeding Unit (PBU), located in Tallassee, AL. The site was not irrigated, and had an initial soil test K of 78 lb K/A, a 'Medium' soil test (recommended fertilizer K_2O application of 40 lb/A). Three cotton cultivars were used: Phytogen 499, Deltapine 1050 and Deltapine 491 (an older cultivar). Potassium rates (as KCl) were 0, 30, 60, 90 and 120 pounds K_2O/A. There were four replicates of each treatment for a total of 60 plots in the experiment (15 treatments). Each plot was 4 rows wide (36 inch row spacing) and 40 feet long, with the middle two rows of each plot harvested. All K was preplant broadcast applied and incorporated prior to planting.

Collected data included: 1) yield, 2) fiber quality, 3) date of first flower and first open boll, 4) plant height at first flower and first open boll, and, 5) tissue K (most recently emerged fully expanded leaves) at first flower and first open boll. Plots were harvested on November 28th, 2014.

C. **Results (yield data only at this point):**

For seed cotton yield, there was not a significant cultivar x K rate interaction, which indicates that the different cultivars responded similarly to increasing potassium. Phytogen 499 had a significantly higher yield than measured in Deltapine 1050 or Delta 491 (Table 1). However – we think the Deltapine 491 was likely damaged by a pesticide spray, so that yield should be viewed with caution. As K rate increased there was a significant linear increase in seed cotton (Figure 1). There was not a different K response due to cultivar. These are the same results as observed in 2013.

Figure 1. Seed cotton yield as affected by K_2O rate 2013, Tallasee, AL

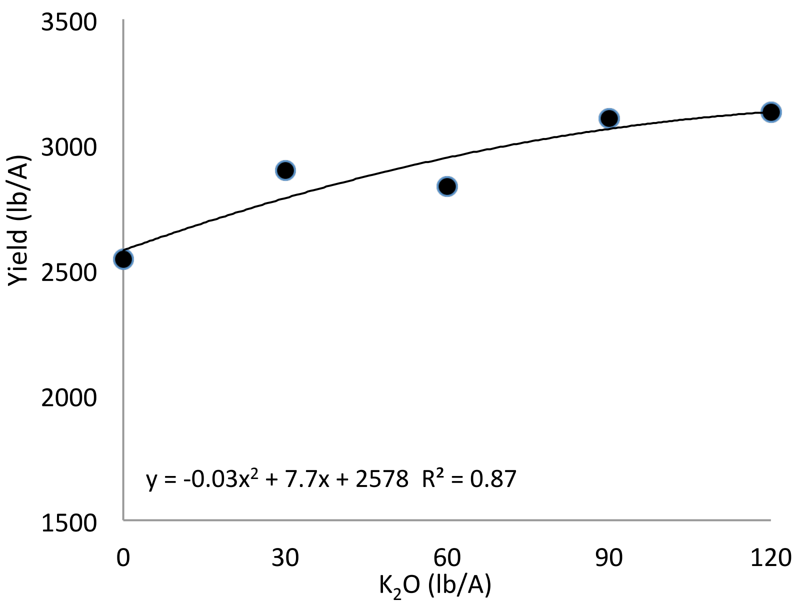


Table 1. Seed cotton yield as affected by cultivar, 2013, Tallasee, AL.

	Yield (lb/A)
Phytogen 499	3179 a
Deltapine 1050	2839 b
Deltapine 491	2683 b

Means followed by the same letter are not significantly different from each other via mean's separation at an alpha of 0.05.

Figure 2. Seed cotton yield as affected by K2O rate, 2014, Tallasee, AL.

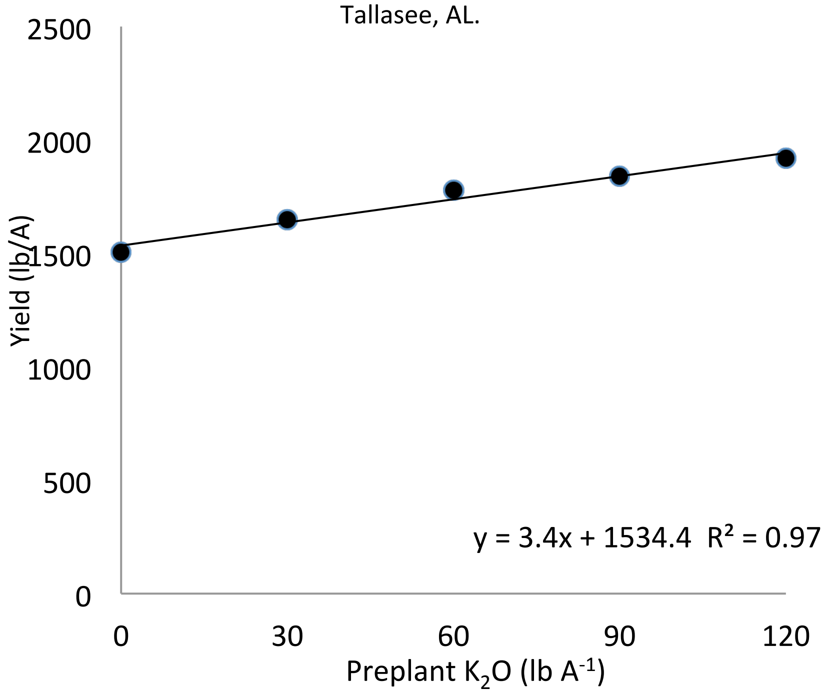


Table 2. Seed cotton yield as affected by cultivar, 2014, Tallasee, AL.

	Yield (lb/A)
Phytogen 499	2069 a
Deltapine 1050	2203 a
Deltapine 491	943 b†

Means followed by the same letter are not significantly different from each other via mean's separation at an alpha of 0.05.

† Deltapine 491 likely sprayed with incorrect pesticide.

Comparison of 4 Irrigation Scheduling Methods to a Limited Irrigation Scheme in Optimizing Available Irrigation Water

W. M. Porter, C. D. Perry, V. Liakos, and G. Vellidis

Non-Technical Summary

The main goal of this project was to compare four irrigation scheduling methods to a limited water regime. The project was conducted at the University of Georgia's Stripling Irrigation Research Park (SIRP) located near Camilla and at the University of Georgia's Tifton Campus. The irrigation scheduling treatments were field tested in research plots with both conventional and strip tillage. The evaluated irrigation scheduling protocols when combined with the tillage scenarios, resulted in ten different treatments except for the limited water scenario in which we only had replications of conservation tillage.

The irrigation scheduling protocols evaluated were the University of Georgia Extension Checkbook method, the SmartIrrigation Cotton App, the SmartIrrigation Cotton App with primed acclimation (60% of normal irrigation until first bloom), a tensiometric threshold of 50kPa (weighted mean of soil water tension at 3 depths measured with the UGA SSA), and a protocol using a total of 2in of supplemental irrigation during critical phenological stages. All five protocols were evaluated at SIRP.

The within-treatment variability of yield and soil moisture condition at the SIRP plots made it difficult to draw distinctions between the performances of the scheduling methods we evaluated so only general conclusions are feasible. In general, sensor-based and smartphone-based irrigation scheduling tools can produce yields as high as or higher than the Checkbook Method but use considerably less irrigation water. Three varieties were planted for this test and this seems to hold true regardless of variety. At SIRP, the SmartIrrigation Cotton App when used with primed acclimation outperformed all other scheduling methods in terms of yield and was the most water efficient of the methods which used regular irrigation schedules. It is not clear why the yields for this method were so much higher than the other methods. The 2in Supplemental Irrigation Method was the most efficient in terms of water use but its yields were 30% or more lower than the other methods.

Even though the yield for the 2in of supplemental irrigation was 30% lower, the irrigation was only applied to this method during flowering. The goal of this method was to determine if a producer had the option to add supplemental irrigation to a dryland field, would it be worth the time, cost, and effort this late in the season? We did not have a dryland yield in this particular field but in other studies at SIRP dryland averaged around 490 lbs/ac of lint yield, and when compared to dryland, we were able to double the yield of the cotton by adding the additional 2 inches of irrigation during the flowering stage.

Objectives:

The main objective of this study was to evaluate four typical irrigation scheduling methods and a limited irrigation situation for three common cultivars produced in the Coastal Plains or Wiregrass Region of Alabama. The secondary objectives were to:

- Document the water applied in each of the irrigation methods and collect cotton yield data at the end of the year from the three varieties to determine the efficacy of the irrigation scheduling methods and limited irrigation scheme.
- To use the documented applied water to determine optimal varietal responses to yield.

Methods:

<u>Cotton Irrigation Scheduling Treatments at the Stripling Irrigation Research Park (SIRP)</u>

At SIRP, cotton was planted in the "Newton Lateral South" plots on May 14 using four varieties – DP1252, FM1944, PHY333, and PHY499. However, PHY499 was not considered in the results because problems during planting resulted in a poor stand. Each plot was 50ft long and 24ft wide and contained 8 rows of cotton with 2 rows per plot planted to each of the four varieties. The plots were irrigated with a conventional linear-move irrigation system (Valley) fitted with standard spray-type sprinklers on drop hoses. Sprinklers over each plot are controlled with a VRI system (FirstWater Ag) such that each plot is individually irrigated to the desired amount. Half of the plots were in conventional tillage with sub-soiling. The other half of the plots were in long-term conservation tillage (strip-till with sub-soiling). A rye cover crop was burned down in early April. A total of 80 lbs of nitrogen was applied throughout the season. PGR (Pix 12 oz/ac) was applied twice. Standard herbicide and insecticides were also applied on an as needed basis based on crop scout recommendations. The first irrigation event took place on June 25 and the final event on September 17. The cotton was defoliated on October 25. Harvest took place 183 days after planting on November 15. The plots were harvested with a JD 9930 2-row cotton picker with bagging attachment. All the cotton harvested from each plot was weighed to determine yield in the field, transported to the UGA Microgin, ginned, and a subsample was analyzed for fiber quality.

Sensor and Scheduling Methods

The irrigation treatments for 2014 included 5 irrigation scheduling methods for each of the tillage treatments (strip-till and conventional). Each scheduling method/tillage treatment was evaluated with 3 replicates for a total of 30 plots. Two replicates of each treatment were instrumented with a UGA SSA sensor node so we are able to view soil water tension at three depths in real time. Each UGA SSA sensor node contained Watermark sensors at 8, 16, and 24in. To keep with standard producer practices and to avoid irrigation-induced surface runoff, if a method called for irrigation, only 0.75in was applied. Except in the case of the AL 2in supplemental irrigation treatment in which the method of irrigation determination is described below its treatment.

- Method 1 – SmartIrrigation Cotton App
- Method 2 – SmartIrrigation Cotton App with Primed Acclimation (at 60% of normal irrigation until first bloom)
- Method 3 – Tensiometric Threshold of 50kPa (weighted mean of 3 depths measured with UGA SSA)
- Method 4 – UGA Extension Checkbook

- Method 5 – Alabama 2in supplemental (add a total of 2in of irrigation during critical phenological stages)
    - Irrigation was scheduled for this treatment as follows:
        - Only supplemental irrigation to ensure a good stand establishment was applied at the very beginning of the season. Once irrigation began only 0.5 inch applications were made (these were increased slightly to account for irrigation efficiency). Since a total of 2 inches was all that was available, there was potential for applying irrigation for 4 weeks or approximately half of the flowering stage of the crop.
        - No irrigation was applied to the plots until the crop began to flower
        - A mid-week evaluation was made based on two criteria: 1. Did the crop receive at least 0.5 inches of rainfall in the past week? 2. Was a significant rainfall event predicted in the near (next 2 to 3 days) future.
        - If either one of the two criteria were met irrigation was postponed until the following week.
        - If neither of the criteria were met then 0.5 inches of effective (0.6 actual assuming 80% irrigation efficiency) of irrigation was applied.
        - This process was repeated throughout bloom stage until the irrigation allocation was expired.

Results:

Table 1 summarizes mean yields in terms of lint yield (lb/ac) and bales across varieties from SIRP. As mentioned earlier, PHY499 was not included in the results because of a poor stand. Lint turnout was estimated at 40%. The table also includes amount of irrigation water applied to each treatment. Precipitation at SIRP between planting and August 31 when irrigation ceased was 11.2 in. The soil water tension data clearly indicated that plots scheduled with the Checkbook Method were wetter than those scheduled with the Cotton App (Figure 1) and other scheduling methods. The SmartIrrigation Cotton App with primed acclimation resulted in the highest yields. However, because of ample rainfall during June, only one irrigation event was scheduled using primed acclimation and this scheduling method used only 0.3in less of irrigation water than the plots scheduled with the Cotton App without primed acclimation. It is difficult to explain the yield differences between the two scheduling methods (Table 1). There was a great deal of variability both in the yield response of individual plots within the same treatment and the soil water tension response of those plots (Figure 3).

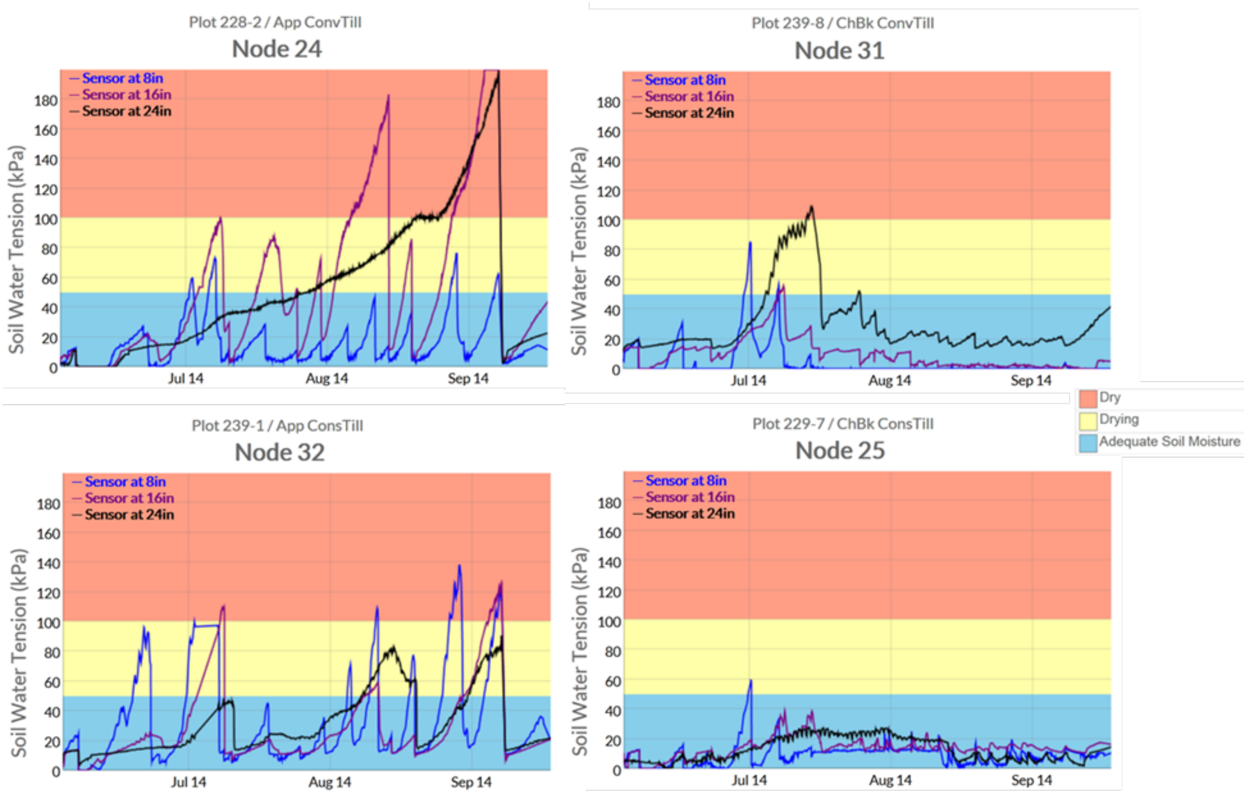


Figure 1. Soil water tension graphs for plots scheduled with the SmartIrrigation App (left) and the Checkbook Method (right). Soil water tension was much lower throughout the growing season for the Checkbook Method plots.

However, the soil water tension data showed that the Primed Acclimation plots were generally drier than the Cotton App plots without Primed Acclimation (Figure 2). The plots which were scheduled with the 50kPa tensiometric threshold were generally wetter than the Cotton App and much wetter than the Cotton App with primed acclimation plots. There was higher variability in soil moisture between plots of this treatment (Figure 3) than perhaps any other treatment. In these plots, irrigation was scheduled when the average weighted mean of the sensors in the two instrumented plots per treatment exceeded 50kPa. At maturity, the weighted mean was calculated as 0.5(kPa at 8in) + 0.3(kPa at 16in) + 0.2(kPa at 24in). Conventional tillage plots were scheduled and irrigated independently of conservation tillage plots.

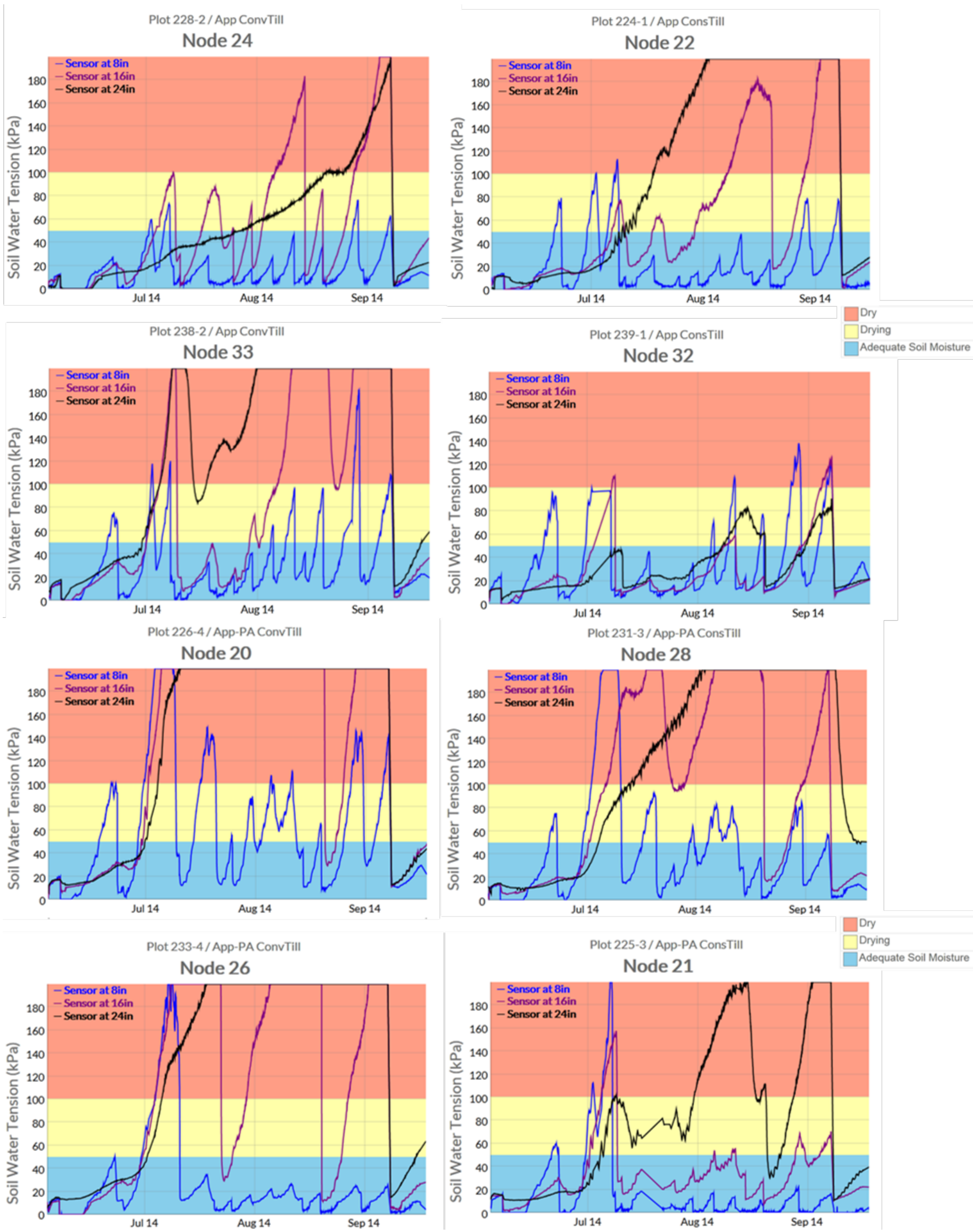


Figure 2. Soil water tension curves for plots scheduled with the SmartIrrigation Cotton App (top 4) and SmartIrrigation Cotton App with Primed Acclimation (bottom 4). The graphs on the left side of the page are for plots in conventional tillage while the ones on the right are for conservation tillage.

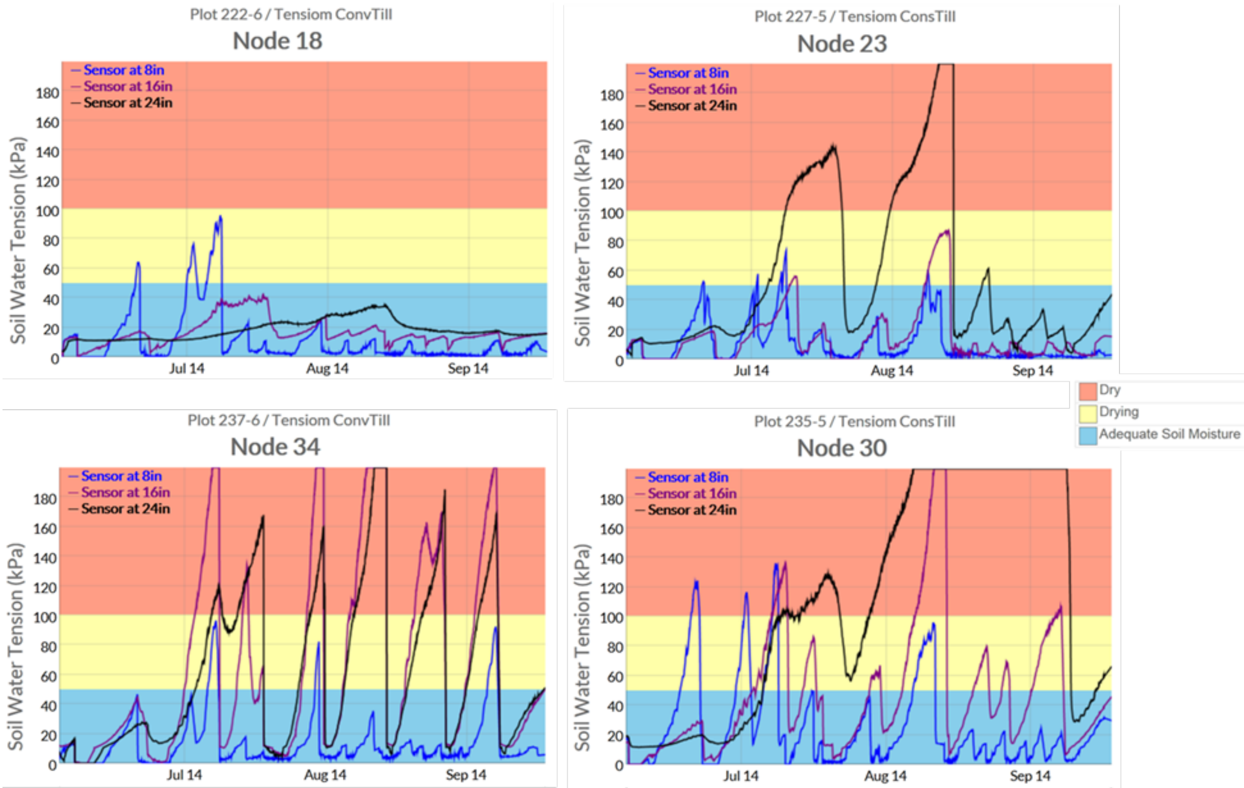


Figure 3. Soil water tension graphs for plots scheduled with the 50kPa tensiometric method. Irrigation was scheduled when the average weighted mean of the sensors in the plots exceeded 50kPa. At maturity, the weighted mean was calculated as 0.5(kPa at 8in) + 0.3(kPa at 16in) + 0.2(kPa at 24in). Conventional tillage plots were irrigated independently of conservation tillage plots.

Table 1. Yields and irrigation amounts from the 2014 irrigation scheduling study at SIRP.

Irrigation Treatments	Yield		Irrigation	Water Use Efficiency	
	(lb/ac)	(ba/ac)	(in)	(lb/ac-in)	(ba/ac-in)
1a. App / Cons	1597	3.33	9.40	170	0.35
1b. App / Conv	1440	3.00	9.40	153	0.32
2a. App-P.A. / Cons	1741	3.63	9.10	191	0.40
2b. App-P.A. / Conv	1844	3.84	9.10	203	0.42
3a. 50kPa Threshold / Cons	1486	3.10	14.65	101	0.21
3b. 50kPa Threshold / Conv	1742	3.63	12.40	140	0.29
4a. CB / Cons	1660	3.46	15.25	109	0.23
4b. CB / Conv	1709	3.56	15.25	112	0.23
5. AL / Cons	1050	2.19	3.81	276	0.57

Table 1 also presents results on water use efficiency or yield produced per inch of irrigation water used. The most efficient method was the Alabama 2in Supplemental method with

276lb/ac of lint per inch of irrigation water applied. Table 1 indicates that a total of 3.81in of irrigation water were used but 1.41in were used to promote germination and to establish a good stand. Thereafter, only 2.4 inches were applied (80% efficiency). Although this method resulted in high water use efficiency, producers may be less willing to adopt it unless their water supplies are severely limited because yields were approximately 30% less than those of other scheduling methods. This method is not recommended as a sound full season irrigation strategy, but as a supplemental last effort to prevent detrimental losses to a dryland crop. In this case these plots were able to achieve 2.1 times the dryland yield by adding this additional irrigation during the critical phonological stages. Thus, it is recommended that producers consider supplemental irrigation sources during very dry years to achieve higher dryland yields. These methods will usually be a traveling gun irrigation system.

Summary and Conclusion

The within-treatment variability of yield and soil moisture condition at the SIRP plots made it difficult to draw distinctions between the performances of the scheduling methods evaluated – only general conclusions are feasible. In general, sensor-based and smartphone-based irrigation scheduling tools can produce yields as high as or higher than the Checkbook Method but use considerably less irrigation water. This held true regardless of variety. At SIRP, the SmartIrrigation Cotton App when used with primed acclimation outperformed all other scheduling methods in terms of yield and was the most water efficient of the methods which used regular irrigation schedules. It is not clear why the yield for this method were so much higher than the other methods. The 2in Supplemental Irrigation Method was the most efficient in terms of water use but its yields were 30% or more lower than other methods, but if used as a supplemental strategy to dryland fields can have a large economic impact.

IV. Insect Management

Determining the Interactive Effects of Two Pre-Emergent Herbicides and an Insecticide Seed Treatment on Thrips Damage to Cotton and Cotton Yields in North Alabama.

T. Reed

This study was conducted at the Tennessee Valley Research and Extension Center at Belle Mina, AL. ST 4946 was planted May 6, 2014. A factorial design was employed. Insecticide factors were 1. Fungicide-Treated Seed 2. Avicta Complete Seed Treatment and 3. Avicta Complete seed treatment + Foliar Spray (bidrin @ 3.2oz./acre) at 1st true leaf. Pre- herbicide factors were 1. No PRE, 2. Cotoran PRE (1x rate = 1qt./acre) 3. Cotoran PRE (2X rate = 2 qts./acre) 4. Reflex Pre (1x rate = 1 pt/acre) 5. Reflex Pre (2X rate = 2 pts/acre). Visual thrips damage ratings were made at 17 and 31 days after planting using a scale of 1 to 5, with 1 being no damage and 5 indicating severe damage. A damage rating of 3 with thrips present is a reasonable treatment threshold for seedling cotton. Plant height measurements of 3 plants per plot were made 27 days after planting. Plant biomass was determined by collecting and drying 5 plants per plot at 42 days after planting. Plots were harvested October 21, 2014.

Results: Mean Thrips damage ratings were moderate. Thrips damage ratings are presented in Table 1.

Table 1. Thrips Damage Ratings in Cotton Herbicide X Insecticide Thrips Control Study. 2014. Belle Mina AL

Herbicide Treatment	Damage Rating 5/23	Damage Rating 6/06	Insecticide Treatment	Damage Rating 5/23	Damage Rating 6/06
No Pre	2.0	2.0	No Insecticide	2.68	2.8
Cotoran 1X	2.2	2.1	Avicta Complete	1.98	1.95
Cotoran 2X	2.0	2.1	Avicta Complete + Bidrin[1]	1.95	1.4
Reflex 1X	2.2	2.0			
Reflex 2X	2.6	2.1			
P>F =	0.19	0.91	P>F =	0.00	0.00
			LSD 0.1 =	0.21	0.25

[1] Bidrin application made after rating on 5/23.

There was no significant herbicide X insecticide interaction with respect to damage ratings on 5/23 (P>F = 0.22) or 6/06 (P>F =0.73). There was no significant herbicide treatment effect with respect to damage rating on 5/23 (P>F=0.19) or 6/06 (P>F=0.91). There was a significant insecticide treatment effect with respect to thrips damage ratings on both 5/23 (P > F =0.00) and

6/06 (P>F = 0.00). The No Insecticide treatment had significantly more damage than the two insecticide treatments on 5/23 (LSD 0.1 =0.21) and 6/06 (LSD 0.1 = 0.25)

Mean cotton plant heights are presented in Table 2. There was no significant herbicide X insecticide interaction with respect to plant height 27 DAP (P>F=0.95). There was no significant herbicide treatment effect (P>F=0.71) or insecticide treatment effect (P>F=0.95) with respect to plant height.

Table 2. Cotton Plant Height 27 DAP In Herbicide X Insecticide Thrips Control Study.

Herbicide Treatment	Plant Height (cm)	Insecticide Treatment	Plant Height (cm)
No Pre	17.5	No Insecticide	17.0
Cotoran 1X	16.5	Avicta Complete	17.1
Cotoran 2X	17.0	Avicta Complete + Bidrin	17.1
Reflex 1X	17.5		
Reflex 2X	16.8		
	P>F = 0.71		P>F = 0.95

Dry plant weights are presented in Table 3. There was no significant herbicide X insecticide interaction with respect to dry plant weights (P>F=0.82). There was no significant herbicide treatment effect (P>F=0.38) or insecticide treatment effect (P>F=0.24) with respect to dry plant weight.

Table 3. Dry Plant Weight of Cotton 42 DAP In Herbicide X Insecticide Thrips Control Study

Herbicide Treatment	Dry Plant Weight (grams)	Insecticide Treatment	Dry Plant Weight (grams)
No Pre	17.2	No Insecticide	14.8
Cotoran 1X	14.4	Avicta Complete	15.2
Cotoran 2X	14.6	Avicta Complete + Bidrin	16.0
Reflex 1X	15.8		
Reflex 2X	14.4		
	P>F = 0.38		P>F = 0.24

Plant stand counts are presented in Table 4. There was no significant herbicide X insecticide interaction with respect to stand count (P>F=0.23). There was no significant herbicide treatment effect (P>F=0.50) with respect stand count.There was a significant insecticide treatment effect with respect to stand count (P>F=0.025). Mean number of plants per 10 row feet was significantly greater in the No Insecticide Treatment than in the other two insecticide treatments (LSD 0.1 = 1.94).

Table 4. Plant Stand Count Cotton Herbicide X Insecticide Thrips Control Study 2014. Belle Mina AL.

Herbicide Treatment	Number of Plants/10 Row Ft	Insecticide Treatment	Number of Plants/10 Row Ft
No Pre	32.5	No Insecticide	35.2 A
Cotoran 1X	32.4	Avicta Complete	32.0 B
Cotoran 2X	34.3	Avicta Complete + Bidrin	32.8 B
Reflex 1X	35.0		
Reflex 2X	32.3		
	P>F = 0.50		P>F = 0.025
			LSD 0.1 = 1.94

Seed cotton yields are presented in Table 5. There was no significant herbicide X insecticide interaction with respect to yield (P>F=0.68). There was no significant herbicide treatment effect (P>F=0.94) or insecticide treatment effect (P>F=0.52) with respect to yield.

Table 5. Seed Cotton Yield for Herbicide X Insecticide Thrips Control Study 2014. Belle Mina AL

Herbicide Treatment	LBs Seed Cotton/Acre	Insecticide Treatment	LBs Seed Cotton/Acre
No Pre	3330	No Insecticide	3368
Cotoran 1X	3409	Avicta Complete	3410
Cotoran 2X	3394	Avicta Complete + Bidrin	3354
Reflex 1X	3337		
Reflex 2X	3419		
	P>F = 0.94		P>F = 0.52

Seedling Plants in this test were not sampled to ID thrips but cotton planted in another nearby test one day earlier was sampled for thrips at the 2nd true leaf stage and the population was 72% tobacco thrips, 19% flower thrips, 0% western flower thrips, and 9% soybean thrips.

Evaluation of Velum Total on Cotton for Nematode and Thrips Control, Velum (Fluopyram and Imidacloprid); Prattville Agricultural Research Center;

R. Smith

Cotton for this trial was planted to ST6448B2RF on April 23 at the Prattville Agricultural Research Unit. Cotton was solid planted in 36 inch rows with recommended lime and fertility levels. This trial design was RCB, 4 replicates, plot size 4 rows x 30 ft. A nematode sample was taken from the trial area on May 14. Trace numbers of the dagger and lesion species were found but no root knot species were present.

Evaluations were made on May 13, when plants were cotyledon to 2 true leaf stage; on May 20, when plants had 4 true leaves; and May 27, when most plants had the 7^{th} true leaf showing. On June 3, a final thrips damage rating was made (1-5 scale).

At 41 DAP, June 3, it was noted that various rows with the same plot often varied in thrips damage from as much as a 2 to a 4 on a 5 point scale. This trial was planted into a reduced tillage soil. Certain rows emerged before others, likely due to the depth of the seed at planting. The earliest emerging rows always showed better vigor and growth with less thrips injury. When evaluating each plot, the center two rows were only used for the visual evaluation and rating. On June 13, 51 DAP, a visual rating was made comparing all treatments and plots to each other using a 0-3 scale. Evaluations Below.

Treatment/Rate/Ac.	Thrips Rating (0-5 scale) (mean – 3 obs. Dates)	Overall Rating 51 DAP (0-3 scale)	Root Galls at Harvest (1-10 scale) (mean – 2 reps)	Yields (lbs. seed cotton/Acre)
Untreated	3.1 A	0	5	2962 A
Temik 51 lbs.	2.5 A	1.0	5	3062 A
Velum SC 10 oz. IF	2.6 A	1.0	1	3137 A
Velum SC 14 oz. IF	2.4 A	2.0	4.5	3243 A
Velum SC 18 oz. IF	2.4 A	1.5	2.5	3425 A

Velum Thrips Control Conclusions

1. All treatments were better than the untreated control.
2. Velum at 10 oz./acre was very comparable to Temik at 5 l bs./acre.
3. Velum at 14 and 18 oz. per acre were superior to Velum at 10 oz. or Temik at 5 lbs., but not visibly different from each other.

Evaluation of Select Insecticides for Plant Bug Control in Cotton; Prattville Agricultural Research Center; Prattville, AL

Trt. #	Trt./Rate	TPB/5 ft. 2 DAA #1	TPB/5 ft. 8 DAA #1	TPB/5 ft. 4 DAA #2	Yields Seed cotton/acre
1	Transform 1.5 oz.	0.1	2.8	0.5	3558
2	Movento 8.0 oz. (+oil+UAN) (Spirotetramat Imidacloprid)	0.1	3.2	0.3	3492
3	Centric 2.0 oz.	1.0	3.8	1.0	3541
4	DoubleTake 4.0 oz. (Dimilin+Karate)	0.2	4.8	0.3	3405
5	Untreated	4.8	4.0	1.8	3436

App #1 – July 9
App #2 – July 17
Small Plot, RCB, 4 Replicates

Evaluation of WideStrike III; Wiregrass Research Center; Headland, AL

Entry	End of Season Dam. Bolls/35 ft.	Yield Lbs. seed cotton/acre
PHY315R	6.5	3068
PHY499WSR	0.5	4243
PHY495WSIIIR	0.0	4066

V. Weed Management

On-Farm Evaluation of Pre-emergence Herbicides to Control Glyphosate Resistant Pigweed

C. Hicks, M. Patterson and C.D. Monks

Seven pre-emergent herbicide treatments were evaluated for the control of glyphosate resistant pigweed. This trial was conducted in Elmore County. Plots were 4 rows by 40 feet long and row spacing was 38 inches. A burndown treatment was applied to the field before planting. Treatments were applied with a CO_2 backpack sprayer with a GPA of 18. TTI11003 nozzles were used. Plots were arranged in a randomized complete block design with four replications. Cotton was planted and sprayed May 14. The field received 2.15 inches of rainfall the same day treatments were applied. A rotary hoe was used on May 23 because of soil crusting. Plots were rated for percent control on May 27, June 2, June 5 and June 9th. Data were statistically analyzed by ARM 9 (Gylling Data Management, Inc.)

Table 1.
Pigweed percent control ratings 13 DAP, 18 DAP, 21 DAP and 25 DAP

Treatment	Rate oz/ac	May 27	June 2	June 5	June 9	
Reflex	16	99a	93ab	93a	89a	
Caparol	32	98a	93ab	93a	88a	
Reflex+Caparol	16+32	99a	97a	92a	89a	
Staple+Caparol	1.3+32	99a	95a	95a	88a	
Diuron	32	99a	97a	97a	94a	
Warrant	48	90b	76b	76b	48b	
Warrant+Reflex	48+10	97a	92ab	92ab	75a	

LSD (P=.05)

Table 2.
Post Direct Spray Treatments applied June 14. Rated 3 DAT

Treatment	Rate oz/ac	June 17
Diuron + MSMA	8+16	99
Diuron + MSMA + Valor	8+16+2	99
Cotoran + MSMA	25.6+16	97
Cotoran + MSMA + Valor	25.6+16+2	99

Summary: In this particular trial, the Diuron treatment was the most cost effective and also had very good pigweed control of all the pre-emergence herbicides. Shortly after treatments were applied, a heavy rainfall occurred. This may explain why Warrant did not perform as well. The post direct spray treatments were applied when the cotton was 5-10 inches tall. The pigweed ranged from 1-5 inches tall when treatments were applied.

On-Farm Evaluation of Pre-emergence Herbicides to Control Prickly Sida

C. Hicks, M. Patterson and C.D. Monks

Six herbicide treatments were evaluated for the control of Prickly sida in cotton. This trial was conducted in Elmore County. Plots were 6 feet by 40 feet long. Cotton was planted in a skip row pattern. Treatments were applied using a CO_2 backpack sprayer that delivered 18 GPA. TTI11003 nozzles were used. Plots were arranged in a randomized complete block design with four replications. Cotton was planted May 8 and treatments were applied May 9. The field received .72 inch of rainfall the day after treatments were applied. Plots were rated for percent control on May 13, May 20, May 27, June 2, June 9 and June 17. Data were statistically analyzed by ARM 9 (Gylling Data Management, Inc.)

Table 1.
Percent control ratings 5 DAP, 12 DAP, 19 DAP, 24 DAP, 31 DAP, 39 DAP

Treatments	Rate (oz/ac)	May 13	May 20	May 27	June 2	June 9	June 17
Cotoran+Prowl+RPMax[1]	32+32+27	99a	98a	97a	92a	88a	78a
Caparol+Prowl+RPMax	32+32+27	99a	97a	95a	89a	83a	61a
Cotoran+Staple LX+RPMax	32+1+27	99a	98a	98a	94a	90a	79a
Caparol+Prowl+Staple LX+RPMax	32+32+1+27	98a	97a	97a	92a	83a	70a
Prowl+Reflex+RPMax	32+16+27	100a	99a	96a	96a	91a	81a
RPMax	27	100a	99a	97a	95a	81a	63a
[1] *Indicates Roundup PowerMax* *LSD P=.10*							

Summary: This field had low weed pressure this particular year. Prickly sida was not widespread throughout the plots. Although there were no significant differences in the treatments, Prowl + Reflex was numerically the best treatment.

Herbicide Resistant Horseweed Field Studies.

J. Tredaway Ducar, C. H. Burmester, A. Price, and S. McElroy

Field studies were conducted in 2013 and 2014 to evaluate pre-emergence and post-emergence herbicide systems to control glyphosate-resistant horseweed. Two trials were conducted in 2014 at the Sand Mountain Research and Extension Center in Crossville, Alabama. The first trial evaluated the following herbicides: Roundup PowerMax at 32 fl. oz/a, Clarity at 8 and 16 fl. oz/a, Roundup PowerMax at 32 fl oz/a plus Clarity at 8 fl. oz/a, Roundup PowerMax at 32 fl oz/a plus Clarity at 16 fl. oz/a, Roundup PowerMax at 32 fl oz/a plus Sharpen at 2 fl. oz/a. A non-ionic surfactant at 0.25% v/v was included in all Clarity treatments and all Roundup PowerMax treatments included a 1% v/v ammonium sulfate. All treatments were applied in the fall and the spring. The second trial evaluated the following herbicides applied preemergence: Valor at 2 oz/a, Zidua at 2 oz/a, Leadoff at 1.5 oz/a, Sharpen at 2 fl. oz/a, and Fierce at 3 oz/a. A blanket application of Gramoxone at 1 pt/a plus 1% v/v ammonium sulfate plus Sharpen at 1 fl. oz/a was applied to the entire test area. Preliminary findings indicated that an addition of Clarity or Sharpen to Roundup PowerMax is needed in both fall and spring applications for resistant horseweed control. No differences were detected with residual herbicides in horseweed control between fall and spring applications that have been evaluated to date. Residual herbicides provide an additional site of action as well as control of other winter weeds.

Evaluating Two-Pass Herbicide Regimes to Reduce Herbicide Resistance Selection Pressure in High-Residue Cover Crop vs. Winter Fallow Conservation Tillage Cotton.

Investigators/Collaborators: A. Price, S. McElroy, C.H. Burmester, J. Tredaway-Ducar, and C.D. Monks.

Location: E.V. Smith Research and Extension Center, Shorter, AL.

Results: The following tables provide weed control details in each of the three studies. In general, the rye cover crop provided greater early-season weed suppression than the winter fallow system, regardless of weed species. Perfect late-season weed control requires the use of a three pass herbicide system to achieve season-long weed control (Tables 1 and 3). However, excellent weed control was observed in a few two pass systems in two of the three studies. The use of Valor as an early PRE application, when followed by an additional PRE and POST herbicide application, provided effective season-long weed control of all species present. Observed Palmer amaranth control in glyphosate-tolerant cotton was less than that in the glufosinate-tolerant cotton; due to the expanding population of a glyphosate-resistant Palmer amaranth population at the experiment site (Table 2). For both cotton systems, the earlier application of Dual Magnum provided greater weed control compared to the later application (Tables 2 and 3).

Table 1. Early and late season weed control in a 2-pass Roundup Ready system with and without Valor PRE.-E.V. Smith, 2014.

	Early % Weed Control[1]						Late % Weed Control[2]				
	Morning glory	Palmer amaran th	Nut sed ge	Cra b gra ss	Car pet wee d	Sic kle pod	Mor ning glory	Palmer amaranth	Nut sed ge	Cra b gra ss	Sic kle pod
Cover											
Fallow	76	79	81	80	76	63	87	80	87	62	70
Rye	92	90	92	94	97	93	83	70	84	71	81
Herbicide											
None	38	46	34	28	49	43	67	57	67	0	65
Valor PRE[3]	64	79	63	72	79	32	67	67	67	0	0
Prowl + Reflex[4]	80	94	93	83	92	76	75	72	82	28	43
Roundup[5]	65	57	81	85	49	65	98	69	99	73	94
Caparol + MSMA[6] layby	48	49	53	51	59	45	53	42	66	22	75
Valor PRE fb Prowl + Reflex	96	98	98	99	99	70	32	43	49	33	17
Valor PRE fb Roundup	93	98	99	99	98	98	100	98	10 0	10 0	10 0
Valor PRE fb Caparol + MSMA layby	86	90	85	95	92	70	81	48	66	51	66
Prowl + Reflex fb Roundup	97	98	99	99	97	99	100	100	10 0	10 0	10 0
Prowl + Reflex fb Caparol + MSMA layby	98	83	98	96	99	83	92	54	97	90	80
Roundup fb Caparol + MSMA layby	84	69	96	92	79	96	100	83	10 0	98	10 0
Valor PRE fb Prowl + Reflex fb Roundup	99	99	98	99	99	99	100	98	99	93	10 0
Valor PRE fb Roundup fb Caparol + MSMA layby	97	98	98	98	98	97	98	100	10 0	10 0	10 0
Prowl + Reflex fb Roundup fb Caparol + MSMA layby	99	98	98	98	96	98	99	99	10 0	10 0	10 0
Valor PRE fb Prowl + Reflex fb Caparol + MSMA layby	99	93	99	99	99	80	98	73	98	79	71
Valor PRE fb Prowl + Reflex fb Roundup fb Caparol+ MSMA layby	99	99	99	99	99	99	100	100	10 0	10 0	10 0

[1]Early-season weed control ratings were taken on 6/3/14.
[2]Late-season weed control ratings were taken on 8/26/14.
[3]Valor (1 oz wt/A) was applied early pre-emergence (before planting).
[4]Prowl H_2O (2 pt/A) and Reflex (1 pt/A) was applied pre-emergence (at planting).
[5]Roundup Powermax (1 lb ai/A) was applied post-emergence (4-leaf growth stage).
[6]Caparol (24 fl oz/A) and MSMA (40 fl oz/A) was applied as a layby application.

Table 2. Weed control in a 2-Pass RR POST residual herbicide system.-E.V. Smith, 2014.

	% Weed Control		
	Palmer amaranth	Crabgrass	Cutleaf evening primrose
Cover Treatment			
Fallow	44	62	64
Rye	51	74	76
Herbicide			
None	0	0	0
Roundup[1] + Dual Magnum[2]/ 2 leaf	61	96	96
Roundup + Dual Magnum/ 8 leaf	44	72	78
Valor[3]	10	8	13
Roundup + Dual Magnum 2 leaf fb Roundup + Dual Magnum 8 leaf	63	96	98
Roundup + Dual Magnum 2 leaf fb Valor	73	97	98
Roundup + Dual Magnum 8 leaf fb Valor	54	78	80
Roundup + Dual Magnum 2 leaf fb Roundup + Dual Magnum 8 leaf fb Valor	78	95	97

[1]Roundup Powermax (1 lb ai/A) was applied POST either at 2-leaf or 8-leaf stage.
[2]Dual Magnum(16 fl oz/A) was applied POST either at 2-leaf or 8-leaf stage.
[3]Valor (1 oz wt/A) was applied as a layby application.

Table 3. Weed control in a 2-Pass LL POST residual herbicide system.-E.V. Smith, 2014.

	% Weed Control		
	Palmer amaranth	Crabgrass	Cutleaf evening primrose
Cover Treatment			
Fallow	53	53	45
Rye	75	76	78
Herbicide			
None	0	0	0
Ignite[1] + Dual Magnum[2]/ 2 leaf	87	95	83
Ignite + Dual Magnum/ 8 leaf	54	58	50
Valor[3]	17	0	0
Ignite + Dual Magnum 2 leaf fb Ignite + Dual Magnum 8 leaf	93	98	99
Ignite + Dual Magnum 2 leaf fb Valor	88	98	98
Ignite + Dual Magnum 8 leaf fb Valor	67	55	48
Ignite + Dual Magnum 2 leaf fb Ignite + Dual Magnum 8 leaf fb Valor	98	99	99

[1]Ignite 280 (29 fl oz/A) was applied POST either at the 2-leaf or 8-leaf stage.
[2]Dual Magnum (16 fl oz/A) was applied POST either at the 2-leaf or 8-leaf stage.
[3]Valor (1 oz wt/A) was applied as a layby application.

VI. Disease Management

Commercial Cotton Variety Response to Fusarium wilt/RKN Nematode Complex in Alabama

A. Smith, K.S Lawrence, K. M. Glass, and E. van Santen

Abstract: *Fusarium oxysporum* f. sp. *vasinfectum* (FOV) is the causal agent of the fungal disease Fusarium wilt in cotton. Objectives of this study are to 1) Observe commercial variety responses to Fusarium wilt and root-knot nematodes (*Meloidogyne incognita*) and compare to yield and 2) Identify races of FOV present at the site of the Commercial Fusarium Wilt Trial. The projected outcome of these experiments is to be able to more effectively control the Fusarium wilt root-knot nematode disease complex in the southeastern United States with resistant varieties being the main control measures. Results showed four varieties having statistically similar yields to the resistant check M-315: Stoneville 4747 GLB2, Stoneville 4946 GLB2, Phytogen 427 WRF, and Phytogen 499 WRF. Eleven of sixteen cultivars showed statistically similar Fusarium wilt percentages to the resistant check M-315. Nine of sixteen cultivars tested had statistically similar root-knot egg reproduction factors compared to the resistant check M-315. There is a diversity of FOV races present at the Plant Breeding Unit, making this location ideal for a field trial. Races 1, 8, LA 108, and LA 127/140 were found to be present in 2014.

Introduction: *Fusarium oxysporum* f. sp. *vasinfectum* (FOV) caused the loss of over $1.3 million and 3100 bales of cotton for 2013 in Alabama (Lawrence et al., 2014). Fusarium wilt and the root knot nematode (RKN) are two pathogens that put great pressure on cotton crops throughout the Southeast. There are currently no commercial cotton cultivars that are resistant to this disease complex. The only available option for control is to fumigate soils to reduce nematode populations; two downfalls to this control method are 1) the lack of economic feasibility for row crop farming to use these nematicides on a large scale and 2) the discontinuation of most effective fumigants due to environmental concerns. It is crucial to find other means of controlling and preventing this disease complex in order to decrease yield losses and economic losses for present day and future farmers. The Commercial Wilt Trial has been utilized since 2003. Its purpose is to evaluate commercially available cotton cultivars for Fusarium wilt and root-knot resistance. Cultivars are provided by plant breeders and various companies for evaluation. Factors considered during evaluation are Fusarium incidence and severity, root-knot reproduction factors, and yield performance.

Figure 1a. Figure 1b. Figure 1c. Figure 1d.

Figure 1a: Fusarium wilt foliar symptoms. Figure 1b: Interveinal chlorosis and necrosis. Figure 1c: Vascular discoloration of hypocotyl. Figure 1d: Galling associated with root-knot nematode damage.

Methods: The Commercial Fusarium Wilt Trial was located at the Plant Breeding Unit of the E. V. Smith Research Center near Tallassee, Alabama. Sixteen commercial varieties that are commonly grown in Alabama and the Southeast were tested with this trial. Egg reproduction factors, Fusarium wilt incidence, and yield were compared to resistant (M-315) and susceptible (Rowden) checks. The trial was organized in a randomized complete block design with four replications. Plots were set up as 20 feet long one-row plots with 36-inch row spacing, with 6 feet alleys separating blocks. The trial was planted May 19, 2014 and maintained throughout the growing season using standard practices for pesticide and fertilizer applications as recommended by the Alabama Cooperative Extension System. Initial survival rates were taken 17 DAP and final survival rates were taken 101 DAP to determine plant survival rates by plot. Five wilt disease evaluations were taken throughout the season at 33, 43, 58, 73, and 93 DAP. Infected plants were counted and collected and the fungus was re-isolated onto half-strength APDA (acidified potato dextrose agar) 100mm plates using sterile techniques to confirm infection. FOV cultures were identified to race using four primers to sequence identification of pathogenic races of FOV according to Kim (2009) and Holmes et al. (2009): two EF-1α primers (EF1 and EF2) and two Beta-tubulin primers (BT3 and BT5). For root-knot nematode reproduction factor calculations, three root systems per plot were sampled at 63 DAP and root-knot eggs were extracted by shaking in 0.6% NaOCl for four minutes, and eggs were collected on a 25µm sieve and counted at 40X using an inverted Nikon TSX microscope. Data were statistically analyzed using Generalized Linear Mixed Models with SAS® PROC GLIMMIX using Tukey-Kramer's ($\alpha \leq 0.05$) with a negative binomial distribution function for count variables. Seed cotton yield was analyzed using a normal distribution function. Dunnett's *P*-values were calculated to compare entries to resistant and susceptible checks.

Results: The susceptible check Rowden averaged 30% wilt incidence and the resistant check M-315 averaged 2% wilt incidence; the commercial varieties with the lowest amount of disease present were Stoneville 4747 GLB2 and Phytogen 427 WRF with 1% wilt incidence. Eleven cultivars displayed statistically similar wilt percentages to the resistant check (Table 1): Phytogen 339 WRF, Phytogen 575 WRF, Phytogen 499 WRF, Phytogen 427 WRF, Deltapine 1321 B2RF, Deltapine 1252 B2RF, Deltapine 1050 B2RF, Stoneville 4747 GLB2, Stoneville

4946 GLB2, Stoneville 6448 GLB2, and FiberMax 1944 GLB2. Wilt percent incidences for each of these varieties was low with a range of 1-7%.

The susceptible check Rowden averaged 1871 root-knot nematode eggs per gram of root fresh weight (eggs/g RFW), and the resistant check M-315 averaged 270 eggs/g RFW. Nine varieties supported root-knot egg numbers that were statistically similar to the resistant check M-315 (Table 1): Croplan Genetics 3787 B2RF, Phytogen 499 WRF, Phytogen 427 WRF, Deltapine 1133 B2RF, Deltapine 1252 B2RF, Deltapine 1050 B2RF, Deltapine 1137 B2RF, Deltapine 1454NR B2RF, and Stoneville 4946 GLB2. Average root-knot eggs per gram of root for each of these varieties ranged from 703 to 1349.

The susceptible cultivar Rowden yielded an average of 684 lbs. of seed cotton per acre, and the resistant check M-315 yielded 1806 lbs. per acre. At .60¢ per pound (the average price of cotton lint in December 2014) the average profit per acre would be $292/acre for Rowden, and $569/acre for M-315. Four varieties were statistically higher yielding than the resistant check M-315: Phytogen 427 WRF, Phytogen 499 WRF, Stoneville 4747 GLB2, and Stoneville 4946 GLB2 with 2536, 2706, 2868, and 2521 lb. averages per acre of seed cotton yield. With the same .60¢ per pound average for 2014, the yields per acre for these varieties (at 40% lint production) would be $1094, $913, $1213, and $1134 per acre. This represents how imperative it is to be selective of the cultivar grown.

Fusarium isolates were taken from each trial and identified to race in order to determine the diversity of *Fusarium oxysporum* f. sp. *vasinfectum* at the field testing site. The predominant race identified was race 1, with 69 isolates being confirmed as race 1. Six isolates were confirmed to be LA 127/140. Five isolates of race 8 and five isolates of race LA 108 were identified. Races 3, 4, LA 110, and LA 112 were not identified at the field testing site in 2014. Although there were five total disease evaluations throughout the season, the first and the fifth were used for race identification. The first disease evaluation had races 1, 8, LA 108, and LA 127/140 present. The fifth disease evaluation had races 1, LA 108, and LA 127/140 present. This indicates a greater diversity at the beginning of the season as opposed to the end.

Table 1. Fusarium wilt incidence, root-knot eggs/g root, and yield for cultivars, 2014. *Varieties in bold are statistically similar to the resistant check M-315.				
	Total wilt (%)	RK eggs/g root	Yield (lb/A)	Yield ($)
Croplan 3787 B2RF	13	**1210**	1664	399
PHY 375 WRF	9	2426	1443	346
PHY 499 WRF	**5***	**1349**	**2536**	609
PHY 339 WRF	**2**	1642	2312	555
PHY 427 WRF	**1**	**906**	**2706**	650
PHY 575 WRF	7	1940	1610	386
DP 1321 B2RF	**3**	1946	1997	479
DP 1133 B2RF	15	**1094**	1659	398
DP 1252 B2RF	7	**909**	1752	420
DP 1050 B2RF	**6**	**1059**	1812	435
DP 1137 B2RF	11	**924**	1799	432
DP 1454 NR B2RF	18	**703**	1399	336
ST 4747 GLB2	**1**	1573	**2868**	688
ST 4946 GLB2	**2**	**1206**	**2521**	605
ST 6448 GLB2	**5**	3331	2111	507
FM 1944 GLB2	**6**	2446	2044	491
M-315	2	270	1806	433
Rowden	30	1871	684	164

Summary: Races of *Fusarium oxysporum* f. sp. *vasinfectum* found at the Plant Breeding Unit were races 1, 8, LA 108, and LA 127/140. Race 1 was most predominantly found in 2014. Ranking the cultivars by yield indicated the highest yielding cultivars were Stoneville 4747 GLB2 followed by Phytogen 427 WRF, Phytogen 499 WRF, and Stoneville 4946 GLB2. Phytogen 427 WRF, Stoneville 4946 GLB2 and Phytogen 499 WRF supported lower root-knot populations and little FOV disease incidence. Stoneville 4747 GLB2 supported very low wilt incidence, but root-knot egg reproduction factors were not significant. Deltapine 1454NR B2RF supported lower numbers of root-knot nematode eggs per gram of root fresh weight than the susceptible check Rowden and other commercial cultivars tested in the trial. This variety performed the best when limiting root-knot nematode reproduction, but could be considered moderately susceptible to Fusarium wilt. Further testing will need to be done to confirm or deny resistance to FOV. Commercial cultivar selection is economically important to producers in fields with the Fusarium wilt Root-knot nematode complex, and these results indicate cultivars are available for growers to help combat losses caused by this disease.

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Verticillium Wilt on-farm Cotton Cultivar Variety Evaluations, 2014

C.J. Land, K.S. Lawrence, C.H. Burmester, and B. Meyer

Eighteen cotton varieties were planted and evaluated for resistance to *Verticillium dahliae*. The trial was planted on the Tate farm in Madison county in northern Alabama. Plots were six rows each, and approximately 500 feet long. The field was irrigated, when needed, with a drip tape irrigation system. Disease ratings were taken September 20. In 10 ft sections of the third row in each plot, total number of plants were determined, and stems were cut longitudinally to assess disease incidence. Disease severity ratings of foliar symptoms were evaluated on a scale from 1 to 5 with 1= no foliar wilting, 3= interveinal chlorosis and necrosis of the leaves, and 5=completely defoliated plants. Four replications, evenly spaced throughout the field of each variety were counted. Petioles were sampled from infected plants of each variety by re-isolating to confirm the presence of *Verticillium dahliae* by the presence of distinct morphological characteristics. The trial was harvested on 17 Oct. Analysis of variance was conducted using SAS 9.3 (SAS Institute), and means were compared using Tukey-Kramer Honest Significant Difference (HSD) ($\alpha \leq .10$).

Verticillium wilt pressure was medium to high during the 2014 season. Two cultivars had the lowest disease severity (<2) rating of the eighteen that were tested, ST 4747 GLB2 and the resistant check FM 1944 GLB2. The two cultivars that had the highest ratings were DPLX 14R1456 B2R2, DPLX 12R224 B2R2, and PHY 333 WRF. These cultivars had mean scores above 4, with plants almost completely defoliated. In terms of disease incidence, ST 4946 GLB2 had the lowest number of plants with darkened vascular systems. PHY 339 WRF, ST 4747 GLB2, and ST 5032 GLB2 all displayed vascular staining with mean disease incidence ranging from 50-53%. These percentages were statistically similar and performed better than the resistant check, FM 1944 GLB2. Five varieties yielded up to 10% higher than the resistant check: ST 4747 GLB2, DPLX 14R1455, DP 1137 B2RF, ST 4946 GLB2, and DPLX 13R352.

		Verticillium		Seed cotton
Cultivars[z]		Severity[y]	% Incidence[x]	(kg/ha)
1	CROPLAN 3787 B2RF	2.87 abc[w]	87 ab	2902 bcde
2	DP 1321 B2RF	2.75 abc	73 abc	3316 abcde
3	DP 1133 B2RF	2.87 abc	75 abc	3178 abcde
4	DP 1137 B2RF	3.25 abc	83 abc	4110 abc
5	DPLX 12R224	4.12 a	89 a	2186 e
6	DPLX 13R310	3.12 abc	83 abc	2403 de
7	DPLX 13R352	2.50 abc	66 abcd	3899 abcd
8	DPLX 14R1455	2.37 abc	67 abc	4298 ab
9	DPLX 14R1456	4.25 a	90 a	2173 e
10	PHY 333 WRF	4.00 a	89 a	2998 abcde
11	PHY 339 WRF	2.75 abc	50 cd	3761 abcde
12	PHY 499 WRF	3.75 ab	73 abc	3501 abcde
13	FM 1944 GLB2	1.75 bc	66 abcd	3783 abcde
14	ST 4747 GLB2	1.63 c	51 cd	4630 a
15	ST 4946 GLB2	2.37 abc	44 d	3985 abcd
16	ST 5032 GLT	2.62 abc	53 bdc	3023 abcde
17	ST 6448 GLB2	2.87 abc	73 abc	3725 abcde
18	BX 1534	2.87 abc	59 abcd	2431 cde
	Pr > F	.0004	.0001	.0027

[z]All seeds were treated by respective companies.

[y]Severity ratings were a scale of 1 to 5 with 1= no foliar wilting, 3= interveinal chlorosis and necrosis of the leaves, and 5=completely defoliated plants.

[x]The total number of plants and stems were cut longitudinally to assess percent disease incidence.

[w]Column numbers followed by the same letter are not significantly different at α = .1 as determined by Tukey-Kramer HSD.

Yield and Reaction of Cotton Varieties and Experimental Lines to Target Spot in Central Alabama

A. K. Hagan, K. Burch, and D. Moore

Variety selection may prove an effective tool for managing target spot in cotton. Previous Alabama field trials have shown that cotton varieties differ greatly in their reaction to target spot. Significant yield gains have been obtained on susceptible cotton but on disease tolerant varieties, such as Phytogen 499 and Deltapine 1050, respectively. The reaction of cotton varieties and experimental lines to target spot were evaluated for their response to target spot and yields.

The study site was paratilled on 21 March and smoothed with a rotary hoe on 21 April. On 5 May, cotton varieties were hill dropped at a rate of 2 seed per row foot in a Lucedale sandy loam (OM < 1%) at the Prattville Agricultural Research Unit in Prattville, AL. A 10 May broadcast application of 300 pounds per acre of 13-13-13 analysis fertilizer was followed by a 19 June layby application of 60 pounds per acre 34-0-0 analysis fertilizer. Weed control was obtained with a pre-emergent application of 1 quart per acre of Prowl H_2O + 1 quart per acre of Diuron on 7 May followed by a 12 June broadcast application of 24 fluid ounces per acre of Roundup Weathermax. Cotton was prepared for harvest with a 23 September application of 4.5 fluid ounces per acre of Daze + 1 quart per acre of Boll'd. Bidrin at 4 fluid ounces per acre + Diamond at 9 fluid ounces per acre were broadcast on 16 July for stink bug control. The experimental design was a randomized complete block with four replications. Individual plots consisted of two 28 foot rows spaced 3 feet apart. Target spot intensity was assessed on 13 September using a 1 to 10 leaf spot scoring system where 1 = no disease, 2 = very few lesions in canopy, 3 = few lesions noticed in lower and upper canopy, 4 = some lesions seen and ≤ 10% defoliation, 5 = lesions noticeable and ≤ 25% defoliation, 6 = lesions numerous and ≤ 50% defoliation, 7 = lesions very numerous and ≤ 75% defoliation, 8 = numerous lesions on few remaining leaves and ≤ 90% defoliation, 9 = very few remaining leaves covered with lesions and ≤ 95% defoliation, and 10 = plants defoliated. Defoliation values were calculated using the formula [% Defoliation = 100/(1 + e(-(disease score - 6.0672)/0.7975)]. Cotton was mechanically harvested on 16 October. Statistical analysis on target spot defoliation was calculated on rank transformations of data, which were back transformed for presentation. Means were separated using Fisher's protected least significant difference (LSD) test ($P \leq 0.05$).

With the exception of Phytogen 427 and experimental lines Phytogen PX5540-63, Phytogen PX499-36, and Phytogen PX 4444-13; highest defoliation levels were recorded for Phytogen 499. An additional 14 varieties and experimental lines had similarly low defoliation levels as Bayer Stoneville 5289. Low defoliation levels observed for some cotton varieties and experimental lines such as DynaGro 2610 and Bayer Stoneville 5289 did not translate into higher seed cotton yields. Yields of 15 varieties and experimental lines were similar to those reported for the highest yielding experimental line Phytogen PX5540-63.

Cotton variety	Target spot defoliation[z] %	Seed cotton yield[y] lb/A
Americot 1511 B2RF	9.5 e-i[x]	3842 a-d
Americot NG 5315 B2RF	10.7 d-i	3289 d-h
Bayer BX 1535 GLT	13.1 b-h	3160 e-h
Bayer BX 1536 GLT	13.5 b-g	3367 b-h
Bayer Stoneville 4747 GLB2	5.5 hi	3643 a-f
Bayer Stoneville 4946 GLB2	12.4 d-i	3600 a-f
Bayer Stoneville 5289 GLT	5.1 i	2785 h
Bayer Stoneville 6448 GLB2	10.3 e-i	3894 a-d
Croplan Genetics 3787 B2RF	10.4 e-i	3497 a-g
Deltapine 1050 B2RF	8.6 f-i	2849 gh
Deltapine 1137 B2RF	11.2 c-i	3328 c-h
Deltapine 1252 B2RF	11.3 e-i	3523 a-f
Deltapine 1454NR B2RF	6.7 f-i	3712 a-e
Deltapine MON 13R352 B2RF	6.5 ghi	3505 a-g
DynaGro 2610 B2RF	7.9 fghi	3004 fgh
Phytogen 375 WRF	14.9 b-g	3364 b-h
Phytogen 333 WRF	15.6 a-f	3781 a-e
Phytogen 495 W3RF	27.0 a-d	3568 a-f
Phytogen 499 WRF	42.9 a	3978 abc
Phytogen 575 WRF	9.0 f-i	3756 a-e
Phytogen PX 4444-13 WRF	18.4 a-e	4008 ab
Phytogen PX499-36 W3RF	23.1 abc	4066 a
Phytogen PX5540-10 WRF	14.2 c-i	3322 c-h
Phytogen PX5540-57 WRF	13.9 e-f	3461 a-g
Phytogen PX5540-63 WRF	33.1 ab	4101 a

[z]Target spot defoliation was assessed on 17 September.
[y]Seed cotton yield = total weight of seed + lint.
[x]Means in each column followed by the same letter are not significantly different according to the least significant difference (LSD) test ($P \leq 0.05$).

Variety Selection and Fungicide Inputs Impact Target Spot Control in Cotton in Central Alabama

A. K. Hagan, K. L. Bowen, K. Burch, and S. Scott

Previous trials have shown that cotton varieties differ considerably in their reaction to target spot. While Phytogen 499 has proven consistently susceptible to target spot and may suffer significant yield loss, other cotton varieties such as Deltapine 1050 have good disease tolerance and are not prone to significant yield losses. Sizable yield gains with fungicide inputs have been seen most often on susceptible varieties. The objective of this study was to assess the reaction of widely planted cotton varieties to target spot and potential yield gains that may be obtained with fungicide inputs.

The study site at the Field Crop Research Unit at the E. V. Smith Research Center was prepared for planting with a KMC strip till rig. On 19 May, cotton varieties were hill dropped at a rate of 2 seed per row foot in a Marvyn loamy sand soil (OM < 1%). A 13 May broadcast application of 88 pounds per acre of 34-0-0 analysis fertilizer was followed by a 27 June layby application of 67 pounds per acre of murate of potash (0-0-60) and a 26 June layby application of 19.4 gallons per acre of 28-0-0 liquid fertilizer (60 pounds actual nitrogen per acre). Weed control was obtained with a pre-emergent incorporated application of 1 pints per acre of Diuron + 1 pint per acre of Reflex on 8 May followed by a 20 June broadcast application of 22 fluid ounces per acre of Roundup Weathermax + 1 pint per acre of Dual Magnum II, and a 26 June layby application of 2.5 pints per acre MSMA + 1 pint per acre of Diuron with a hooded sprayer. Cotton was prepared for harvest with a 24 September application of 1 pint per acre of Folex + 6 fluid ounces per acre of Daze followed by a 1 October application of 8 fluid ounces of Folex + 3 fluid ounces of Daze + 12 fluid ounces per acre of Boll'd. Bidrin, at 4 fluid ounces per acre, was broadcast on 14 July and 1 August for stink bug control. Plots received 0.6, 0.75, 0.9, and 1.1 acre inches of water on 2 July, 31 July, 12 August, and 10 September, respectively. The experimental design was a factorial arranged in a split-plot with cotton variety as the whole plot and fungicide as the split plot treatment. Individual split-plots consisted of four 30-foot rows spaced 3 feet apart. Four replications of treatments were included. Headline 2.09SC at 9 fluid ounces per acre was broadcast with a Spider sprayer on 23 July (1^{st} week of bloom), 8 August, 24 August, and 2 September with AITTJ60-11002VP nozzles on 18 inch centers using 15 gal/A of spray volume at 40 psi. A non-fungicide treated control was included. Target spot intensity was assessed on 17 September using a 1 to 10 leaf spot scoring system where 1 = no disease, 2 = very few lesions in canopy, 3 = few lesions noticed in lower and upper canopy, 4 = some lesions seen and $\leq$ 10% defoliation, 5 = lesions noticeable and $\leq$ 25% defoliation, 6 = lesions numerous and $\leq$ 50% defoliation, 7 = lesions very numerous and $\leq$ 75% defoliation, 8 = numerous lesions on few remaining leaves and $\leq$ 90% defoliation, 9 = very few remaining leaves covered with lesions and $\leq$ 95% defoliation, and 10 = plants defoliated. Defoliation values were calculated using the formula [% Defoliation = 100/(1 + e(-(disease score - 6.0672)/0.7975)]. Defoliation ratings from 17 September are displayed in the table. Cotton was mechanically harvested on 7 October. Significance of interactions was done using the PROC GLIMMIX procedure in SAS. Statistical analysis on target spot defoliation and yield were performed on rank transformations of data,

which were back transformed for presentation. Means were separated using Fisher's protected least significant difference (LSD) test ($P \leq 0.05$).
Temperatures during the study period were at or above the 30-year historical average. Rainfall totals for May and June were above to well above normal but were below normal through much of July, August, and September.

Since all interactions for yield are not significant, data presented for each variable are pooled. Due to a significant variety x fungicide interaction for target spot defoliation on 17 September, data are presented by cotton variety and fungicide treatment. Significant differences in target spot-induced defoliation were noted between cotton varieties and fungicide treatments. In the non-treated controls and Headline 2.09SC-treated plots, similar and significantly higher target spot-related defoliation levels were observed on Phytogen 499 compared with all other cotton varieties except for the non-fungicide treated Stoneville 6446. The non-fungicide treated Fibermax 1944 suffered less defoliation than all remaining non-fungicide treated varieties. When treated with Headline 2.09SC, the latter variety had similarly low defoliation ratings to the remaining varieties except Deltapine 1137 and Phytogen 499, which suffered higher levels of target spot-related defoliation. Significant reductions in target spot defoliation were observed on Phytogen 575, Deltapine 1137, Deltapine 1050, Deltapine 1252, and Stoneville 6448 but not Phytogen 499 and Fibermax 1944 with Headline 2.09SC. Higher yields were noted for Fibermax 1944 compared with all varieties except for Phytogen 499, while Deltapine 1252 and Phytogen 575 had similarly low yields. While a reduction in defoliation was obtained on five of seven cotton varieties, yield response with the four Headline 2.09SC application program and non-treated control was similar. The slow pace of disease development coupled with relatively low defoliation levels indicate that target spot had minimal impact on seed cotton yield of the majority of varieties screened with the possible exception of Phytogen 499.

Table 1. Impact of variety selection and fungicide inputs on target spot severity and yield of selected commercial cotton varieties in Central Alabama.

Factorial analysis (F values)	Target spot % defoliation[z]		Seed cotton yield lb/A[y]
Cotton variety	14.08***[x]		6.25**
Fungicide	60.53***		0.02
Cotton variety x fungicide	4.73**		1.21
Cotton varieties	Control	Headline	
Phytogen 499 WRF	44.7 a[w]	21.7 ab	3904 ab
Phytogen 575 WRF	12.0 bc	4.8 de	3267 de
Deltapine 1137 B2RF	14.7 bc	6.5 d	3559 cd
Deltapine 1050 B2RF	12.5 bc	4.8 de	3415 de
Deltapine 1252 B2RF	11.8 c	5.3 de	3246 e
Fibermax 1944 GLB2	5.8 de	3.1 e	4111 a
Stoneville 6448 GLB2	16.7 ab	6.0 de	3822 bc
Fungicide and rate/A			
Non-treated control	--		3611 a
Headline 2.09SC 9 fl oz	--		3623 a

[z]Target spot intensity was rated on 15 September.
[y]Seed cotton yield = total weight of seed + lint.
[x]Significance of *F* values at the 0.05, 0.01, and 0.001 levels is indicated by *, **, or ***, respectively.
[w]Means in each column followed by the same letter are not significantly different according to the least significant difference (LSD) test ($P \leq 0.0$

Fungicide Placement and Control of Target Spot on two Cotton Varieties in Southwest Alabama

A. K. Hagan, K. L. Bowen, K. Burch, and H. B. Miller

Fungicides often to do not provide the expected level of target spot control on cotton. Fungicide efficacy may be improved and higher yields realized if fungicide coverage of the leaves in the lower and mid-canopy is improved, which may in turn delay target spot onset and development. The objective of this study was to determine if nozzle arrangement impacts target spot control and yield response with the fungicides Heritage 2.09SC and Quadris 2.08SC on two cotton varieties.

The study site was prepared for planting with a KMC ripper bedder. On 11 March, 256 pounds per acre of 20-60-60 analysis fertilizer was broadcast and incorporated. On 8 May, Phytogen 499 and Deltapine (DPL) 1252 cotton varieties were hill dropped at a rate of 3 seed per foot of row in a Benndale fine sandy loam at the Brewton Agricultural Research Unit in Brewton, AL. A layby application of 100 pounds per acre of 34-0-0 analysis fertilizer on 6 June was followed by an application of 400 pounds per acre of 15-0-15 analysis fertilizer on 19 June. Weed control was obtained with a pre-emergent incorporated application of 1.5 pints per acre of Prowl H_20 followed by a 7 June application of 1 quart per acre of Roundup WeatherMax with a hooded sprayer. Cotton was prepared for harvest with an application of 1.5 pints per acre of Finish defoliant on 30 September. Plots received 0.5, 0.6, 0.6, 0.7 and 0.7 acre inches of water on 2 July, 8 July, 5 August, 11 August, and 4 September, respectively. The experimental design was factorial arranged as a split split-plot with cotton variety as the whole plot, fungicide as the split plot, and fungicide placement as the split split-plot treatment. Individual split split-plots consisted of four 30–foot rows spaced 3 feet apart. Four replications of treatments were included. Headline 2.09SC at 9 fluid ounces per acre and Quadris 2.08SC at 9 fluid ounces per acre were applied with a 'high-boy' sprayer as a broadcast application on 11 July (1st week of bloom) and 23 July (3rd week of bloom) with TX-12 nozzles on 20 inch spacing at 20 gallons per acre of spray volume at 60 psi or with a drop nozzle arrangement with a single TX-12 nozzle over the top of the row for top coverage and one TX-12 nozzle on a drop on each side of the row to deliver the fungicide into the cotton canopy at a spray volume of 20 gallons per acre at 60 psi. A non-fungicide treated control was included. Target spot intensity was assessed on 18 September, using a 1 to 10 leaf spot scoring system where 1 = no disease, 2 = very few lesions in canopy, 3 = few lesions noticed in lower and upper canopy, 4 = some lesions seen and $\leq$ 10% defoliation, 5 = lesions noticeable and $\leq$ 25% defoliation, 6 = lesions numerous and $\leq$ 50% defoliation, 7 = lesions very numerous and $\leq$ 75% defoliation, 8 = numerous lesions on few remaining leaves and $\leq$ 90% defoliation, 9 = very few remaining leaves covered with lesions and $\leq$ 95% defoliation, and 10 = plants defoliated. Defoliation values were calculated using the formula [% Defoliation = 100/(1+e(-(disease score-6.0672)/0.7975)]. Cotton was mechanically harvested on 14 October. Significance of interactions was determined using PROC GLIMMIX procedure in SAS. Means were separated using Fisher's protected least significant difference (LSD) test ($P \leq 0.05$).

Monthly rainfall and temperatures were at or above the 30 year average during the study period.

Since the cotton variety x fungicide interaction for target spot intensity and yield are significant, data were segregated by cotton variety and fungicide treatment Table 1). Mean defoliation levels were higher for Phytogen 499 than DPL 1252. When compared with the non-fungicide treated control, Quadris 2.08SC failed to reduce target spot-related defoliation on Phytogen 499 but proved equally effective as Headline 2.09SC in controlling this disease on Deltapine 1252. Defoliation levels for the Headline 2.09SC-treated Phytogen 499 and non-fungicide treated Deltapine 1252 were similar. Target spot control was not impacted by nozzle arrangement. For both varieties, seed cotton yields were not impacted by fungicide program, including the non-fungicide-treated control. Non-fungicide treated and Quadris 2.08SC-treated Phytogen 499 had lower yields than Deltapine 1252, regardless of the fungicide program. Only the Headline 2.09SC-Phytogen 499 yields were similar to Deltapine 1252. Nozzle arrangement did not impact seed cotton yield.

Table 1. Defoliation levels and seed cotton yield as influenced by fungicide selection and placement on two cotton varieties in Southwest Alabama.

Split plot analysis (F)	Target spot % defoliation[z]		Seed cotton yield lb/A[y]	
Cotton variety	189.96***[x]		3.50	
Fungicide	22.82***		3.79	
Cotton variety x Fungicide	17.11***		4.62*	
Nozzle arrangement	5.05*		2.03	
Cotton variety x Nozzle arrangement	2.20		2.17	
Fungicide x Nozzle arrangement	0.01		0.18	
Cotton variety x Fungicide x Nozzle arrangement	0.33		0.91	
	Cotton varieties			
Fungicide and rate/A	Phytogen 499	DPL 1252	Phytogen 499	DPL 1252
Non-treated control	70.9 a	29.3 b	3873 bc	4380 a
Headline 2.09SC 9 fl oz	35.0 b	11.5 c	4067 abc	4271 a
Quadris 2.08SC 9 fl oz.	60.0 a	13.3 c	3675 c	4290 a
Nozzle arrangement				
Broadcast	33.1 a		4144 a	
Drop	26.8 a		4007 a	

[z]Target spot intensity was rated using a leaf spot scoring system (1 to 10 scale) on 18 September and converted to % defoliation values.
[y]Seed cotton yield = total weight of seed + lint.
[x]Significance of *F* values at the 0.05, 0.01, and 0.001 levels is indicated by *, **, or ***, respectively.
[w]Means in each column followed by the same letter are not significantly different according to Fisher's protected least significant difference (LSD) test ($P \le 0.05$).

Cotton Yield Response and Fiber Quality as Influenced by Variety Selection and Fungicide Inputs in Southwest Alabama

A. K. Hagan, K. L. Bowen, K. Burch, and H. B. Miller

Trials in previous years have shown that cotton varieties differ considerably in their reaction to target spot. While Phytogen 499 is susceptible to target spot and may suffer significant yield loss, other cotton varieties such as Deltapine 1050 have good disease tolerance. Significant yield gains with fungicides have been seen most often on the more susceptible varieties and rarely on tolerant varieties. The objective of this study was to assess the reaction of widely planted cotton varieties to target spot and potential yield gains that may be obtained with fungicide inputs.

The study site at the Brewton Agricultural Research Unit in Brewton, AL was prepared for planting with a ripped and bedded with a KMC ripper bedder. On 24 Apr, 256 pounds per acre of 20-60-60 analysis fertilizer was broadcast and incorporated. On 23 May, seven cotton varieties were hill dropped at a rate of 3 seed per row foot in a Benndale fine sandy loam (OM < 1%). A layby application of 100 pounds per acre of 34-0-0 analysis fertilizer on 16 June was followed by an application of 400 pounds per acre of 15-0-15 analysis fertilizer on 8 July. Weed control was obtained with a pre-emergent incorporated application of 1.5 pints per acre of Prowl H_20 on 23 May followed by an 8 July application of 1 quart per acre of Roundup Weathermax with a hooded sprayer. Cotton was prepared for harvest with an application of 1.5 pints per acre of Folex + 1.5 pints per acre of Bollbuster on 21 October. Plots received 0.5, 0.6, 0.6, 0.7 and 0.7 acre inches of water on 2 July, 8 July, 5 August, 11 August, and 4 September, respectively. The experimental design was factorial arranged as a split-plot with cotton variety as the whole plot and fungicide treatment. Individual split-plots consisted of four 21–foot rows spaced 3 feet apart. Five replications of treatments were included. Headline 2.09SC at 9 fluid ounces per acre was applied with a 'high-boy' sprayer as a broadcast application on 6 August (1st week of bloom), 21 August, 5 September, and 18 September with TX-12 nozzles on 20 inch spacing at 20 gallons per acre of spray volume at 60 psi. A non-fungicide treated control was included. Target spot intensity was assessed on 12 August, 25 August, 11 September, 18 September, 11 September, 23 September and 4 October using a 1 to 10 leaf spot scoring system where 1 = no disease, 2 = very few lesions in canopy, 3 = few lesions noticed in lower and upper canopy, 4 = some lesions seen and ≤ 10% defoliation, 5 = lesions noticeable and ≤ 25% defoliation, 6 = lesions numerous and ≤ 50% defoliation, 7 = lesions very numerous and ≤ 75% defoliation, 8 = numerous lesions on few remaining leaves and ≤ 90% defoliation, 9 = very few remaining leaves covered with lesions and ≤ 95% defoliation, and 10 = plants defoliated. Defoliation values were calculated using the formula [% Defoliation = 100/(1+e(-(Florida scale value-6.0672)/0.7975)]. Cotton was mechanically harvested on 4 November and seed cotton samples graded. Counts of open and unopened bolls were made in a 21 foot border row on 5 November. Disease intensity ratings from 4 October are displayed. Significance of interactions was determined using PROC GLIMMIX procedure in SAS. Means were separated using Fisher's protected least significant difference (LSD) test ($P \leq 0.05$) unless otherwise indicated.

Since the cotton variety × fungicide interaction for open boll count and yield are not significant, data are pooled for those variables (Table 1). Data for unopened bolls (*P*≤0.10) and yield are segregated by variety and fungicide treatment due to a significant variety × fungicide interaction. Similar open boll counts were noted for all cotton varieties and fungicide treatments. For Deltapine 1050, unopened boll counts were higher for the non-fungicide treated control than with Headline 2.09SC, but similar for the six remaining varieties for both fungicide treatments. Defoliation levels were not as high as anticipated, possibly due to the late May planting date. As a result, the onset of premature defoliation attributed to target spot was delayed well into mid-August on most varieties and noticeable defoliation was not seen until mid-September on most varieties except for Phytogen 499 (Fig. 1). Regardless of the fungicide treatment, higher target spot-related defoliation levels were found for Phytogen 499 compared with the other varieties, which did not significantly differ for the non-fungicide treated control and Headline 2.09SC treatments. Significant reductions in target spot defoliation were obtained with Headline 2.09SC on all varieties. Higher seed cotton yields were recorded for Fibermax 1944 than all other varieties except for Phytogen 499, while Deltapine 1252 and Deltapine 1137 produced similarly low yields. A significant yield gain (*P*≤0.10) of 90 pounds of seed cotton per acre was obtained the four application Headline 2.09SC program when compared with the non-fungicide treated control. The slow rate of disease development and relatively low mean defoliation levels as show in Figure 1 indicate that target spot had minimal impact on seed cotton yield of the majority of varieties screened with the possible exception of Phytogen 499.

While fungicide inputs had no impact on any of the above fiber quality parameters or gin out, gin out as well as fiber MIC (micronaire), length, and strength but not uniformity were influenced by cotton variety (Table 2). Deltapine 1252 had the highest gin out value, while those values recorded for Phytogen 575, Fibermax 1944, and Stoneville 6448 were similarly low. Higher MIC values were noted for Deltapine 1252 than all remaining cotton varieties with the lowest MIC values reported for Phytogen 575. The only variety to match the fiber lengths measured for Phytogen 575 was Stoneville 6448. Deltapine 1050 and Deltapine 1252 had similarly low fiber lengths. Similarly high fiber strength values were noted for Phytogen 499 and Fibermax 1944. Fiber strength was equally low for Deltapine 1137, Deltapine 1050, and Deltapine 1252. Fiber uniformity values were similar for all cotton varieties.

Table 1. Influence of variety selection and fungicide inputs on the target spot severity and yield of commercial cotton varieties in Southwest Alabama in an irrigated production system in 2014 at the Brewton Agriculture Research Unit.

	Boll count[z]			Target spot % defoliation[y]		Seed cotton yield[x] lb/A
Source of Variation (F Value)	Open	Unopened				
Variety	0.43	3.12*[w]		5.59**		6.66***
Fungicide	1.11	7.17*		91.83***		4.00^
Variety x Fungicide	1.14	2.02^		2.76***		0.96
Cotton variety		Control	Headline	Control	Headline	
Phytogen 499	75.1 a	2.2 bcd	1.8 bcd	55.3 a	34.4 b	4288 ab
Phytogen 599	67.9 a	2.0 bcd	2.6 bcd	28.5 b	9.0 cd	4187 bc
Deltapine 1137	67.6 a	3.2 bcd	2.6 bcd	20.2 bc	6.9 d	3974 de
Deltapine 1050	69.3 a	8.4 a	3.8 bc	22.9 b	7.1 d	4072 cd
Deltapine 1252	66.5 a	5.0 b	4.2 bc	20.1 bc	5.7 d	3879 e
Fibermax 1944	73.1 a	1.2 cd	0.4 d	34.4 b	6.4 d	4457 a
Stoneville 6448	72.6 a	3.6 bcd	2.0 bcd	17.6 bc	5.1 d	4087 bc
Fungicide and rate/A						
1. Non-fungicide treated control	72.2 a	---		---	---	4090 b
2. Headline 2.09SC 9 fl oz	68.4 a	---		---	---	4180 a

[z]Number open and unopened bolls per 21 foot of row.
[y]Target spot intensity was rated using a leaf spot scoring system (1 to 10 scale) on 18 September and converted to % defoliation values.
[x]Seed cotton yield = total weight of seed + lint.
[w]Significance of *F* values at the 0.10, 0.05, 0.01, and 0.001 levels is indicated by ^, *, **, or ***, respectively.
[v]Means in each column followed by the same letter are not significantly different according to Fisher's protected least significant difference (LSD) test ($P \leq 0.05$).

Figure 1. Mean target spot defoliation levels recorded over time on seven cotton varieties in 2014.

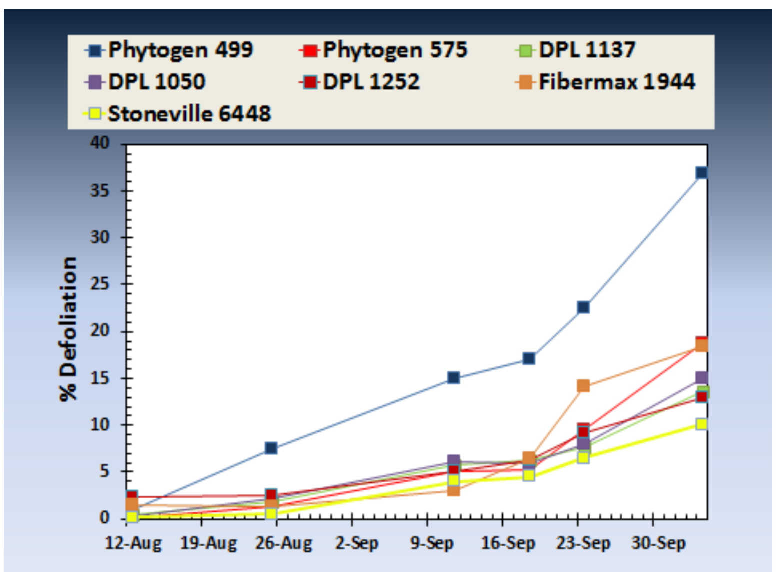

Table 2. Gin out and fiber quality factors for seven cotton varieties as influence by fungicide treatment.

Source of Variation (*F* value)	Gin Out	Fiber quality factors			
		MIC	Length	Uniformity	Strength
Variety	53.81***[z]	16.48***	34.80***	0.86	19.14***
Fungicide	2.48	1.10	2.36	0.18	0.11
Variety x Fungicide	0.55	0.78	0.75	0.53	1.19
Phytogen 499	0.453 b[y]	4.71 b	1.15 cd	84.5 a	32.6 a
Phytogen 575	0.420 d	4.16 e	1.22 a	84.6 a	30.8 b
Deltapine 1137	0.444 c	4.59 b	1.14 de	83.9 a	28.7 c
Deltapine 1050	0.456 b	4.42 cd	1.17 c	84.3 a	29.3 c
Deltapine 1252	0.473 a	4.90 a	1.13 e	84.3 a	29.4 c
Fibermax 1944	0.419 d	4.55 bc	1.19 b	83.9 a	32.5 a
Stoneville 6448	0.419 d	4.37 d	1.21 ab	84.3 a	30.6 b
1. Control	0.439 a	4.51 a	1.18 a	84.2 a	30.6 a
2. Headline 2.09SC	0.442 a	4.55 a	1.17 a	84.3 a	30.5 a

[z]Significance of *F* values at the 0.10, 0.05, 0.01, and 0.001 levels is indicated by ^, *, **, or ***, respectively.
[y]Means in each column followed by the same letter are not significantly different according to Fisher's protected least significant difference (LSD) test ($P \leq 0.05$).

Impact of Fungicide Inputs on Target Spot Development and Yield of Commercial Cotton Varieties in Central Alabama

A. K. Hagan, K. L. Bowen, K. Burch, and S. Scott

Fungicides often to do not provide the expected level of target spot control in cotton. Fungicide efficacy may be improved and higher yields realized if coverage of the leaves in the lower and mid-canopy, which is the site of disease onset and early development, is improved. The objective of this study was to determine if nozzle arrangement impacts target spot control and yield response with the fungicides Heritage 2.09SC and Quadris 2.08SC on two cotton varieties.

The study site at the Field Crops Unit of the E. V. Smith Research Center was prepared for planting with a KMC strip till rig. On 19 May, Phytogen 499 WFR and Deltapine 1252 B2RF cotton varieties, both of which are susceptible to target spot, were hill dropped at a rate of 2 seed/row ft in a Marvyn loamy sandy soil (OM<1%). A 13 May broadcast application of 88 lb/A of 34-0-0 analysis fertilizer was followed by a 27 June layby application of 67 pounds per acre of murate of potash (0-0-60) and a 26 June layby application of 19.4 gallons per acre of 28-0-0 liquid fertilizer (60 pounds of actual nitrogen per acre). Weed control was obtained with a pre-emergent incorporated application of 1 pint per acre of Diuron + 1 pint per acre of Reflex on 8 May followed by a 20 June broadcast application of 22 fluid ounces per acre of Roundup Weathermax + 1 pint per acre of Dual Magnum II, and a 26 June layby application of 2.5 pints per acre of MSMA + 1 pint per acre of Diuron with a hooded sprayer. Cotton was prepared for harvest with a 24 September application of 1 pint per acre of Folex + 6 fluid ounces per acre of Daze followed by a 1 October application of 8 fluid ounces of Folex + 3 fluid ounces of Daze + 12 fluid ounces of Boll'd. Bidrin at 4 fluid ounces per acre was broadcast on 14 July and 1 August for stink bug control. Plots received 0.6, 0.75, 0.9, and 1.1 acre inches of water on 2 July, 31 July, 12 August, and 10 September, respectively. The experimental design was a factorial arranged in a split split-plot with cotton variety as the whole plot, Headline 2.09SC and Quadris 2.08SC fungicides as the split plot, and fungicide placement as the split split-plot treatment. Individual split split-plots consisted of four 30-foot rows spaced 3 feet apart. Four replications of treatments were included. Headline 2.09SC at 9 fluid ounces per acre and Quadris 2.08SC at 9 fluid ounces were applied with a Spider sprayer on 23 July (1st week of bloom) and 8 August (3rd week of bloom) as 1) a broadcast application with AITTJ60-11002VP nozzles on 18 inch centers at 15 gallons per acre of spray volume at 40 psi and 2) with a drop nozzle arrangement consisting of a single AITTJ60-11002VP nozzle over the top of the row and one AITTJ60-11002VP nozzle on a drop on each side of each row at a spray volume of 32 gallons per acre at 40 psi. A non-fungicide treated control was included. Target spot intensity was assessed on 31 July, 14 August, 21 August, 29 August, 9 September, and 17 September using a 1 to 10 leaf spot scoring system where 1 = no disease, 2 = very few lesions in canopy, 3 = few lesions noticed in lower and upper canopy, 4 = some lesions seen and ≤ 10% defoliation, 5 = lesions noticeable and ≤ 25% defoliation, 6 = lesions numerous and ≤ 50% defoliation, 7 = lesions very numerous and ≤ 75% defoliation, 8 = numerous lesions on few remaining leaves and ≤ 90% defoliation, 9 = very few remaining leaves covered with lesions and ≤ 95% defoliation, and 10 = plants defoliated. Defoliation values were calculated using the following formula [% Defoliation = 100/(1+e(- (disease scale - 6.0672)/0.7975)]. On 7 October, counts of open bolls were made on 3 row feet in a border row. Cotton was mechanically harvested on 6 October and a seed cotton sample from each plots was collected and graded. Disease intensity ratings from 17 September are displayed. Significance of interactions was calculated using the PROC GLIMMIX procedure in SAS. Statistical analysis on target spot defoliation was done on rank transformations of data, which were back transformed for presentation. Means were separated using Fisher's protected least significant difference (LSD) test ($P \leq 0.05$).

Temperatures during the study period were at or above 30-year historical average. Rainfall totals for May and Jun above to well above normal but conditions were dry through much of July, August, and September.

Since interactions for target spot defoliation and yield are not significant, data presented for each variable are pooled. While target spot defoliation levels were lower for Deltapine 1252 than Phytogen 499, open boll counts and yield of the latter variety were higher. When compared with the non-fungicide treated control, significant reductions in target spot defoliation were obtained with Quadris 2.08SC and Headline 2.09SC with the latter treatment giving the best disease control. While the open boll counts for the non-treated control and for both nozzle arrangements with Headline 2.09SC and Quadris 2.08SC did not significantly differ, higher open boll counts were noted with Headline 2.09SC applied with a drop compared with broadcast nozzle arrangement. Reductions in target spot defoliation obtained with the above fungicides did not translate into significant yield gains when compared with the non-fungicide treated control. Nozzle arrangement had no impact on target spot control or seed cotton yield.

Table 1. Impact of fungicide selection and placement on target spot control and yield response of two cotton varieties in Central Alabama.

Factorial analysis (*F* values)	Target spot % defoliation[z]	Boll count[y]		Seed cotton yield lb/A[x]
Cotton variety	27.54*	9.54**		50.51***
Fungicide	7.05*	0.03		1.51
Cotton variety x fungicide	1.92	0.13		0.01
Nozzle arrangement	1.95	4.72*		0.01
Cotton variety x nozzle arrangement	3.61	0.00		2.32
Fungicide x nozzle arrangement	2.80	5.43*		1.42
Cotton variety x fungicide x nozzle arrangement	0.34	2.39		0.00
Cotton variety				
Phytogen 499 WRF	41.9 a	83 a		3897 a
Deltapine 1252 B2RF	7.1 b	68 b		3375 b
Fungicide and rate/A		**Broadcast**	**Drop**	
Non-treated control	35.1 a	74.1 ab		3600 a
Headline 2.09SC 9 fl oz	18.9 c	64.5 b	86.7 a	3700 a
Quadris 2.08SC 9 fl oz	24.7 b	74.3 ab	75.8 ab	3582 a
Nozzle arrangement				
Broadcast	23.4 a	--		3653 a
Drop	20.3 a	--		3647 a

[z]Target spot defoliation was assessed on 17 September.
[y]Counts of open bolls were made on 3 row feet on October 7 from a border row.
[x]Seed cotton yield = total weight of seed + lint.
[w]Significance of *F* values at the 0.05, 0.01, and 0.001 levels is indicated by *, **, or ***, respectively.
[v]Means in each column followed by the same letter are not significantly different according to the least significant difference (LSD) test ($P \leq 0.05$).

Impact of Variety Selection, Tillage, and Crop Rotation on the Yield of Cotton as Influenced by Target Spot

Project Leaders:
A. K. Hagan, K. L. Bowen, C. H. Campbell, D. Monks, and C. Hicks

Objective:

1. Evaluate the susceptibility of commercial cotton varieties to target spot.
2. Determine the impact of target spot on the yield of cotton.
3. Establish the efficacy of registered and experimental fungicides for the control of target spot along with their effect cotton quality and yield.
4. Determine the impact of cotton cropping frequency and tillage practices on the target spot intensity as well as cotton quality factors and yield.

Narrative:

With few exceptions, target spot did not seriously damage Alabama's cotton crop in 2014. Disease outbreaks were largely limited to irrigated cotton in the southern tier of counties in Alabama along with the Florida Panhandle. Minimal disease activity was observed in North Alabama cotton. Mineral deficiencies and skippy stands resulting from excessive May and early June rains followed by an extended period of hot and dry weather patterns in August delayed disease development into early September. The resulting late season defoliation had little or no impact on yield. Despite less than ideal weather for target spot development, considerable differences in cotton variety sensitivity to this disease were observed at multiple locations in Alabama. Yield response and reaction of 25 cotton varieties and advanced breeding lines to target spot was evaluated at the Prattville Agricultural Research Unit. With the exception of Phytogen 427 and experimental lines Phytogen PX5540-63, Phytogen PX499-36, and Phytogen PX 4444-13; highest defoliation levels were recorded for Phytogen 499. An additional 14 varieties and experimental lines had similarly low defoliation levels as Bayer Stoneville 5289. Low defoliation levels observed for some cotton varieties and experimental lines such as DynaGro 2610 and Bayer Stoneville 5289 did not translate into higher seed cotton yields. Yields of 15 varieties and experimental lines were similar to those reported for the highest yielding experimental line Phytogen PX5540-63. At the Brewton Agricultural Research Unit (BARU), the impact of variety selection and fungicides inputs (two applications of Headline 2.09SC @ 9 fl oz/A) on target spot severity and yield of seven cotton varieties was assessed. Open boll counts were similar for all seven cotton varieties as well as for the non-fungicide treated control and Headline 2.09SC-treated cotton. Unopened boll counts differed by cotton variety and fungicide treatment. For Deltapine 1050, higher unopened boll counts were noted for the non-fungicide than Headline 2.09SC-treated cotton. For all other cotton varieties, similar unopened boll counts were recorded for both fungicide treatments. Final % target spot defoliation ratings differed by cotton variety and fungicide treatment. Significant reductions in target spot-incited defoliation were obtained on all cotton varieties with the Headline fungicide treatment as compared with the non-fungicide treated control. Regardless of the fungicide treatment, higher defoliation levels were noted for Phytogen 499 than for the remaining six cotton varieties. In addition, defoliation level recorded for the Headline 2.09SC-treated Phytogen 499 was similar to the defoliation levels recorded for Phytogen 575, Deltapine 1137, Deltapine 1050, Deltapine

1252, Stoneville 6448, and Fibermax 1944, which did not significantly differ. The high yields recorded for Fibermax 1944 were matched only by Phytogen 499. Similarly low yields were recorded for Deltapine 1252 and Deltapine 1137. Yields were higher for the Headline 2.09SC-treated than the non-fungicide treated cotton. In the same study at the E. V. Smith Research Center, significant differences in target spot-related defoliation were noted between cotton varieties and fungicide treatments. In the non-fungicide treated controls and Headline 2.09SC-treated plots, significantly higher target spot-related defoliation levels were observed on Phytogen 499 compared with all other cotton varieties except for the non-fungicide treated Stoneville 6446. The non-fungicide treated Fibermax 1944 suffered less defoliation than all remaining non-fungicide treated cotton varieties. When treated with Headline 2.09SC, the latter variety had similarly low defoliation ratings to the remaining varieties except for Deltapine 1137 and Phytogen 499, which suffered higher levels of defoliation. Significant reductions in target spot defoliation were observed on Phytogen 575, Deltapine 1137, Deltapine 1050, Deltapine 1252, and Stoneville 6448 but not Phytogen 499 and Fibermax 1944 when treated with Headline 2.09SC. Higher yields were noted for Fibermax 1944 compared with all varieties except for Phytogen 499, while Deltapine 1252 and Phytogen 575 had similarly low yields. While a reduction in defoliation was obtained on five of seven cotton varieties, yield response to the four Headline 2.09SC application program and non-fungicide treated control was similar. The impact of nozzle arrangement on the control of target spot with Headline 2.09SC @ 9 fl oz/A and Quadris 2.08SC @ 9 fl oz/A was assessed on Phytogen 499 and Deltapine 1252 at two Alabama locations. At BARU, mean defoliation levels were higher for Phytogen 499 than Deltapine 1252. When compared with the non-fungicide treated control, Quadris 2.08SC failed to reduce target spot-related defoliation on Phytogen 499 but proved as efficacious as Headline 2.09SC on Deltapine 1252. Defoliation levels for the Headline 2.09SC-treated Phytogen 499 and non-fungicide treated Deltapine 1252 were similar. Similar levels of target spot control were obtained with the broadcast and drop nozzle application equipment. For both varieties, seed cotton yields were not impacted by fungicide program, including the non-fungicide-treated control. Non-fungicide treated and Quadris 2.08SC-treated Phytogen 499 had lower yields than all fungicide programs on Deltapine 1252. Only yields recorded for the Headline 2.09SC program on Phytogen 499 yields were similar to those recorded for both the non-fungicide treated control and fungicide treatments on Deltapine 1252. Nozzle arrangement did not impact defoliation levels or seed cotton yield. At the E. V. Smith Research Center, higher open boll counts and yield were noted for Phytogen 499 than for Deltapine 1252. When compared with the non-fungicide treated control, significant reductions in target spot defoliation were obtained with Quadris 2.08SC and Headline 2.09SC with the latter treatment giving the best disease control. While the open boll counts for the non-treated control and for both nozzle arrangements with Headline 2.09SC and Abound 2.08SC did not significantly differ, higher open boll counts were noted with Headline 2.09SC applied with a drop compared with broadcast nozzle arrangement. Reductions in target spot defoliation obtained with the above fungicides did not translate into significant yield gains when compared with the non-fungicide treated control. Nozzle arrangement had no impact on target spot control or seed cotton yield. Impact of cotton cropping frequency as influenced by cotton variety selection was assessed at the Wiregrass Research and Extension Center. Cropping patterns included continuous cotton (28 years), Peanut-Cotton-Cotton, a 1-year out Cotton-Peanut-Cotton, and a 2-year out Peanut-Peanut-Cotton rotation, while the cotton varieties screened were Phytogen 499, Phytogen 427, Deltapine 1050, and Deltapine 1454NR. Cotton cropping frequency and variety impacted target spot intensity at the latter three rating dates and AUDPC values. A significant cropping frequency × variety interaction noted at the 2 September and 25 September rating dates showed that the impact of cropping frequency on target spot differed by cotton variety. At the final rating date, defoliation levels for Phytogen 427 but not the other varieties were affected by cotton cropping frequency. While Phytogen 499 suffered the heaviest defoliation, the least damage was noted on Deltapine 1454NR. Season-long, equally defoliation levels were recorded for the continuous cotton and two years of cotton following 1 year of peanut. The one- and two-year out cropping patterns had similarly lower AUDPC values compared with the latter cropping pattern. Cotton cropping frequency did not have the expected impact on yield as the Peanut-Cotton-Cotton rotation had higher yields than the one- and two-year out rotations. Highest yields of 4 bales/A were recorded for Phytogen 499, while yields for Deltapine 1050 and Deltapine 1454NR were intermediate between those recorded for the former variety and Phytogen 427, which had the lowest seed cotton yields. Impact of tillage and cotton cropping frequency on the yield and target spot susceptibility of Phytogen 499 was assessed at BARU. A forage and sweet sorghum were the rotation partners. Due to several factors, target spot activity, regardless of the cropping pattern, was very low with minimal leaf spotting and no premature defoliation in the lower plant canopy. However, higher yields were noted for the strip than conventionally tilled Phytogen 499 cotton. In contrast, similar seed cotton yields were noted for all cotton cropping patterns. For the second consecutive year, as study was conducted to determine the impact of target spot on cotton yield in North Alabama. As was noted in 2013, minimal target spot development was noted on Phytogen 499 and Deltapine 1137. Regardless of the number of Headline 2.09SC applications, similar yields were observed for both peanut cultivars. An identical yield loss study was conducted at the Plant Breeding Unit in Tallassee, AL on Phytogen 499 and Deltapine 1137. Final target spot intensity ratings and season-long target spot AUDPC values on Phytogen 499 and Deltapine 1137 did not significantly differ. As indicated by a non-significant variety × Headline application number interaction, a similar pattern of target spot control was obtained on both of the above varieties with all Headline 2.09SC programs. While significant reductions in final defoliation ratings and AUDPC values were obtained with all Headline 2.09SC programs when compared with the non-fungicide treated control, target spot control, as indicated by final defoliation ratings or AUDPC values, was similar regardless of the number of Headline 2.09SC applications. Seed cotton yields as well as open and total boll counts were not impacted by cotton variety or the number of Headline 2.09SC applications. Open boll and locked boll counts were higher for Phytogen 499 than Deltapine 1137. Gin out values on Phytogen 499 for the non-fungicide treated control, two and four Headline 2.09SC application programs were higher for Phytogen 499 than Deltapine 1137. Similar MIC values were recorded regardless of the number of Headline 2.09SC applications on Deltapine 1137, while lower MIC values were recorded for the one and three compared with the two and four Headline 2.09SC programs and the non-fungicide treated control. Fiber strength and uniformity were not impacted by variety selection or fungicide treatment. Target spot was diagnosed on sesame samples collected from two locations in Central AL. While damage was limited, sesame along with soybean can be considered a bridge crop for the carryover of *Corynespora cassiicola*.

Seedling Disease Research and Education Committee 2014 Seedling Disease Research Report

K.S. Lawrence, C. Burmester, C. Norris

Objective: Increased use of Pre-emergence herbicides due to increased weed resistance has been blamed for increased seedling diseases in some areas. The objective of this study is to determine any potential negative effects of pre-emergence herbicides on stand establishment, early season vigor and yield of cotton.

Two herbicide sequences and three fungicide combinations were evaluated effects on seedling disease of cotton. Treatments were evaluated for the management of cotton seedling disease in a naturally infested field on the Tennessee Valley Research and Education Center in Belle Mina, AL. The field had a history of cotton seedling disease incidence and was infested by *Rhizoctonia solani*, *Pythium* spp., *Thielaviopsis basicola*, and *Fusarium* spp. The soil type was a Decatur silt loam (24% sand, 49% silt, 28% clay). The seed treatments were applied to the seed by Bayer CropScience. Temik 15G (5 lb/A) was applied at planting on April 24 in the seed furrow with chemical granular applicators attached to the planter. Plots consisted of 2 rows, 25-ft long, with 40-in.row spacing and were arranged in a randomized complete block design with five replications. Blocks were separated by a 20-ft wide alley. All plots were maintained throughout the season with standard herbicide, insecticide, and fertility production practices as recommended by the Alabama Cooperative Extension System. Plots were irrigated with an overhead sprinkler system as needed. Seedling stand was determined at 34 days after planting (DAP) on May 28. Plots were harvested on September 30.

The effect of herbicide and fungicide were analyzed using Proc Glimmix, SAS version 9.3 (SAS Institute Inc., Cary NC). The model statement listed the Herbicide and Fungicide and their interaction, and the random statement included Rep and Variety x Nematicide x Rep. The critical value of P = 0.01 was used for testing the fixed effects of herbicide, fungicide and their interaction. Determination of differences in least squares means was based on adjusted P values obtained by using the options adjust=Tukey in the LSMEANS statement. Stand, plant vigor, and yield were analyzed. The Pearson-product correlation method was used to examine the relationship among cotton stand, vigor, and yield.

Seedling disease pressure was moderate in 2014 due to optimum moisture and temperatures. An interaction between herbicide and fungicide occurred only for the stand counts conducted at 14 DAP. No other significant interactions were found for plant stand and vigor ratings and yield (Table 1). Overall, plant stand was greater in the fungicide plots compared to the untreated control and the herbicide application did not affect the 14DAP stand. However, the Aeris addition to the fungicides in the pre-emergence the herbicide application did support a lower stand as compared to the Roundup herbicide system. Plant vigor was significant and the plants in the Roundup herbicide plots were visually healthier than those in the pre-emergence herbicide system at 14 and 34 DAP. Plant stand were greater in the no pre-emergence herbicide (Round up) plots compared to the pre-emergence herbicide (Cotoran Staple) plots by the 34 DAP counts. The greatest stands were in the no pre-emergence herbicide plots with 2.8 plants per foot of row.

Seed cotton yields were increased by the fungicide treatments as compared to the untreated control. Fungicide treatments increased yield in both herbicide regimes by an average of 375 lb/A. The largest yield increase over both herbicides was with the Spear + Vortex+ Allegiance alone or with the addition of Evergol Extend + Aeris which increased yield by an average of Herbicide yield were higher in the no pre-emergence herbicide (Roundup) plots by 481 lb/A of seed cotton as compared to the pre-emergence herbicide (Cotoran Staple) plots.

Correlations between seed cotton yield and plant stand as well as plant vigor ratings at 14 and 34 DAP were significant. Plant stands influenced yield by 33% (P > 0.04) while plant vigor ratings were related to yield by 55% (P > 0.001). Both parameters were good predictors of potential seed cotton yield.

Table 1. Significant probability for the interaction of the herbicide and the fundicide programs analysis of variance, 2014 NCC Seeding Disease Research Program.

		Probability of a significant F-test				
	Degrees	Stand	Vigor	Stand	Vigor	Yield
	of freedom	14 DAP	14 DAP	34 DAP	34 DAP	lb/A
Herbicide	1	0.3436	0.0010	0.0540	0.0010	0.0007
Fungicide	3	0.0038	0.3296	0.0337	0.5576	0.0336
Herbicide * Fungicide	3	0.1096	0.2570	0.2095	0.8808	0.9096

Table 2. Effects of Pre-emergence or roundup herbicide applications with seed treatment fungicide on cotton stand, vigor, and yield, 2014.

Treatment	Rate	Stand/25 ft row May 8, 2014	Seedling vigor May 8, 2014	Stand/25 ft row May 28, 2014	Seedling vigor May 28, 2014	Seed cotton lb/A Sept 30, 2014
Pre-emergence herbicide[x]						
1 Untreated + Gaucho		62.4 bc	1.8 c	57.4	2.0	4740 c
2 Spera + Vortex + Allegiance	1.8 + 0.08 + 0.75 oz/cwt	77.6 ab	1.4 c	63.0	2.2	5193 abc
3 Trt 2 + Evergol Extend + Allegiance	Trt 2 + 1.0 + 0.75 oz/cwt	82.0 a	2.0 bc	67.4	2.6	4920 bc
4 Trt 3 + Aeris	Trt 3 + 0.75 mg ai/seed	67.8 abc	2.0 bc	74.6	2.4	5335 abc
Round up herbicide[y]						
5 Untreated + Gaucho		59.6 c	2.6 ab	67.0	3.0	5275 abc
6 Spera + Vortex + Allegiance	1.8 + 0.08 + 0.75 oz/cwt	71.6 abc	3.6 a	74.6	3.0	5724 a
7 Trt 2 + Evergol Extend + Allegiance	Trt 2 + 1.0 + 0.75 oz/cwt	70.6 abc	3.6 a	68.8	3.2	5460 abc
8 Trt 3 + AERIS	Trt 3 + 0.75 mg ai/seed	76.8 ab	3.4 ab	72.6	3.0	5656 abc
Pre-emergence herbicide[x]		72.5 a	1.8 b	65.6 b	2.3 b	5047 b
Roundup herbicide[y]		69.7 a	3.3 a	70.8 a	3.1 a	5528 a
1.Untreated + Gaucho		61.0 b	2.2	62.2 b	2.5	5007 b
2. Spera + Vortex + Allegiance	1.8 + 0.08 + 0.75 oz/cwt	74.6 a	2.5	68.8 ab	2.6	5459 a
3. Trt 2 + Evergol Extend + Allegiance	Trt 2 + 1.0 + 0.75 oz/cwt	76.3 a	2.8	68.1 ab	2.9	5190 ab
4. Trt 3 + AERIS	Trt 3 + 0.75 mg ai/seed	72.3 a	2.7	73.6 a	2.7	5496 a

[x] Cotoran and Staple herbicides applied immediately after planting with Roundup herbicide applied as needed thereafter.

[y] Roundup herbicide applied after emergence and as needed through the season

VII. Nematode Management

Evaluation of Cotton Cultivars with and without Nematicides in the Presence and Absence of the Reniform Nematode

K. S. Lawrence, J. Luangkhot, C.J Land, K. M. Glass, C.H. Burmester

Abstract: Greenhouse and field trials were conducted to determine the reductions in plant growth and yield due to the reniform nematode and to determine the potential benefit of seed treatment nematicides on commercially available cotton cultivars. Ten high yielding commercial cultivars were planted with and without seed treatment nematicides in a reniform nematode infested field and also in an adjacent field without the reniform. Greenhouse tests found the abamectin (Avicta) plus thiodicarb (Aeris) nematicide seed treatments decrease in reniform nematode egg production by 76% over all cotton cultivars. In the field trials, the reniform nematode reduced seed cotton yields by 63% between the field with and without the reniform nematode. The application of the seed treatment nematicides increased the yields of the cotton cultivars in the reniform infested field by 23%. Thus the application of the nematicides did improve yield but not to the level of the yields in the non-infested field

Introduction: The Reniform nematode (*Rotylenchulus reniformis*) is distributed worldwide in tropical and sub-tropical climate zones. In Alabama, this nematode is most damaging on upland cotton. The reniform nematode causes significant yield losses in Alabama and throughout the cotton belt of the United States. It is estimated that reniform nematodes have caused up to 50% loss in cotton yield (Lawrence et al. 2014). Symptoms of a reniform nematode infection include small egg masses on the plant roots, root necrosis, and a decline in yields over time. The purpose of this study is to determine the yield reduction due to the reniform nematode and to determine the yield bust due to nematicide seed treatments. The hypothesis of this study is that the nematicide seed treatments will effectively reduce reniform nematode population densities and subsequent damage to the cotton plants and in turn increase yields. The study was conducted in North Alabama on a research farm that had been previously inoculated with a healthy reniform nematode population, and in a controlled greenhouse environment on the campus of Auburn University.

Materials and Methods

Greenhouse Trial: Ten high yielding cotton cultivars were selected for evaluation with greenhouse trials. Trials were planted at Plant Sciences Research Center at Auburn University in a randomized complete block design replicated 5 times using 150 cc conetainers. Media used consisted of a 1:1 mixture of pasteurized field soil and sand. Cultivars selected for this trial were Americot NG 1511 B2RF, Deltapine 1321 B2RF, and Deltapine 1133 B2RF, Deltapine 1252 B2RF, Deltapine 1454 NR B2RF, Phytogen 375 WRF, Phytogen 499 WRF, Phytogen 339 WRF, Phytogen 427 WRF, and Stoneville 4747 GLB2. Each seed was treated with a nematicidal seed treatment consisting of Avicta (abamectin) applied at 0.15 mg ai/seed in combination with Aeries (thiodicarb) at 0.375 mg ai/seed. At planting, each conetainer was inoculated with 2000 reniform eggs and vermiform life stages. The trial was allowed to run for 45 days. Data taken at termination of the trial included plant heights, shoot fresh weight, root fresh weight, and reniform population reproduction factors. All data were analyzed in SAS 9.3 using the Glimmix procedure. The LSMEANS were separated by Tukey-Kramer (α=0.1).

Field Trial: The same ten cultivars were evaluated for selected variables during the 2014 growing season in field trials. Trials were planted at Tennessee Valley Research and Experiment Center (TVREC) in a completely randomized block design with 5 replictions. Soil type at TVREC station is a Decatur silt loam comprised of 23% sand, 49% silt, and 28% clay. Trials were planted in a naturally infested reniform field (field #55) and a non-infested (field #53) reniform field. Each field was composed of the identical soil types and both fields were irrigated equally according to need. All seeds were treated with Avicta (abamectin) applied at 0.15 mg ai/seed in combination with Aeries (thiodicarb) at 0.375 mg ai/seed. Initial reniform nematode samples were taken at planting. Each plot consisted of two rows, each 25 feet in length with 40-inch spacing between rows. Reniform nematode populations were taken 39 days after planting by extracting reniform eggs from three root systems randomly removed from each plot. Plot yield data was collected 168 days after planting. All data was analyzed in SAS 9.3 using Glimmix procedure. The LSMEANS were separated by Tukey-Kramer (α=0.1).

Results

Greenhouse Trial: Over all cotton cultivars the plant biomass produced in the greenhouse was 12% larger when grown in soils without the reniform nematode compared to the same cultivars grown with the nematode. The seed treatment nematicide did not increase the plant biomass of the reniform infested cultivars (data not shown). Reniform nematode eggs per gram of root were reduced by the application of the seed treatment nematicides (Table 1). The reduction in the reniform numbers was 76% compared to the cultivars without the nematicide. All cultivars supported similar numbers of reniform nematodes with or without the seed treatment nematicides in the greenhouse tests.

Table 1. Reniform nematode population densities at 45 days after planting on cotton cultivars with and without a seed treatment nematicide and with and without reniform nematodes in the greenhouse, 2014.			
	Reniform infested soil		Non-infested soil
	No seed treatment nematicide	With seed treatment nematicide	No seed treatment nematicide
	Reniform eggs/ gm root	Reniform eggs/ gm root	Reniform eggs/ gm root
ST 4747 GLB2	579 a	138 a	0.0 a
DP 1321 B2RF	976 a	99 a	0.0 a
Americot NG 1511 B2RF	261 a	137 a	0.0 a
PHY 499 WRF	369 a	93 a	0.0 a
PHY 427 WRF	374 a	177 a	0.0 a
PHY 339 WRF	321 a	58 a	0.0 a
DP 1454 NR B2RF	467 a	34 a	0.0 a
PHY 375 WRF	461 a	107 a	0.0 a
DP 1133 B2RF	539 a	250 a	0.0 a
DP 1252 B2RF	867 a	147 a	0.0 a
[z] Means followed by the same letter in a column are not significantly differ (α=0.1, Tukey-Kramer's LS-means)			

Field Trial: Reniform nematode population levels were relatively high by the 30 days after planting sampling period. No reniform were found in the non-infested field as expected. In the reniform field, the seed treatment nematicides reduced reniform populations 30% compared to the cultivars not treated with the nematicides (Table 2). DP 1454 NR B2RF with the seed treatment nematicides supported fewer reniform nematodes than all the other cultivars. This cultivar was developed with resistance to the root-knot nematode but did not support as many reniform nematodes in this test. The application of the nematicide reduced reniform numbers on all cultivars except DP 1454 NR B2RF.

Seed cotton yields were reduced 62% by the reniform nematode (Table 3). The application of the seed treatment nematicides improved yield by 23 % compared to the same cultivars without a nematicide application. The average yield over all 10 cultivars in the non-infested field and the reniform infested field were 3930 lb/A and 1464 lb/A, respectively. The application of the seed treatment nematicides in the reniform infested field improved the average yield from the 1464 lb/A to 1905 lb/A. Every cultivar tested produced an increase in yield with the application of the seed treatment nematicides. The cultivars ST 4747 GLB2, DP 1321 B2RF, Americot NG 1511 B2RF, PHY 499 WRF, PHY 427 WRF, and PHY 339 WRF produced similar yield in the reniform free field. However yield potential was reduced with the reniform nematode. PHY 427 WRF produced the greatest yield with reniform and no nematicide while PHY 499 WRF was very sensitive to the nematode and produced the lowest yields. The application of the nematicide evened the yield differences produce similar yields over all cultivars.

Table 2. Reniform nematode population densities at 30 days after planting on cotton cultivars with and without a seed treatment nematicide and a non-infested field without reniform nematodes, 2014.			
	Reniform nematode		
	Infested field		Non-infested field
	No seed treatment nematicide	With seed treatment nematicide	No seed treatment nematicide
	Reniform eggs/ gm root	Reniform eggs/ gm root	Reniform eggs/ gm root
ST 4747 GLB2	5592 a	2706 a	0.0 a
DP 1321 B2RF	3346 a	1684 a	0.0 a
Americot NG 1511 B2RF	1550 a	2237 a	0.0 a
PHY 499 WRF	7051 a	3776 a	0.0 a
PHY 427 WRF	3439 a	1319 a	0.0 a
PHY 339 WRF	4304 a	3758 a	0.0 a
DP 1454 NR B2RF	944 b	3525 a	0.0 a
PHY 375 WRF	2525 a	1062 a	0.0 a
DP 1133 B2RF	2928 a	2380 a	0.0 a
DP 1252 B2RF	3677 a	2175 a	0.0 a
[z] Means followed by the same letter in a column are not significantly differ (α=0.1, Tukey-Kramer's LS-means)			

Table 3. Seed cotton yield for cultivars in a reniform infested field with and without a seed treatment nematicide and a non-infested field without reniform nematodes, 2014.			
	Reniform nematode		
	Infested field		Non-infested field
	No seed treatment nematicide	With seed treatment nematicide	No seed treatment nematicide
	Lbs./a	Lbs./a	Lbs./a
ST 4747 GLB2	1654.5 ab	2032.4 a	4622.5 a
DP 1321 B2RF	1671.6 ab	2155.7 a	4497.1 ab
Americot NG 1511 B2RF	1104.5 ab	2073.1 a	4374.3 ab
PHY 499 WRF	960.5 b	1350.0 a	4289.4 ab
PHY 427 WRF	2296.7 a	2428.4 a	4262.0 ab
PHY 339 WRF	1462.9 ab	2324.9 a	4201.9 ab
DP 1454 NR B2RF	1124.5 ab	1583.1 a	3594.5 bc
PHY 375 WRF	1788.1 ab	1981.2 a	3580.1 bc
DP 1133 B2RF	1500.2 ab	1738.7 a	3218.3 cd
DP 1252 B2RF	1079.4 ab	1382.4 a	2661.9 d
[z] Means followed by the same letter in a column are not significantly differ (α=0.1, Tukey-Kramer's LS means)			

Summary: The primary goal of these studies was to determine the damage potential of the reniform nematode on cotton cultivars and to determine the potential benefit of the seed treatment nematicides.

In the greenhouse trials, nematicides reduced reniform numbers by 76%.

In the field trials, nematicides reduced reniform numbers by 30% and increased yields by 23%. However, the reniform nematode did reduce yields between the infested and non-infested field by 63%.

It is very important to keep non-infested fields clean and not introduce this pathogen.

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Experimental Nematicides for Management of the Reniform Nematode in North Alabama, 2014

C.J. Land, K.S. Lawrence, C.H. Burmester, and C. Norris

Eight different nematicide combinations were evaluated for control of the reniform nematode. The field has a history of cotton production at the Tennessee Valley Research and Extension Center and the soil is a Decatur silt loam (24% sand, 49% silt, 28% clay). The cotton seed was treated by Bayer CropScience. Plots were planted at a 2.5 cm. depth and adequate soil moisture was provided from pivot irrigation. Plots consisted of 2 rows, 7.3 m long with 1.0 m row spacing and were arranged in a randomized complete block design with five replications. Blocks were separated by a 6 m alley. Plots were uniformly maintained with herbicides, insecticides, and fertilizers upon recommendations of the Alabama Cooperative Extension System. Initial vermiform reniform nematode numbers were taken with soil probes at the time of planting. Plant stands were recorded and vigor ratings were given on a scale of 1-5, with 1 being plants with stunting, chlorosis, and necrosis of the leaves and 5 are plants with a healthy appearance. Nematodes were collected for nematode analysis by digging up 3 random plants per plot at 42 days after planting (DAP). Nematodes were extracted from the root systems using 6% NaOCl and collecting the nematodes on a 25 µm sieve. The trial was harvested for seed cotton on 22 October. The data was analyzed with SAS 9.3 (SAS Institute), means were compared using pairwise Tukey's ($\alpha \leq .10$).

Nematode pressure was very high for the beginning of the season. Treatments had an average stand ranging from 81-75 plants per 7.3 m row 34 DAP with no differences between any treatment. After 42 days, eggs per gram of root showed differences among treatments. Treatment 6- Gaucho 600 FS (.375) + Fluopyram 600 FS (.35) + Evergol Prime (27) had significantly, the lowest number of eggs follow by Treatment 5- Gaucho 600 FS (.375) + Fluopyram 600 FS (.30) + Evergol Prime (5). Differences were not observed between yields however, Treatment8- Aeris Seed Applied System (.75) + Fluopyram 600 FS (.30) + Evergol Prime (5) did increase the yield 26% compared to the untreated check of Treatment 1- Evergol Prime (5). Overall, the highest rates of Fluopyram 600 FS had the best effect of reducing nematode populations.

			42 DAP		Seed Cotton
Treatment [y]		Dose/ Unit	Total Reniform[z]	Reniform eggs per gram of root	Yield (kg/ha)
1	EVERGOL	5 g ai/100 kg	5685 ab	5274 abc	1272.5 a
2	GAUCHO 600 FS +	0.375 mg ai/ seed			
	EVERGOL PRIME	5 g ai/100 kg	13855 ab	16215 ab	1027.5 a
3	GAUCHO 600 FS +	0.375 mg ai/ seed			
	FLUOPYRAM 600 FS	0.2 mg ai/ seed	9636 ab	8596 abc	1288.3 a
4	GAUCHO 600 FS +	0.375 mg ai/ seed	6498 ab	4519 abc	1592.4 a
	FLUOPYRAM 600 FS +	0.25 mg ai/ seed			
	EVERGOL PRIME	5 g ai/100 kg	6498 ab	4519 abc	1592.4 a
5	GAUCHO 600 FS +	0.375 mg ai/ seed	2911 ab	2111 bc	1253.5 a
	FLUOPYRAM 600 FS	0.3 mg ai/ seed			
	EVERGOL PRIME	5 g ai/100 kg	2911 ab	2111 bc	1253.5 a
6	GAUCHO 600 FS +	0.375 mg ai/ seed	2327 b	1680 c	1531.2 a
	FLUOPYRAM 600 FS	0.35 mg ai/ seed			
	EVERGOL PRIME	27 g ai/ 100 kg	2327 b	1680 c	1531.2 a
7	AERIS SEED APPLIED SYSTEM +	0.75 mg ai/ seed	16141 a	16683 a	1221.8 a
	EVERGOL PRIME	5 g ai/100 kg	16141 a	16683 a	1221.8 a
8	AERIS SEED APPLIED SYSTEM +	0.75 mg ai/ seed	6573 ab	4495 abc	1716.0 a
	FLUOPYRAM 600 FS	0.2 mg ai/ seed			
	EVERGOL PRIME	5 g ai/100 kg	6573 ab	4495 abc	1716.0 a

[z] Column numbers followed by the same letter are no significantly different at α = .05 as determined Tukey Kramer's HSD
[y] All seeds were treated by Bayer CropScience with additional chemical such as Votex FL, Spera, and Alliance FL.

Experimental BCS Compound for Management of the Reniform Nematode in North Alabama, 2014

C.J. Land, K.S. Lawrence, C.H. Burmester, and C. Norris

Eight different pesticide combinations were evaluated for cotton production in a reniform nematode field. The field has a history of cotton production at the Tennessee Valley Research and Extension Center and the soil is a Decatur silt loam (24% sand, 49% silt, 28% clay). The cotton seed was treated by Bayer CropScience. Plots were planted at a 2.5 cm. depth and adequate soil moisture was provided from pivot irrigation. Plots consisted of 2 rows, 7.3 m long with 1.0 m row spacing and were arranged in a randomized complete block design with five replications. Blocks were separated by a 6 m alley. Plots were uniformly maintained with herbicides, insecticides, and fertilizers upon recommendations of the Alabama Cooperative Extension System. Initial vermiform reniform nematode numbers were taken with soil probes at the time of planting. Plant stands were recorded and vigor ratings were given on a scale of 1-5, with 1 being plants with stunting, chlorosis, and necrosis of the leaves and 5 are plants with a healthy appearance. Nematodes were collected for nematode analysis by digging up 3 random plants per plot at 42 days after planting (DAP). Nematodes were extracted from the root systems using 6% NaOCl and collecting the nematodes on a 25 µm sieve. The trial was harvested for seed cotton on 22 October. The data was analyzed with SAS 9.3 (SAS Institute), means were compared using pairwise Tukey's ($\alpha \leq .1$).

Nematode pressure was very high for the beginning of the season averaging 5788 vermiform reniform life stages per 150 cm^3 of soil. Treatments had an average stand ranging from 69-81 plants per 7.3 m row 21 DAP with no differences between any treatment. After 40 days, eggs per gram of root showed differences among treatments. Treatment 4- BCS-AR83685 (3.42), Treatment 6- Proline 480 SC (2.85) + BCS-AR83685 (3.42), Treatment 7- Proline 480 SC (5.7) + BCS-AR83685 (6.84), and Treatment 8- Proline 480 SC (2.85) + BCS-AR83685 (6.84) had significantly, the lowest number of reniform nematode eggs. The addition of the BCS-AR83685 in all of these treatments significantly reduced nematode population densities. Differences were also observed between yields. There were three treatments which significantly increase yields compared to the check, Treatment 4- BCS-AR83685 (3.42), Treatment 6- Proline 480 SC (2.85) + BCS-AR83685 (3.42), and Treatment 8- Proline 480 SC (2.85) + BCS-AR83685 (6.84). On average these yields increased 65% compared the Check. Overall, the Proline 480 SC treatment was enhanced with the application of the BCS-AR83685 with increased yields and decreased nematode populations.

			42 DAP		Seed Cotton
Treatment		Dose/ Unit	Total reniform[z]	Reniform egg/g of root	Yield (kg/a)
1	Check		12171.6 a	7265.2 a	1338.5 b
2	Proline 480 SC	2.85 (oz/ A)	11067.9 ab	10042.1 ab	1383.5 b
3	Proline 480 SC	5.7 (oz/ A)	12790.1 ab	10851.5 ab	1376.2 b
4	BCS-AR83685	3.42 (oz/ A)	710.1 b	189.5 b	2221.5 a
5	BCS-AR83685	6.84 (oz/ A)	2399.5 ab	945.6 ab	1870.4 ab
6	Proline 480 SC +	2.85 (oz/ A)			
	BCS-AR83685	3.42 (oz/ A)	992.7 ab	250.6 b	2254.9 a
7	Proline 480 SC +	5.7 (oz/ A)			
	BCS-AR83685	6.84 (oz/ A)	1093.5 b	341.9 b	1696.9 ab
8	Proline 480 SC +	2.85 (oz/ A)			
	BCS-AR83685	6.84 (oz/ A)	730.0 b	437.7 b	2177.6 a
[z] Column numbers followed by the same letter are no significantly different at α = .1 as determined Tukey Kramer's HSD					

Cotton Nematicide Combinations for Reniform Management in North Alabama, 2014.

K.S. Lawrence, C.J. Land, R. Sikkens, C.H. Burmester, and C. Norris

Nematicide combinations were evaluated for reniform nematode management on cotton. The field site is located on the Tennessee Valley Research Center near Belle Mina, AL. This field has been cultivated in cotton for over 15 years and was infested with the reniform nematode field in 1997. The soil is a Decatur silt loam (24% sand, 49% silt, 28% clay). The cotton seed were treated with nematicide seed treatments using the table top seed treater. Counter 18G was applied at planting with granular hoppers attached to the planter. Vydate CLV was applied as a foliar spray at the 6 to 8 leaf stage using a CO_2 charged backpack sprayer. Plots were planted on 7 May with a soil temperature of 70°F at a 10 cm depth and adequate soil moisture. Plots consisted of 2 rows, 7.6 m long with 1.0 m row spacing and were arranged in a randomized complete block design with five replications. Blocks were separated by a 6.1m wide alley. All plots were maintained throughout the season with standard herbicide, insecticide, and fertility production practices as recommended by the Alabama Cooperative Extension System. Plots were irrigated with a sprinkler system as needed. Seedling stand was determined at 30 days after planting (DAP) on 28May. Nematodes were collected for nematode analysis by digging up 3 random plants per plot on 16 June. Nematodes were extracted from the root systems using 6% NaOCl and collecting the nematodes on a 25 µm sieve. Plots were harvested on 24 Oct. Data were statistically analyzed using SAS 9.2 and means compared using Tukey's multiple comparison test ($P \leq 0.10$). Monthly average maximum temperatures from planting in April through harvest in October were 71.6, 78.4, 88.5, 87.2, 87.3, 86.2, and 75.6°F with average minimum temperatures of 50.5, 58.1, 67.669.168.4, 63.3, and 48.7°F, respectively. Rainfall accumulation for each month was 4.8, 5.9, 3.0, 10.6, 1.5, 3.6, and 0.8 in with a total of 30.2in cm over the entire season. The rainfall was adequate in July but very dry in August and September.

Reniform nematode disease pressure was high with an average at plant population with 5788 vermiform life stages per 150 cm^3 of soil in the irrigated cotton filed in 2014. Plant stand at 30 DAP was similar for all nematicides with an average of 12 plants per m of row. Reniform population densities were high at 45 DAP. The lowest numbers of reniform nematodes were found on Thimet 15G (Trt 2) and Aeris + Counter 18G (Trt 8) and these treatments were lower than the Avicta seed treatment alone (Trt 5) but not from the insecticide control Goucho 600 (Trt 1). The numbers of reniform per grams of root did follow similar trends as the total reniform population numbers per 3 plants. Seed cotton yields varied by over 1112 lb/A over all treatments. Yields were greater in the Aeris + Counter 18G (Trt 8) with Counter 15G at 0.9 kg/ha (Trt 3) and 1.8 kg/ha (Trt 4), Avicta + Counter 18G (Trt 6) and Counter 18G + Vydate CLV (Trt 10) all producing significantly greater yields than the insecticide control (Trt 1). This yield increase was equal to an average of 809 lb/A of lint cotton over the control. Ranking the nematicides indicated that Counter 18 G applied at the high rate or combined with the seed treatments Avicta or Aeris or the foliar application of Vydate produced similar yields.

	Stand*	*Rotylenchulus reniformis*		Seed cotton
Nematicide treatment and rate	30 DAP	Per 3 plants	Per gm/root	(lb/A)
1. Gaucho 600 0.5 mg ai/seed	76	3890 ab	5973	1985.6 c
2. Thimet 15 G 0.9 kg/ha	78	270 b	336	2236.5 b
3. Counter 18 G 0.9 kg/ha	79	2166 ab	2459	2431.6 abc
4. Counter 18 G 1.8 kg/ha	83	2451 ab	2710	2803.4 ab
5. Avicta 0.15 mg ai/seed	79	8190 a	3148	2214.4 bc
6. Avicta 0.15 mg ai/seed + Counter 18 G 0.9 kg/ha	80	4037 ab	4635	2828.1 ab
7. Aeris 0.75 mg ai/seed	79	5020 ab	9192	1930.9 c
8. Aeris 0.75 mg ai/seed + Counter 18 G 0.9 kg/ha	85	585 b	955	3042.7 a
9. Avicta 0.15 mg ai/seed + Vydate CLV 0.2 l/ha	80	2616 ab	5287	2002.5 c
10. Counter 18 G 0.9 kg/ha + Vydate CLV 0.2 l/ha	81	1358 ab	1689	2867.2 ab

* Stand was the number of seedlings in 25 foot of row.

** Means followed by same letter do not significantly differ according to Tukey-Kramer ($P \leq 0.10$).

Determine the Efficacy and Economics of Recommended and Experimental Nematicides and Biologicals on Different Cotton Varieties for Management of Both the Reniform and Root-knot Nematodes, 2014.

K.S. Lawrence, C.H. Burmester, and C. Norris.

Six nematicide combinations were evaluated for reniform nematode management on two cotton varieties. The field site is located on the Tennessee Valley Research Center (TVREC) and the Plant Breeding Unit (PBU). These fields have been cultivated in cotton for over 15 years and are infested with the reniform (TVREC) or root-knot (PBU) nematodes. The soil at TVREC is a Decatur silt loam (24% sand, 49% silt, 28% clay) and a Kalmia loamy sand (80% sand, 10% silt, 10% clay) at the PBU. The cotton varieties were treated with nematicide seed treatments by Bayer CropScience. Velum Total was applied as an in-furrow spray with 8002 flat fan nozzles angled diagonally across the seed furrow immediately in front of the seed. Temik 15 G was applied at planting with granular hoppers attached to the planter. Vydate CLV was applied as a foliar spray at the 6 to 8 leaf stage using a small plot sprayer. Plots were planted on May 7 and 8 respectively with a soil temperature near 76 °F at a 10 cm depth and adequate soil moisture. Plots consisted of 2 rows, 25 feet long with 40 - 38 inch row spacing and were arranged in a RCBD with five replications. All plots were maintained throughout the season with standard production practices were irrigated with a sprinkler system as needed. Seedling stand was determined at 30 days after planting (DAP). Nematodes were collected for nematode analysis by digging up 3 random plants per plot near 40DAP. Nematodes were extracted from the root systems using 6% NaOCl, collected, and counted. Plots were harvested on Oct. 24 at TVREC and Oct. 9 at the PBU. Data were statistically analyzed using SAS Proc Glimmix and means compared using Tukeys test ($P \leq 0.10$).

At TVREC, reniform nematode disease pressure was high for irrigated cotton in 2014. Statistically, no interactions occurred between the cotton varieties and nematicides thus the data are presented for the varieties and the nematicides separately. Plant stand at 34 DAP was similar for all varieties and nematicides with an average of 12 plants per m of row. Although all stands were within the optimal rage of 4 to 12 plants per meter of row. Reniform population densities were very high at 41 DAP. FM 1740 B2F supported similar numbers of nematodes per gram of root as ST 4946GLB2. The nematicide combination of Velum Total in-furrow spray over the Aeris seed treatment (3) did support lower numbers of reniform nematodes per three plants and per gram of root. Temik 15 G (2) and Gaucho plus Flupyran seed treatment (5) produced similar reniform population densities to the Velum Total plus Aeris treatment (3) and all three were significantly lower than the Gaucho control (1). Seed cotton yields were also similar between the two cultivars producing an average of 1848 lb/a. The Temik 15 G (2) and Velum Total plus Aeris seed treatment (3) increased yield by 941 and 1130 lb/a, respectively, averaged over both cultivars. In these tests Velum Total produced similar yields to the industry standard Temik 15 G.

		Stand*	*Rotylenchulus reniformis* per		Seed cotton
Cotton variety	Seed treatment and rate	30 DAP	3 plants	gm/root	(lb/a)
ST 4946GLB2		75.1	5365	4932	1876.9
FM 1740 B2F		77.1	5410	6201	1819.1
	1. Gaucho 600 (0.5 mg ai/seed)	75.2	9079 a	9225 a	1436.2 b
	2. Temik 15 G 5 lb/A	74.6	3034 bc	2932 ab	2377.6 a
	3. Velum Total(18oz/A)+ Aeris (0.75 mgai/seed)	76.7	859 c	604 b	2566.6 a
	4. Aeris (0.75 mg ai/seed)	76.8	6568 ab	7925 a	1426.2 b
	5. Gaucho (0.375 mg ai/seed) + Flupyran (0.35 mg ai/seed)	76.0	3691 bc	3193 ab	1755.6 b
	6. Aeris (0.75 mg ai/seed + Vydate 17 oz/A	77.3	9097 a	9521 a	1525.9 b
*Stand was the number of seedlings in 25 foot of row.					
**Means followed by different letters are significantly differ according to Tukey-Kramer ($P \leq 0.10$).					

At the PBU, root-knot nematode disease pressure was high for irrigated cotton in 2014. Statistically, no interactions occurred between the cotton varieties and nematicides thus data is presented separately. Plant stand at 30 DAP was similar for all varieties and nematicides with an average of 5.3 plants per m of row. ST 4946GLB2 and FM 1740 B2F supported similar plant stands. The nematicide treatments did not affect seedling stand as compared to the Gaucho insecticide control. Root knot population densities were high at 40 DAP. FM 1740 B2F and ST 4946GLB2 supported similar numbers of nematodes. Temik 15G (2) and Velum Total in-furrow spray plus Aeris seed treatment (3) nematicide treatments significantly reduced the root knot density per three plants and per gram of root as compared to the Gaucho control. The Gaucho plus Flupyran seed treatment (5) ranked 3rd lowest following Temik 15 G and the Velum Total plus Aeris in the nematode numbers. Seed cotton yields were very good in 2014. Yields were similar over all nematicide treatments compared to the Gaucho control.

		Stand (plants/ 25 ft m row*)	*Meloidogyne incognita* per		Seed cotton
Cotton variety	Seed treatment and rate	30 DAP	3 plants	gm/root	(lb/A)
ST 4946GLB2		35 b	534	341	3310.8
FM 1944 B2F		47 a	832	671	3417.5
	1. Gaucho 600 (0.5 mg ai/seed)	44	1540 a	1319 a	3341.3
	2. Temik 15 G 5 lb/A	38	162 b	100 b	3490.6
	3. Velum Total(18oz/A)+ Aeris (0.75 mgai/seed)	44	233 b	133 b	3314.6
	4. Aeris (0.75 mg ai/seed)	38	1124 ab	798 ab	3508.0
	5. Gaucho (0.375 mg ai/seed) + Flupyran (0.35 mg ai/seed)	44	323 ab	210 b	3557.4
	6. Aeris (0.75 mg ai/seed + Vydate 17 oz/A	39	724 ab	478 ab	2972.8

*Stand was the number of seedlings in 25 foot of row.

**Means followed by different letters are significantly differ according to Tukey-Kramer ($P \leq 0.10$).

VIII. Extra

Maintenance and Expansion of the ACES & Exp. Station Web Sites for Ala. Crops, 2014

D. Monks, C. Dillard, D. Delaney, C. Burmester, and P. Mask

Objective: Maintain, expand, and update the ACES web sites and other media outlets for Alabama row crops in order to provide producers and the industry with important timely information and updates.

Additional information: 2014 funding for this project was also provided by the Alabama Wheat and Feed Grains Committee and the Alabama Soybean Producers.

The Alabama Crops web site (www.alabamacrops.com) serves as the primary information outlet for research and extension information for the following Alabama crops: field corn, cotton, soybean, forages, small grains, stored grains, hay & pasture weed control, precision ag, soil fertility and soil testing, plant disease diagnostics, enterprise budgets, IPM guides, OVT research information, and on-farm research and development.

The funding sources for this effort are received from the Alabama Cotton Commission, Alabama Soybean Producers, Wheat and Feed Grains Committee, and private company funding. The current position that has developed from the efforts of Jon Brasher allows the agronomic crops team to provide production and research information as it becomes available for the agricultural industry. A crops calendar keeps users informed of training opportunities, conferences, and meetings. The web site is a link to the streaming video site for ACES and to ACES on YouTube and is also linked to Twitter and Facebook. Information on on-farm research and development, enterprise budgets, and IPM Guides is also available.

Webtrends Stats for 2014 - Alabama Crops

Alabama Crops

Page	Visits	Views
Alabama Crops	5972	8010
Alabama Variety Testing Program	2449	3366
Alabama Corn Production	2200	3254
Alabama Soybeans	1069	1179
Small Grains	320	342
Cotton	312	352
Conversion Tables	301	306
Total for all pages within the Alabama Crops website	57,343	

To better explain the terminology, a **visit** is a series of actions that begins when a visitor goes directly to the web site using the primary web address. **Views** are the number of times this page was viewed by visitors who were directed there from a different starting point.

We appreciate the support and funding that we have received each year from cotton producers, the Alabama Cotton Commission, Cotton Inc. & private industry partners.

Restoration of an Antique Thresher (circa 1930) and Cotton Picker (circa 1946)

C. C. Mitchell and D. Delaney

Around 2000, the McLemore family of Montgomery, AL, donated an antique, stationary Frick® Threshing machine (circa 1920) and a circa 1946 cotton picker to the College of Agriculture and Ala. Agric. Exp. Station. Both were in very good condition and both had been stored out of the weather. Since then, both have been under a shed at E.V. Smith Research Center. Neither the College of Agriculture nor the AAES has resources to restore such equipment. With the establishment of Ag. Heritage Park, there is a venue for displaying these items from Alabama's agricultural history. Events such as Ag. Discovery Day may offer opportunities to demonstrate uses of these types of old equipment in the field.

The Frick® stationary thresher (circa 1920s) stored at E.V. Smith Research Center.

The Frick Threshing machine needs replacement belts, a good lube job and some cosmetic repair and it could be used. Certainly it would make an interesting contribution to Ag. Heritage Park's collection and a preservation of a bit of Alabama's agricultural history related to wheat and feed grain production.

The cotton picker is mounted on a Farmall M tractor and was purchased by Mr. A.J. McLemore in 1946, two years after International started making these machines. Dr. Glen Harris with the Georgia Agric. Experiment Station staff did a restoration of a similar picker in 2008 for about $15,000.

The following history of this cotton picker and tractor was told to Dr. Charles Mitchell by Mr. Shep Morris of Shorter, AL, following a Wheat and Feed Grains Committee meeting on Feb. 16, 2011.

"This model cotton picker was introduced by International Harvester in 1944. Two of them were purchased by Mr. A. J. (Jack) McLemore of Montgomery to help harvest his cotton. ***These are thought to be the first mechanical cotton pickers purchased for general use in Alabama.*** *However, Mr. McLemore had an unforeseen problem. As with most spindle-type pickers, the picked cotton contained a lot more trash than cotton picked by hand. Mr. McLemore's gin and none of the other area gins had the capability of cleaning the cotton. He sold one of the pickers to a farmer near Indianola, MS, and the other one to a farmer in Deatsville, AL. The Deatsville farmer installed lint cleaners on his cotton gin. After one or two years, the Deatsville farmer*

sold his picker to Mr. John Garnahan who farmed along the Tallapoosa River and used the picker for several years. Mr. Garnahan did custom picking for Mr. Billy McLemore, A.J. McLemore's son, near Burch Hill (near Waugh, AL). Billy later purchased the one-row picker from Mr. Granahan. Later Billy traded all his old one-row pickers for two, John Deere 99, 2-row cotton pickers from Montgomery Tractor. Billy's nephew, Tom, bought the old picker back from Montgomery Tractor for sentimental reasons and put it under a shed on their farm near Mitylene."

The McLemore's International cotton picker (crica 1946) is thought to be the very first mechanical cotton picker used commercially in Alabama. It is mounted on a Farmall M tractor.

The following was added by Tom McLemore on Feb. 17, 2011.

Mr. McLemore and his sons and employees (mainly Oscar Williams) used the old, one-row picker from about 1972 to 1980. It could not dump into the larger, taller wagons so this old picker had 2 smaller, old-fashioned, lower cotton wagons dedicated to its exclusive use. The Tom McLemore (Senior) farm had two larger pickers and several larger wagons to pick the majority of their crop.

The original owner, Jack McLemore's farm, was divided into three separate farms upon his death but the sons operated the gin together. Two of Jack McLemore's grandson's, Tom and Charles (a veterinarian) donated this picker to Auburn University's College of Agriculture to guarantee its historical preservation and to possibly pick "The Old Rotation."

Shortly before the property was sold for development, Tom McLemore, contacted Charles Mitchell and Jim Bannon at Auburn University. Dr. Charles McLemore and his older brother, Tom, wished to donate the old thresher to the College of Agriculture at Auburn University for possible display at Ag. Heritage Park. Dr. Bannon and Dr. Mitchell met with Tom McLemore around 2000. They accepted the old thresher and were then told about the old cotton picker which the McLemores graciously offered as well.

Both are in the process of being cosmetically restored by Mr. Randy Bodine of Auburn, AL. Restoring them mechanically remains much too expensive.

Restoration of Antique Cotton Pickers

LEADERS: C.C. Mitchell, D. Delaney, K. Balkcom, T. McDonald, and J. Fulton

With additional support from Dean of the College of Agriculture, Dr. William Batchelor, one of two antique cotton pickers that we use to harvest the Old Rotation and the Cullars Rotation, is currently being repaired and painted. It was used for harvest of the 2014 cotton crop after some mechanical repairs. Work is being done by Randy Bodine of Auburn, AL