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Confidential Report

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http://www.ag.auburn.edu/aaes/communications/researchreports/08cottonrr.pdf

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VARIETY TRIALS

Enhancing Cotton Variety Selection Through On-Farm Evaluations, 2008

C. D. Monks, C. H. Burmester, W. C. Birdsong, and R. W. Goodman

On-farm cotton variety trials were initiated in 2008 in the following Alabama counties: Barbour, Cherokee, Elmore, Fayette, Macon, Shelby, and Mobile. As was the case in 2007, the objective was to compare and evaluate the performance of Roundup Ready Flex, Bollgard II/Widestrike, and conventional varieties. This was an effort to evaluate new releases for their potential as a replacement of current glyphosate and insect resistant technologies (i.e., DP 555 BG/RR) in 2010.

Participating seed companies for the Flex trials included Delta and Pine Land, Stoneville, FiberMax, and Phytogen. Varieties included in the conventional trial in Macon County included Bronco, Seed Tec, DPL, and Phytogen. The number of entries in the trials was reduced when compared to earlier years to allow for more uniform test sites and replication where possible.

The prevailing environmental conditions in 2008 were much more favorable when compared to the previous two years except for Cherokee County (not harvested). All trials were successfully initiated in April and May and harvested for yield. All locations resulted in yields that were suitable for yield and fiber comparisons. Yield and fiber quality data are now available through the Alabama crops website at www.alabamacrops.com.

Regional Agents By Location

County	Regional agent
Barbour	B. Dillard
Cherokee	D. Derrick
Cherokee and Fayette	E. Schavey
Elmore and Macon	L. Kuykendall
Mobile	R. Petcher
Shelby and Fayette	W. Griffith

Breeding Cotton for Yield and Quality in Alabama

D. B. Weaver

There are four major aspects to this project: (1) development of cotton germplasm or cultivars with improved yield and fiber properties, (2) evaluation and development of cotton germplasm for resistance to reniform nematode, (3) evaluation and development of cotton germplasm for resistance to abiotic stresses, particularly heat and drought, and (4) evaluation of the effect of exotic germplasm introgression on cotton yield and fiber properties.

For the first objective, experimental breeding lines from several different cotton populations were developed using bulk and pedigree methods. In 2008, 80 experimental lines were evaluated for yield and fiber properties at two locations: Tallassee and Prattville. Plots were two rows, 6.1 m in length, with a spacing of 1 m between rows, replicated three times. Data were collected by sampling 50 bolls from each plot for determining lint percentage, boll size, lint weight per seed, and fiber quality. Fiber quality was analyzed by HVI at Cotton Inc., Cary, NC. The entire plot area was spindle-harvested to determine seed and lint yield. Good data were collected at both locations, and yield and fiber data analysis is in progress. Complete yield and fiber quality data are now available from the 2007 Regional Breeders Testing Network at 10 locations across the Cotton Belt. Auburn experimental lines ranked 4th, 5th, and 14th in the 32-entry test (29 experimental lines plus three checks). We have cooperated in this test for the past seven growing seasons. Five advanced lines were evaluated in the Regional Breeders Testing Network at 12 locations across the Cotton Belt in 2008. Data collection is still in progress. Further work is being done to develop new populations for generating experimental cotton lines for future testing. New crosses were made in the field in 2008, and F_2 and F_3 generations from crosses made in previous years were grown. Single plants were harvested from F_3 populations and will be used to generate lines for testing in future years.

We have made significant progress developing advanced populations from crosses between four adapted lines (FM966, SG747, PM1218, and Delta Pearl) and two germplasm lines (TX245 and TX1419) identified as having a moderate level of resistance to reniform nematode. Three types of populations have been developed: adapted × resistant accession ($F_{2:4}$ lines); (adapted × resistant accession) × adapted ($BC_{1:3}$ lines); and (adapted × resistant accession) × resistant accession ($BC_{1:3}$ lines). We grew a total of 1200 lines representing 25, 50, and 75 percent adapted germplasm and increased these in the field in 2008. We have begun the evaluation of these lines for nematode resistance in greenhouse tests and evaluation will continue into 2009. Because of extreme variation we have altered our evaluation procedures to include 10 plants per line, so we are able to evaluate about 20 lines every two weeks. Evaluation and incorporation of genes for resistance into adapted types will be a long-term process.

We are continuing along the same path in development of similar type populations using genotypes identified as heat tolerant. We have identified seven accessions as having significantly greater vegetative heat tolerance than Deltapine 90 and have demonstrated a relationship between chlorophyll fluorescence following heat stress and vegetative heat tolerance among these selected accessions. Development of these populations is progressing more slowly, due to the difficulty of crossing with these materials. These lines are photoperiodic, with long juvenile periods and can take more than a year between planting and flowering. We were able to make crosses in the greenhouse in spring of 2007 and grew the F_1 plants during summer and early winter of 2008. We have begun to harvest F_2 seeds from these plants from at least three of the population, and more have produced bolls that will be harvestable in late winter and spring of 2009. These F_2 populations, along with the parental lines, will be used to determine heritability of the chlorophyll fluorescence trait and to further establish the relationship between chlorophyll fluorescence and vegetative heat tolerance. During the upcoming year, we will continue to work with these lines to determine the level of expression of this trait and to identify genes that are responsible.

For our fourth objective, using materials described above in the reniform nematode work, we have developed a series of 120 advanced lines [8 populations, each with 15 lines (five lines each at 25, 50, and 75 percent adapted germplasm)] to study the effect of exotic (unadapted) germplasm on yield and fiber quality of upland cotton. Lack of genetic progress in cotton has been at least partially ascribed to a very narrow genetic base, and the purpose of this research is to assess the impact that exotic germplasm has on cotton yield and fiber properties and to determine if genetic variation can be improved by introgression of exotic lines. We plan to evaluate these materials in the field at two locations in 2009.

Economic Consequences of Using Different Cotton Variety Technology Systems in Alabama

T. Reed, C. H. Burmester, and C. D. Monks

A test was conducted at the Tennessee Valley Research and Extension Center (TVREC) at Belle Mina and at the E.V. Smith Research Center (EVSRC) at Shorter to evaluate the economic consequences of using different cotton variety technology systems. Cotton was planted at TVREC on April 22 and at EVSRC on April 23 in 40-inch rows with 4.5 seed per row foot. Varieties planted at both locations were Stoneville 4554 B2RF (ST) (Bayer Crop Science), Phytogen 485 WF (PHY) (Dow AgroSciences LLC), and a conventional variety CT 210 (CT) (Seed Tech Genetics). Temik 15G was applied in-furrow at TVREC and Temik 15G + Terraclor Super X was applied in-furrow at EVSRC. The experimental design was a split split-plot with varieties being the main plot variable. The main plots were then split by pre-emergence weed control. Half the plots at TVREC received Cotoran 4L + Prowl H_2O at planting. Half the plots at EVSRC received Cotoran and Prowl + Roundup. All herbicides used and their costs are shown in Tables 1 and 2.

The second split was by Heliothine (bollworm/budworm) control with larvicides for Heliothine control compared to plots without larvicides. At TVREC half the CT plots received applications for Heliothines on three occasions when treatment thresholds were reached (two Belt + one Brigade spray). A Brigade overspray was made to half the biotech variety plots on July 30 when Heliothine egg/larval counts exceeded the treatment threshold in the CT plots. At EVSRC applications for Heliothines were applied to half of all the plots each time the economic threshold was reached in the conventional variety plots. There were a total of four Heliothine sprays at EVSRC: twice with Tracer, once with Tracer + Asana, and once with Steward + Mystic. Plant bugs in plots without larvicides were controlled using three sprays at TVREC and five sprays at EVSRC.

Plots at TVREC were rated for vigor on May 29, and plant stand counts were made on May 30. Plant height was measured at TVREC on June 30 and October 14. Plots were harvested on October 13, and cotton was ginned to determine percent lint. Cotton was classed at the Birmingham classing office. Staple, strength, and uniformity characteristics were measured. This information was used in completing the economic analysis.

In the technology systems comparison, CT initially grew slower than the two biotech varieties at TVREC. TVREC plots were rated for vigor using a scale of 1 to 5 with 5 being the best possible rating. There was a significant difference in vigor ratings (Pr>F = 0.0012) in late May. The average vigor rating for CT was 2.44 while the two biotech variety vigor ratings averaged 3.1 (LSD 0.10 = 0.3). The effect of technology level on cotton plant height in June is shown in Table 3.

There was a significant variety × herbicide × larvicide interaction with respect to October plant height (Pr>F = 0.0102) at TVREC. CT plots without PREs and without larvicides averaged 50.8 inches while CT plots that received one or both of these treatments averaged from 43 to 43.9 inches. ST and PHY plots treated with different combinations of PREs and larvicides had average heights ranging from 39.8 to 46.4 inches (LSD 0.10 = 3.3).

Stand counts made at TVREC on May 30 showed there were significantly fewer plants (Pr>F = 0.0062) per 20 row feet in the ST plots (63.7) and CT plots (64.7) than in the PHY plots (72.9) (LSD 0.10 = 5). There was a significant difference in yield among varieties at both TVREC (Pr>F = 0.0001) and EVSRC (Pr>F = 0.0015). There was a significant variety × larvicide treatment response with respect to yield at both TVREC and EVSRC (Table 4) with CT benefiting from Heliothine control at both locations and PHY benefiting from larvicides at TVREC.

ST and PHY with and without larvicide yielded significantly more cotton than CT plots, regardless of larvicide treatment or location. There was no significant difference in ST and PHY with-larvicide and without-larvicide plots at TVREC. ST plots did not respond to larvicide sprays. A pyrethroid applied on July 30 significantly increased the PHY yield at TVREC; however, larvicide treatment at EVSRC did not increase PHY yield. Larvicide applications increased CT yield 498 pounds per acre at TVREC and 298 pounds per acre at EVSRC.

There was also a significant variety × herbicide interaction with respect to yield at TVREC with CT 210 yielding significantly more cotton when pre-emergence herbicides were used (Table 5).

Tables 6 and 7 show the results of the economic analysis for the 12 variety/larvicide/herbicide combinations at TVREC and EVSRC.

Loan values ranged from 52.3 to 54.45 cents per pound at TVREC and from 53.55 to 54.35 cents per pound at EVSRC. The CT plots without pre-herbicides and without larvicides netted the least return after selected expenses were considered at both locations. ST plots with a pre-herbicide and without larvicides netted the highest return at both locations.

TABLE 1. DATE OF APPLICATION AND COST OF HERBICIDES USED AT TVREC - 2008

Herbicide	Date applied	Rate/acre	Cost/acre/ $	CT 210 Pre	CT 210 no Pre	ST 4554 B2RF Pre	ST 4554 B2RF no Pre	PHY 485 WRF Pre	PHY 485 WRF no Pre
Cotoran 4L	4/22	2 pt	10.00	B[1], G		B-G		B-G	
Prowl H2O	4/22	1 pt	4.50	G[2]		G		G	
Glyphosate	5/29	2 pt	9.00				B-G		B-G
Dual	5/29	1 pt	13.13				G		G
Staple	5/29	2 oz	13.00		B				
Select	5/29	10 oz	14.00		G				
Glyphosate	6/9	2 pt	9.00			B-G		B-G	
Staple	6/9	2 oz	13.00	B					
Glyphosate	6/26	2 pt	9.00				B-G		B-G
Envoke	6/26	0.1 oz	7.50		B				
Valor	7/8	2 oz	8.26	B	B	B	B	B	B
MSMA	7/8	2 pt	5.00	G	G	G	G	G	G
Total Cost/$[3]				41	48	37	44	37	44

[1] B = Broadleaf weeds. [2] G = Grass. [3] Rounded to the neared $.

TABLE 2. DATE OF APPLICATION AND COST OF HERBICIDES USED AT EVSRC - 2008

Herbicide	Date applied	Rate/acre	Cost/acre/ $	CT 210 Pre	CT 210 no Pre	ST 4554 B2RF Pre	ST 4554 B2RF no Pre	PHY 485 WRF Pre	PHY 485 WRF no Pre
Roundup(RU)	3/24	1.5 pt	10.88	B[1]-G[2]	B-G	B-G	G-G	B-G	B-G
Cotorran 4L	4/24	2.0 pt	10.00	B		B-G		B-G	
Prowl 3.3 EC	4/24	2.0 pt	8.00	G		G		G	
RU	4/24	1.5 pt	10.88	B-G			B-G		B-G
RU WMax	5/21	22 oz	11.69				B-G		B-G
Parrlay	5/21	1.3 pt	12.47				B		G
Staple	5/21	2.0 oz	13.00		B				
Poast+	5/21	2.25 pt	16.00		G				
RU WM	5/30	2 2 oz	11.69			B-G	B-G	B-G	B-G
Envoke	5/30	0.1 oz	7.50	B	B				
Caparol	6/17	1.5 pt	3.75	B-G	B-G	B-G	B-G	B-G	B-G
MSMA	6/17	2.5 pt	6.25	G	G	G	G	G	G
Total Cost/$[3]				57	58	61	56	61	56

[1] B = Broadleaf weeds. [2] G = Grass. [3] Rounded to the neared $.

TABLE 3. EFFECT OF TECHNOLOGY LEVEL ON COTTON PLANT HEIGHT (JUNE) AT TVREC, 2008

Technology variety	Treatment	Plant height *in.*
	PHY 485 WRF	21.0 a
	ST 4554 B2RF	19.7 b
	CT 210	17.2 c
	LSD (0.10)	***1.2***
Herbicide		
	Cotoran + Prowl, Pre	20.0 a
	No Pre	18.6 b
	LSD (0.10)	***1.0***

TABLE 4. EFFECT OF VARIETY AND LARVICIDE TECHNOLOGY ON COTTON YIELD, 2008

Variety	Technology larvicide	Lint yield *(lb/A)* TVREC	Lint yield *(lb/A)* EVSRC
ST 4554	None	958	2196
ST 4554	Treated	1946	2117
PHY 485	None	1875	1899
PHY 485	Treated	1981	1819
CT 210	None	1222	1232
CT 210	Treated	1720	1530
LSD (0.10)		***86***	***90***

TABLE 5. EFFECT OF VARIETY AND HERBICIDE TECHNOLOGY ON COTTON YIELD AT TVREC, 2008

Variety	Herbicide	Lint yield *(lb/A)*
Stoneville 4554 B2RF	No Pre emergence	1696
	Pre emergence	1674
Phytogen 485 WRF	No Pre emergence	1689
	Pre emergence	1737
CT 210 Conventional	No Pre emergence	1235
	Pre emergence	1394
LSD (0.10)		***86***

TABLE 6. NET RETURNS FOR THREE COTTON TECHNOLOGY SYSTEMS AT TVREC IN 2008[1]

Variety	Pre-herbicide	Larvacide	Lint *lb/A*	Value/A *$*	Seed + tech fee cost/A[2]	Herbicide cost/A	Insecticide cost/A	Net *$*
ST	No	No	1920	1042	77	44	26	895
ST	No	Yes	1995	1082	77	44	28	933
ST	Yes	No	1995	1079	77	37	26	939
ST	Yes	Yes	1896	1032	77	37	28	890
PHY	No	No	1817	985	75	44	26	840
PHY	No	Yes	1999	1081	75	44	28	934
PHY	Yes	No	1933	1045	75	37	26	907
PHY	Yes	Yes	1964	1062	75	37	28	922
CT	No	No	1068	578	20	48	26	484
CT	No	Yes	1704	923	20	48	64	791
CT	Yes	No	1376	720	20	41	26	633
CT	Yes	Yes	1731	941	20	41	64	816

[1] Abbreviations, ST, Stoneville 4554B2RF; PHY, Phytogen 485 WF; CT, CT 210. [2] Seed plus tech fee cost per acre based on seeding rate of 4.6 acres per bag of ST and PHY cotton seed and 4 acres per bag of CT seed.

TABLE 7. NET RETURNS FOR THREE COTTON TECHNOLOGY SYSTEMS AT EVSRC IN 2008[1]

Variety	Pre-herbicide	Larvacide	Lint *lb/A*	Value/A *$*	Seed + tech fee cost/A[2]	Herbicide cost/A	Insecticide cost/A	Net *$/A*
ST	No	No	2173	1179	101	56	35	987
ST	No	Yes	2103	1140	101	56	114	869
ST	Yes	No	2220	1189	101	61	35	992
ST	Yes	Yes	2082	1125	101	61	114	849
PHY	No	No	1805	976	96	56	35	789
PHY	No	Yes	1806	982	96	56	114	716
PHY	Yes	No	1951	1056	96	61	35	864
PHY	Yes	Yes	1805	971	96	61	114	700
CT	No	No	1234	661	20	58	35	548
CT	No	Yes	1507	809	20	58	114	617
CT	Yes	No	1332	715	20	57	35	603
CT	Yes	Yes	1380	739	20	57	114	548

[1] Abbreviations, ST, Stoneville 4554B2RF; PHY, Phytogen 485 WF; CT, CT 210. [2] Seed plus tech fee cost per acre based on seeding rate of 4.6 acres per bag of ST and PHY cotton seed and 4 acres per bag of CT seed.

Screening Trials for Cotton Variety Resistance to Verticillium Wilt

C. H. Burmester, K. S. Lawrence, E. Schavey, B. Meyer, and N. Silvey

Verticillium wilt is a soilborne pathogen that can attack the root vascular system of cotton and cause premature cotton defoliation and death in certain cases. In cotton, resistant varieties are used as the primary method of control. In recent years, verticillium wilt has returned as a major factor reducing cotton yields in the northern areas of Alabama and into Tennessee. Several years ago the cotton variety ST5242 BR was identified as having resistance to verticillium wilt in this area. It has been planted on many acres but is currently being phased out as a commercial variety. Tests were conducted in 2007 and 2008 to identify possible replacement varieties of cotton that have resistance to the verticillium wilt in this area.

Screenings were conducted in irrigated cotton fields with a history of verticillium wilt problems in 2007 and 2008. One row of each variety was planted across the length of the cotton field. Twenty four varieties were screened in 2007 and 30 varieties were screened in 2008. In early fall when verticillium wilt symptoms began appearing, ratings were conducted in four regions of the test area where uniform wilt symptoms were found. Cotton plants in ten row feet were counted and the number of plants with wilt symptoms was recorded. An overall rating of the severity of the wilt symptoms was made with 0 indicating no symptoms and 5 indicating severe symptoms.

Overall the occurrences of wilt symptoms were much higher and more consistent in the 2008 test site than in the 2007 site (Table 1 and 2). The 2008 site also contained several new and experimental cotton varieties that will be available in 2009. Although no cotton variety had lower verticillium wilt ratings than ST5242 BR in 2008, several varieties indicated some possible wilt tolerance. Cotton varieties in 2008 with wilt ratings lower than ST5242 BR included DP0920 B2RF, DP0935 B2RF, DP161 B2RF, FM1740 B2RF, and ST4498 B2RF. Experimental cotton varieties STX 0721 B2RF, STX 0727 B2RF, and STX704 B2RF also indicated lower wilt ratings in 2008.

These screening trials are only the first step in identifying possible replacement cotton varieties for this area of Alabama and Tennessee. On-farm cotton yield results will ultimately determine which cotton varieties have the yield and wilt resistance cotton farmers need in this area.

Table 1. Incidence of Verticillium Wilt and Variety Rating on Tate Farms in Madison County, 2007

Variety	Average wilt[1] %	Average wilt rating[2]
DP117 B2RF	7.7	2.88
DP141 B2RF	5.3	1.25
DP143 B2RF	16.6	2.38
DP161 B2RF	15.2	3.25
DP445 BG/RR	14.9	3.50
DP454 BG/RR	8.3	3.75
DP455 BG/RR	3.4	2.38
DP143 B2RF	22.7	3.13
DP164 B2RF	8.1	2.63
DPL117 B2RF	11.5	3.25
FM9063 B2RF	8.8	3.25
MX0610 B2RF	29.6	4.00
MX0613 B2RF	10.9	2.50
MX0616 B2RF	16.8	3.88
PHY485 WRF	17.4	3.13
ST4554 B2RF	8.0	2.13
ST4427 B2RF	26.3	2.63
ST4554 B2RF	9.0	2.56
ST5242 BR [3]	10.8	2.63
ST5327B2RF	10.1	2.63
ST6611B2RF	7.1	1.13
STX0626 B2RF	14.4	2.38
STX0627 B2RF	17.8	3.50
STX0630 B2RF	12.5	2.88

[1] Four reps. [2] 0 = no symptoms, 5 = severe. [3] Check variety.

Table 2. Incidence of Verticillium Wilt and Variety Rating on Tate Farms in Madison County, 2008

Variety	Average wilt[1] %	Average wilt rating[2]
AFD5065 B2RF	29.8	2.25
AM1550 B2RF	43.5	3.00
CG3220 B2RF	37.0	3.25
CG3520 B2RF	41.4	3.75
DP0912 B2RF	42.3	2.75
DP0920 B2RF	30.4	1.75
DP0924 B2RF	25.7	3.38
DP0935 B2RF	22.9	2.00
DP141 B2RF	35.1	3.63
DP143 B2RF	36.0	2.63
DP161 B2RF	29.3	2.00
DP445/RR	24.8	3.25
DPLX07W903 DF	30.7	3.00
DPLX07X440 DF	25.0	2.75
FM1740 B2RF	25.4	2.50
PHY375 WRF	34.6	3.00
PHY485 WRF	53.8	3.00
ST4498 B2RF	22.1	2.00
ST4554 B2RF	26.4	2.50
ST5242 BR [3]	46.5	1.13
ST5242 BR [3]	25.9	1.25
ST5327 B2RF	37.8	3.75
ST5458 B2RF	39.8	3.25
ST4427 B2RF	34.8	3.88
STX0703	40.0	2.75
STX0705	34.7	2.50
STX0721 B2RF	24.6	1.75
STX0727 B2RF	27.3	2.00
STX702 B2RF	44.1	3.25
STX704 B2RF	38.0	2.00

[1] Four reps. [2] 0 = no symptoms, 5 = severe. [3] Check variety.

CROP PRODUCTION

Benefits of Uniform Row Spacing in a Cotton-Corn Conservation System

R. L. Raper, K. S. Balkcom, F. J. Arriaga, A. J. Price, T. S. Kornecki, and E. B. Schwab

Crop rotations are an important part of every conservation system. However, different crops have varying needs and much of the data for their growth was obtained in a monoculture. When these crops are integrated into a conservation system that minimizes surface disturbance, tillage practices may need to be further examined to choose the best solutions for both crops.

Soil compaction in the southeastern region of the U.S. is extremely prevalent and routinely reduces crop yields unless in-row subsoiling is annually conducted.

In 2006, an experiment was initiated at the E.V. Smith Research Center in Shorter, Alabama, to evaluate the effects of crop rotation, row spacing, and tillage practices on corn and cotton production systems. Soils at the site are mostly in the Compass series and are coarse-loamy, siliceous, subactive, thermic Plinthic Paleudults. The conservation system included a cover crop system which was crimson clover (*Trifolium incarnatum* L.) prior to corn, and rye (*Secale cereale* L.) prior to cotton.

A dryland corn-cotton rotation was established at the site in the spring of 2007 with corn being planted on the eastern half of the plots either in 30- or 36-inch rows and cotton being planted on the western half of the plots in 36-inch rows. In 2008, the crops were rotated with cotton being planted on 36-inch rows in the previous corn plots and corn being planted either in 30- or 36-inch rows following the cotton in 36-inch rows. Plant populations were maintained at similar levels in both row spacings with cotton being planted with 45,000 seeds per acre and corn with 28,000 seeds per acre

Additionally, four in-row subsoiling treatments were arranged within the experiment: (1) annual, (2) spring prior to corn, (3) spring prior to cotton, and (4) none. All of the plots were managed with conservation systems which used no surface tillage. The total number of plots in the experiment were 64 which were composed of two crops (corn and cotton) × two row spacings (30-inch and 36-inch corn) × four tillage treatments × four replications. Figure 1 illustrates how the row spacings were arranged with the first pass (center of tractor) of the cotton (2008) being positioned directly over the first pass (center of tractor) of corn (2007).

All in-row subsoiling operations were conducted prior to planting with a KMC (Kelly Manufacturing Company) ripper bedder to an approximate depth of 16 inches. Subsoiling and planting operations were conducted with a Trimble AgGPS Autopilot® automatic steering system, which was capable of inch-level precision.

Soil strength measurements were obtained with the multiple-probe soil cone penetrometer system in the fall of the year after harvesting the cash crop. This machine acquired three sets of soil strength measurements across the row from which cone index values were calculated (ASAE Standards, 2004a; ASAE Standards, 2004b).

Statistical analyses were performed on the split-plot experiment with row spacing as the main plots and the four different tillage treatments as the subplots. The split-plot experiment was analyzed with the appropriate ANOVA model using SAS. A predetermined significance level of $P \leq 0.10$ was selected and Fisher's least-significant-difference test (LSD) was used for mean separation.

Due to space limitations, discussion will be limited to the significant main effects of the cone index measurements.

During the 2007 growing season, no differences in crop yield were found nor were they expected as the benefits from controlled traffic would not be apparent until the second growing season. In 2008, corn yield showed a significant interaction between row spacing and tillage treatment (Figure 2) with the highest yields occurring in the 36-inch rows with the in-row subsoiling treatment being conducted prior to the previous cotton crop. Not statistically different were the 36-inch corn following annual in-row subsoiling, 36-inch corn following in-row subsoiling conducted prior to corn, and 30-inch corn following in-row subsoiling conducted prior to corn. These results were interesting and surprising as highest yields for this region are commonly thought to occur with the narrow row spacing of 30 inches. However, using controlled traffic with conservation systems and maintaining the rows in the same location (as well as the benefits from in-row subsoiling) increased corn yields with the 36 inch rows significantly. Additionally, no loss in benefits was found by in-row subsoiling almost one year previously before the cotton crop.

Cotton yields in 2008 were affected only by tillage treatments (Figure 3) with the highest yields occurring with annual in-row subsoiling or with in-row subsoiling conducted just prior to the cotton crop (with both row spacings). No-tillage and in-row subsoiling conducted prior to the previous corn crop produced lower yields. These results indicated that cotton was more sensitive to soil compaction and required in-row subsoiling conducted just prior to establishment.

The soil strength data provide further evidence of the benefits of in-row subsoiling conducted just prior to cotton establishment. Figure 4 shows the loosened row middles where the cotton roots are actively growing. Note the absence of intense soil compaction with the soil being loosened where the cotton roots are growing. Now compare this to the soil condition resulting from in-row subsoiling conducted the previous year before the corn crop (Figure 5). Intense soil compaction is shown near the row middles of the previous corn crop, probably resulting from vehicle traffic being conducted the previous growing season. Note especially the last cotton row, which was placed near a previous corn row middle with the roots attempting to grow in a compacted region. However, both soil conditions are superior to the no-tillage treatment where no deep tillage has been conducted throughout the period of the experiment (Figure 6). In these plots, uniform compaction is prevalent throughout the entire growing region where row spacings are non-uniform.

The following conclusions can be drawn:

• Highest corn yields were found in the 36-inch rows, which differs from the commonly held belief that increased corn yields are obtained in our region with narrower row spacings of 30 inches.

• Corn yields were not found to suffer from in-row subsoiling conducted almost a year previously before the cotton crop.

• Cotton yields were found to benefit from in-row subsoiling conducted just prior to planting.

• Soil strength information verified that intense soil compaction was found beneath a portion of the rows in the cotton plots that had previously been under the previous corn crop's trafficked row middles.

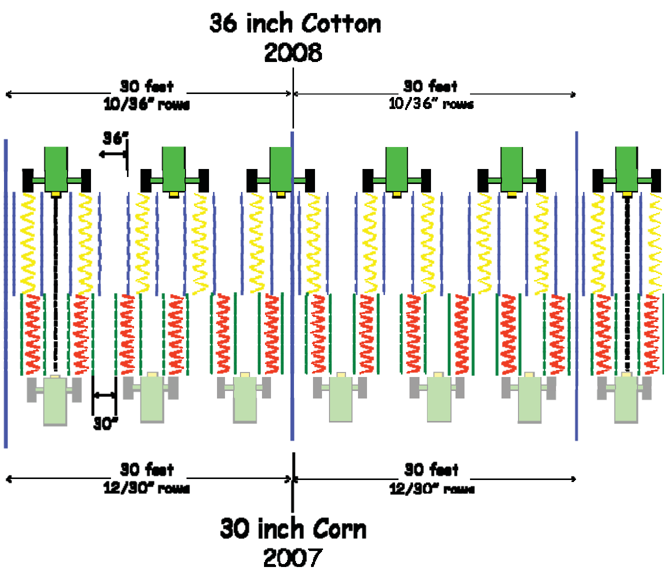

Figure 1. Row spacings layout showing 30 inch corn spacings (bottom) and 36 inch cotton spacing (top).

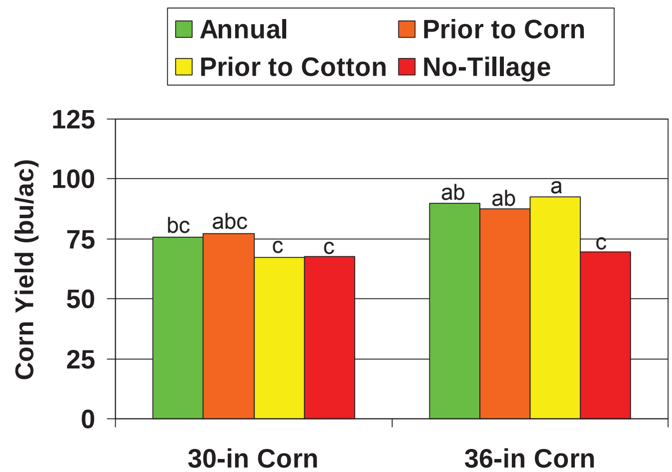

Figure 2. Corn yield in 2008 showing the effects of annual in-row subsoiling, no tillage, or in-row subsoiling prior to corn or cotton. Letters indicate statistical significance (LSD ≤ 0.10).

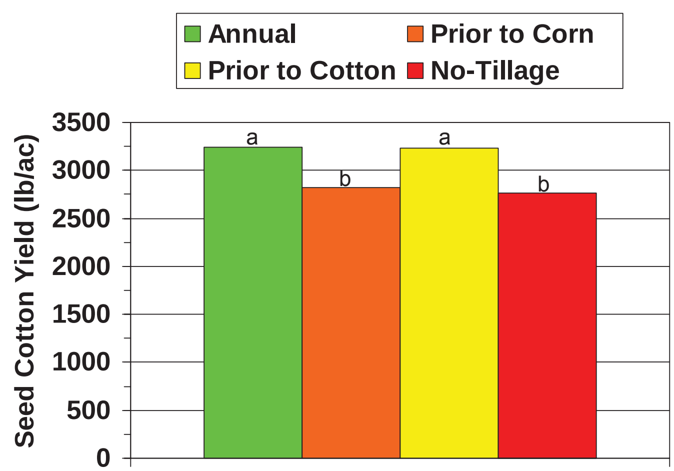

Figure 3. Cotton yield in 2008 showing the effects of annual in-row subsoiling, no tillage, or in-row subsoiling prior to corn or cotton. Letters indicate statistical significance (LSD ≤ 0.10).

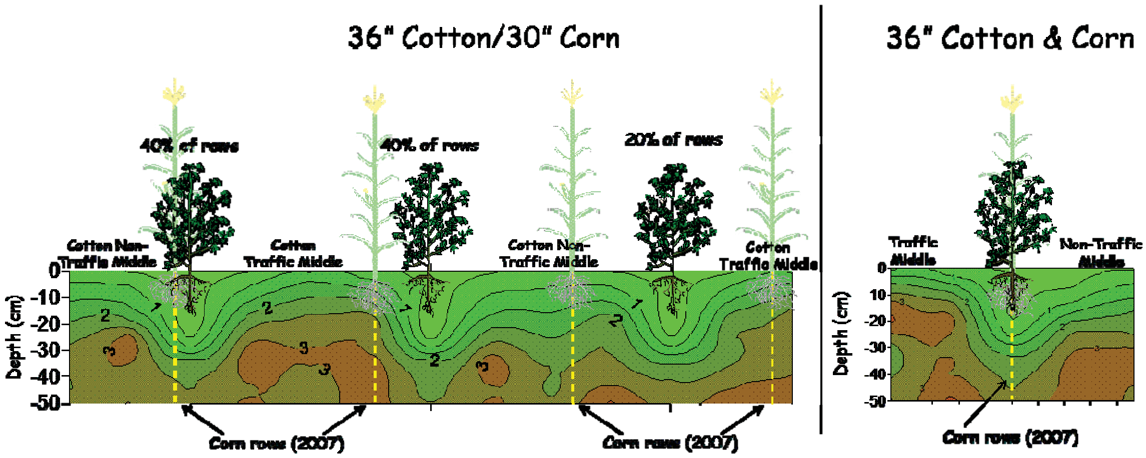

Figure 4. Cone index iso-profiles (MPa) for in-row subsoiling treatments conducted prior to cotton planting across the growing zone showing differences that were caused by vehicle traffic and in-row subsoiling for different row spacings (left) and similar row spacings (right).

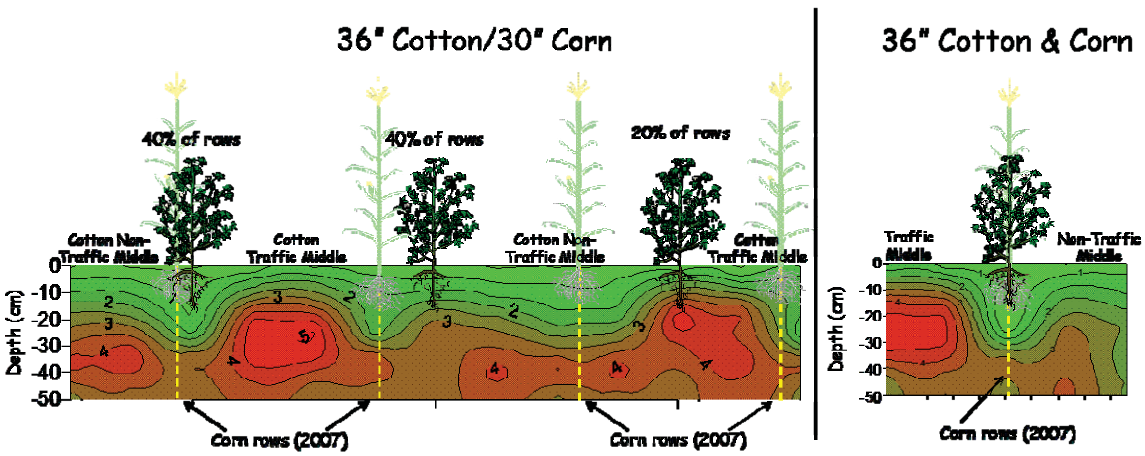

Figure 5. Cone index iso-profiles (MPa) for in-row subsoiling treatments conducted prior to corn planting across the growing zone showing differences that were caused by vehicle traffic and in-row subsoiling for different row spacings (left) and similar row spacings (right).

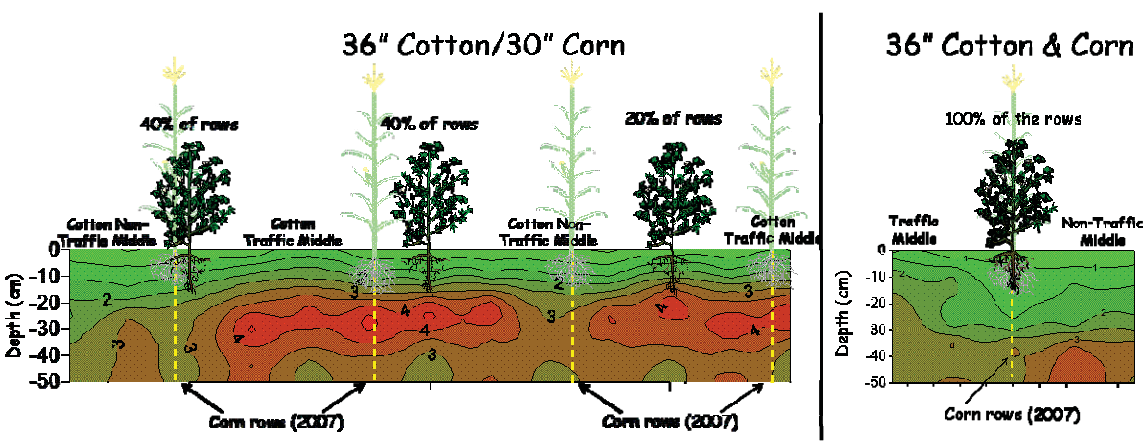

Figure 6. Cone index iso-profiles (MPa) for no tillage treatments across the growing zone showing differences that were caused by vehicle traffic and in-row subsoiling for different row spacings (left) and similar row spacings (right).

Effect of Premature Defoliation on Cotton Yield and Lint Quality in Southwest Alabama

C. D. Monks, R. W. Goodman, M. Pegues, J. Jones, and R. Petcher

The objective of this study was to investigate the impact that mid- to late-season leaf removal (i.e., hurricane damage) has on cotton yield and lint quality. This trial was conducted in 2006, 2007, and 2008 at the Gulf Coast Research and Extension Center in Fairhope (Tables 1, 2, and 3). Defoliation treatments began in mid-August when cotton maturity reached four to five nodes above white bloom and before cotton began opening. At this stage, there were no open bolls found in the plots. Subsequent defoliation was accomplished for each treatment on a weekly interval. Seed cotton yields were obtained approximately two weeks after each defoliation treatment was applied, and were then hand ginned. Turnout was either unaffected (2006) or lower when cotton was defoliated prior to opening. Micronaire was not affected in 2006 but was severely reduced in 2007 and 2008 by the early treatments. Fiber length was generally longer for the early application timings; however, fiber strength was less predictable. Lint yield was severely reduced in most years by early defoliation.

Table 1. Effect of Early Defoliation on Cotton Yield and Quality, 2006[1]

Defoliation timing[2] Trt. No.	Turnout %	Lint yield lb/A	Mic.	Length in	Strength g/tex
1	42	255 e	3.1	1.13	28.1
2	42	351 de	3.9	1.13	28.4
3	42	432 cd	4	1.11	27.9
4	43	463 bc	4	1.12	28.9
5	43	630 a	4	1.11	29.3
6	44	602 a	3.3	1.12	28.6
7	43	588 a	4	1.11	28.9
8	43	553 ab	4	1.11	28.5
LSD (0.05)	***NS***	***Above***	***NS***	***NS***	***NS***
C.V. (%)	***1.9***	***12.5***	***16.4***	***1.6***	***3.6***
Pr>F	***0.1813***	***0.0001***	***0.4516***	***0.5173***	***0.7191***

[1] Planting date: DP 555 BG/RR on May 8, 2006.
[2] First application date prior to boll opening: August 18, 2006.

Table 2. Effect of Early Defoliation on Cotton Yield and Quality, 2007[1]

Defoliation timing[2] Trt. No.	Turnout %	Lint yield lb/A	Mic.	Length in	Strength g/tex
1	41 f	965 c	3.1 d	1.13 a	27.6 ab
2	42 e	1121 bc	3.5 c	1.12 ab	28 ab
3	43 ab	1342 ab	4.1 b	1.11 abc	28.2 ab
4	44 bc	1477 a	4.4 b	1.11 abc	29 a
5	44 bc	1382 a	4.3 b	1.09 cd	27.6 ab
6	45 a	1426 a	4.7 a	1.07 d	27.1 b
7	44 ab	1416 a	na	na	na
8	43 cd	1427 a	4.2 b	1.11 bc	28 ab
LSD (0.05)	***Above***	***Above***	***Above***	***Above***	***Above***
C.V. (%)	***1.4***	***11.5***	***5.7***	***1.5***	***4***
Pr>F	***0.0001***	***0.0009***	***0.0001***	***0.003***	***0.3717***

[1] Planting date: DP 555 BG/RR on May 3, 2007.
[2] First application date prior to boll opening: August 16, 2007.

Table 3. Effect of Early Defoliation on Cotton Yield and Quality, 2008[1]

Defoliation timing[2] Trt. No.	Turnout %	Lint yield lb/A	Mic.	Length in	Strength g/tex
1	41 b	427 e	2.7 d	1.14	27.4 bc
2	41 b	655 d	2.7 d	1.15	27.7 bc
3	41 b	912 c	3.1 c	1.13	29.0 a
4	43 a	1160 b	3.6 b	1.10	28.4 ab
5	43 a	1313 ab	3.9 a	1.10	28.4 ab
6	43 a	1348 a	4.0 a	1.10	27.2 c
7	43 a	1327 a	4.0 a	1.11	29.1 a
8	43 a	1280 ab	4.1 a	1.10	27.7 bc
LSD (0.05)	***Above***	***Above***	***Above***	***0.03***	***Above***
C.V. (%)	***1.8***	***9.1***	***5.2***	***1.9***	***2.4***
Pr>F	***0.0001***	***0.0001***	***0.0001***	***0.0169***	***0.0061***

[1] Planting date: DP 555 BG/RR on May 8, 2008.
[2] First application date prior to boll opening: August 18, 2008.

Agronomic and Economic Impact of Timing for Planting and Defoliation of Cotton on Cotton Yield, Quality, and Profitability

J. Bergtold, C. D. Monks, K. S. Balkcom, R. Raper, and F. J. Arriaga

This experiment was initiated in the fall of 2006 at the E.V. Smith Research Center, Field Crops Unit near Shorter, Alabama, on a Compass sandy loam (coarse-loamy, siliceous, subactive, thermic Plinthic Paleudults). The experiment was rotated to a different location each year, but the soil type was the same.

The experimental design contained a strip-plot treatment restriction in a randomized complete block design with three replicates. All plots were 24 feet wide and 75 feet long in 2007 and 50 feet long in 2008. The horizontal plots consisted of three planting dates, and the vertical plots were defoliation times that corresponded to 40, 60, 80, and 100 percent open boll. A rye cover crop was drilled across the experimental area each fall at 90 pounds per acre. An in-row subsoiling operation was performed, prior to each planting date, with a KMC (Kelly Manufacturing Company) Rip Strip®.

A starter fertilizer application was applied across the experimental area to supply 40 pounds N per acre, 11 pounds P_2O_5 per acre, and 40 pounds K_2O per acre. Cotton (DPL 454BG/RR®) was planted (73,000 plants per acre) in 36-inch rows with an in-furrow application of Temik® (7 pounds per acre) and Terraclor® (10 pounds per acre). Nitrogen applied as a UAN solution at 70 pounds per acre was sidedressed by early square for each planting date. A POST application of Roundup® (1.5 pints per acre) was applied for each planting date at the four-leaf stage, followed by a layby application of Roundup® (1.5 pints per acre) + Caparol® (1.5 pints per acre). For each defoliation time, all corresponding cotton plots were defoliated with Def 6® (8 ounces per acre), and Dropp® (3 ounces per acre). Four rows of the subsequent plots were harvested with a spindle picker equipped with a bagging attachment approximately two weeks following defoliation. A large sub-sample (approximately 50 pounds) was sent to the University of Georgia's Micro-Gin Facility to determine ginning percentages. After the ginning process, another sub-sample of the lint from each plot was sent to the USDA Classing office in Macon, Georgia, to determine cotton quality from all plots with HVI-fiber analysis.

Initial plant populations were recorded approximately four weeks after each planting date by counting all the plants from four 5-foot sections across four harvest rows within each plot. Final plant heights were recorded from 20 plants per plot (five per harvest row) just prior to defoliation.

All response variables were analyzed using the MIXED procedure (Littell et al., 2006) and the LSMEANS PDIFF option to distinguish between treatment means (release 9.2; SAS Institute Inc., Cary, NC). Data were analyzed by year with planting date, defoliation time, and their interactions as fixed effects in the model, while replication, replication × planting date, and replication × defoliation time were considered random. Treatment differences were considered significant if $P \leq 0.05$.

Plant Populations. In 2007, plant populations were influenced by the planting dates (Pr> F = 0.0004). The plant populations were 45,400, 37,900, and 67,000 plants per acre for planting dates 1, 2, and 3, respectively. These values reflect the climate for the 2007 growing season. Early spring weather was cool, which certainly would affect cotton germination, followed by extremely dry weather. The dry weather forced seeding cotton for the second planting date to be planted in dry soil. No rainfall occurred after the second planting date, and cotton did not germinate until the field was irrigated approximately three weeks later. As a result, the lowest plant populations were recorded from the second planting date. Excellent planting conditions and subsequent moisture resulted in the highest plant stands recorded for the third planting date.

In 2008, the growing season was much cooler initially, which delayed all three planting dates. However, differences among the plant populations were observed and as the planting dates progressed, the subsequent plant populations increased. Plant populations were 42,800, 50,500, and 57,300 for planting dates 1, 2, and 3, respectively.

Plant Heights. No differences were observed among plant heights for the three planting dates of the 2007 growing season (Pr> F = 0.2430). Plant heights averaged 41, 43, and 40 inches tall for planting dates 1, 2, and 3, respectively. However, plant heights measured during the 2008 growing season were affected by planting dates (Pr> F = 0.0002). Plant heights in 2008 averaged 43, 55, and 46 inches tall for planting dates 1, 2, and 3, respectively. The much taller plants observed for the second planting date can be attributed to above average rainfall that stimulated vegetative growth. The wet soil conditions did not allow for timely growth regulator applications.

Cotton Yields. As previously mentioned, extreme cool weather at the beginning of the 2008 growing season pushed all the planting dates back approximately 1 month. This delay combined with cool weather in early fall of 2008 did not allow for cotton harvest of the third planting date. In addition, only seed cotton values are available for the first and second planting dates of the 2008 growing season. However, there was an interaction between planting dates and defoliation dates (Pr > F = 0.0507) for the 2008 seed cotton yields as illustrated in Figure 1. Seed cotton yields from the first planting date were numerically higher than values from the second planting date with the exception of the 100 percent defoliation time. Yields from the 100 percent defoliation of the first planting date 1 were significantly lower than the 40 percent and 80 percent defoliation times of the first planting date. Seed cotton yields from the second planting date were equivalent across defoliation times, but the 40 percent and 80 percent defoliation dates for the second planting date were lower than yields from the 80 percent defoliation of the first planting date.

At this time, a complete data analysis that includes fiber quality is only available for the 2007 growing season. This analysis will focus on lint, length, micronaire, strength, and uniformity with the means across treatments presented in the table.

An interaction (Pr> F = 0.0003) was observed between planting dates and defoliation percentages for cotton lint yields (Figure 2). This interaction can be attributed to 33 percent lower lint yields measured from the second planting date compared to the first and third planting dates. The lower lint yields for the second planting date resulted from dry conditions at planting, which suppressed cotton emergence and subsequent growth. In addition, cotton lint yields were more variable across the different defoliation percentages from the first planting date compared to lint yields across defoliation percentages for the third planting date (Figure 2). These yields indicate that for early planted cotton, there may be a yield advantage to defoliating the cotton slightly later.

Fiber Quality. Length, micronaire, and strength were only affected by planting date in 2007, but planting date affected the fiber properties differently (see table). The first planting date produced the longest fibers followed by the third and second planting dates. This indicates that cotton from the first planting date was not stressed as much as cotton in the other planting dates. On the other hand, micronaire values for the first planting date were in the discount range for low micronaire. This would indicate more immature bolls at cotton harvest. This is supported by the lower gin turnout for this planting date (data not shown). Micronaire values for the second planting date were in the premium range, but due to low yields, this seems more due to chance.

The highest micronaire values were for the third planting date; they were just below the discount range for high micronaire. Fiber strength values were equivalent for the first and second planting dates, but approximately 10 percent greater for the third planting date. Uniformity values for different defoliation percentages within each planting date were not consistent, which resulted in an observed interaction (Pr> F = 0.0392) across planting dates and defoliation percentages (Figure 3). Although uniformity values were not below discount thresholds, the third planting date produced higher uniformity values. Uniformity values for the third planting date were superior to at least one of the other planting dates across most of the defoliation times.

In conclusion, one year of data collection for fiber properties that were influenced by the environment limit the scope of these results. However, combining these results across multiple years should allow trends to become more apparent and enable different management strategies to be tested across various climatic and market conditions.

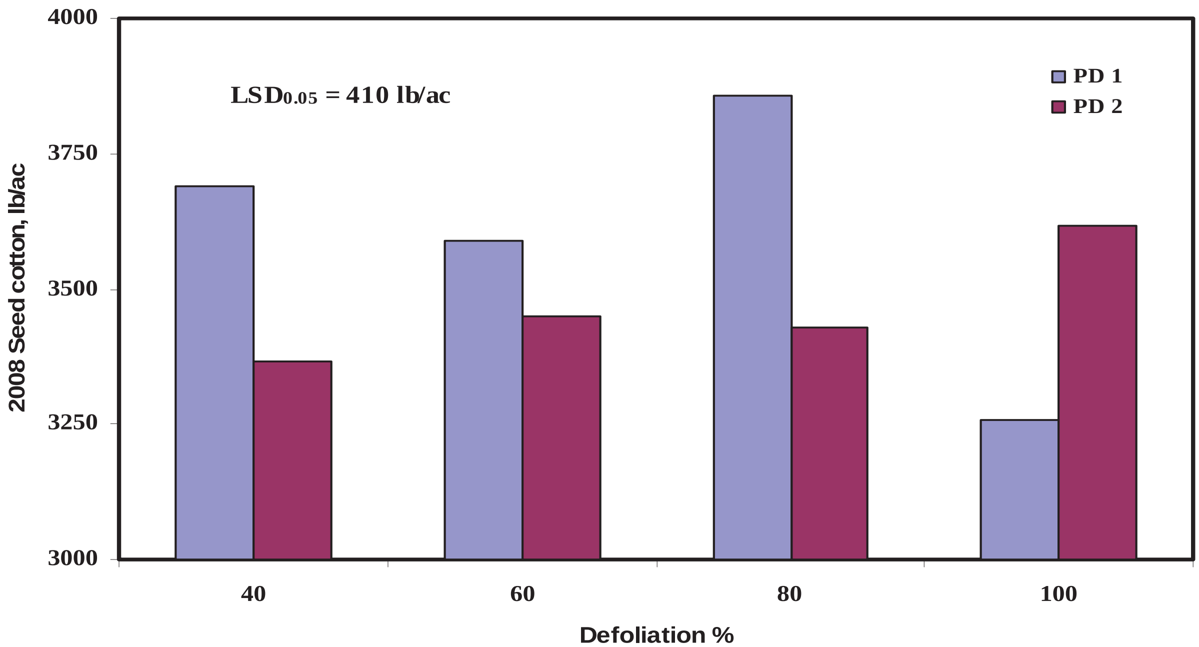

Figure 1. Seed cotton yields measured across two planting dates and four defoliation times during the 2008 growing season at the Field Crops Unit of E.V. Smith Research Center in Shorter, AL.

Cotton Lint, and HVI Fiber Properties Measured Across Three Planting Dates (PD) and Four Defoliation Times (Def) at the Field Crops Unit, EVSRC, 2007

	Lint	Staple	Length	Micronaire	Strength	Uniformity
	lb/A	*32nds*	*in*		*kN m/kg*	*%*
PD1	1022	35	1.10	34	281.8	80.8
PD2	670	32	1.01	39	282.6	80.7
PD3	987	33	1.04	48	310.5	82.0
Def-40%	715	33	1.05	40	293.7	81.2
Def-60%	884	34	1.05	41	293.3	81.6
Def-80%	988	33	1.05	41	290.8	81.3
Def-100%	984	34	1.05	40	288.7	80.7
PD	0.0021	0.0003	0.0000	0.0000	0.0041	0.0165
Def	0.0386	0.8950	0.9903	0.8192	0.7054	0.1116
PD x Def	0.0003	0.6206	0.9535	0.2262	0.3761	0.0392

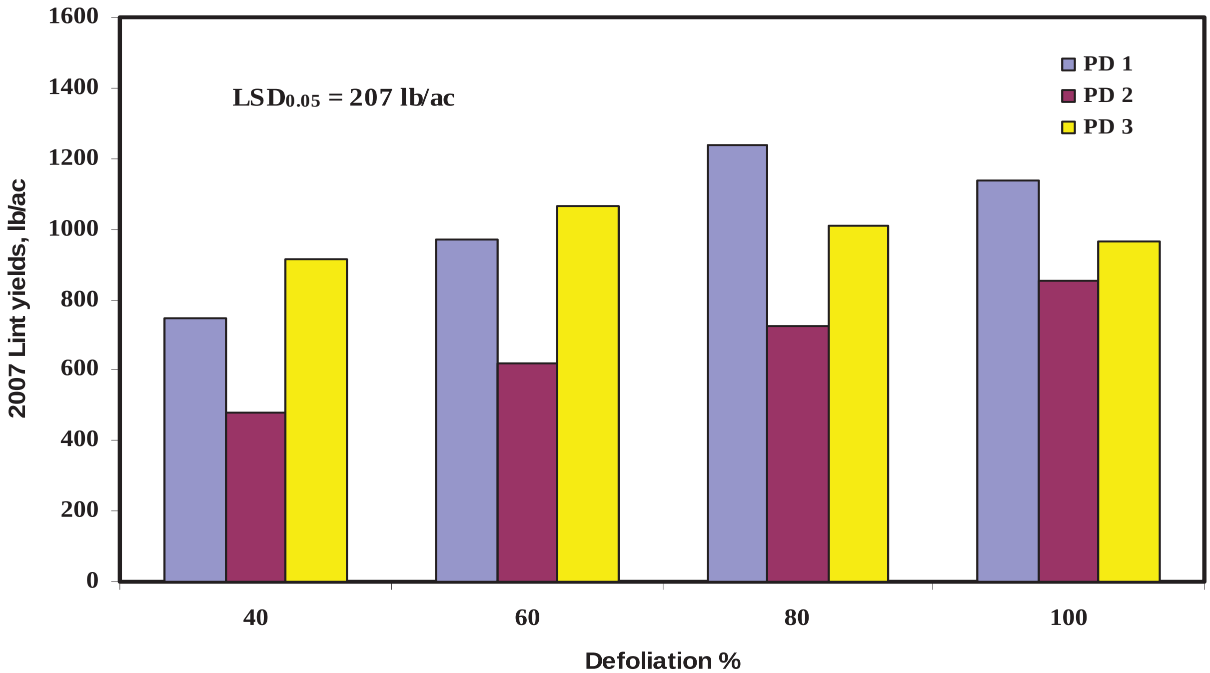

Figure 2. Cotton lint yields measured across three planting dates and four defoliation times during the 2007 growing season at the Field Crops Unit of E.V. Smith Research Center in Shorter, Alabama.

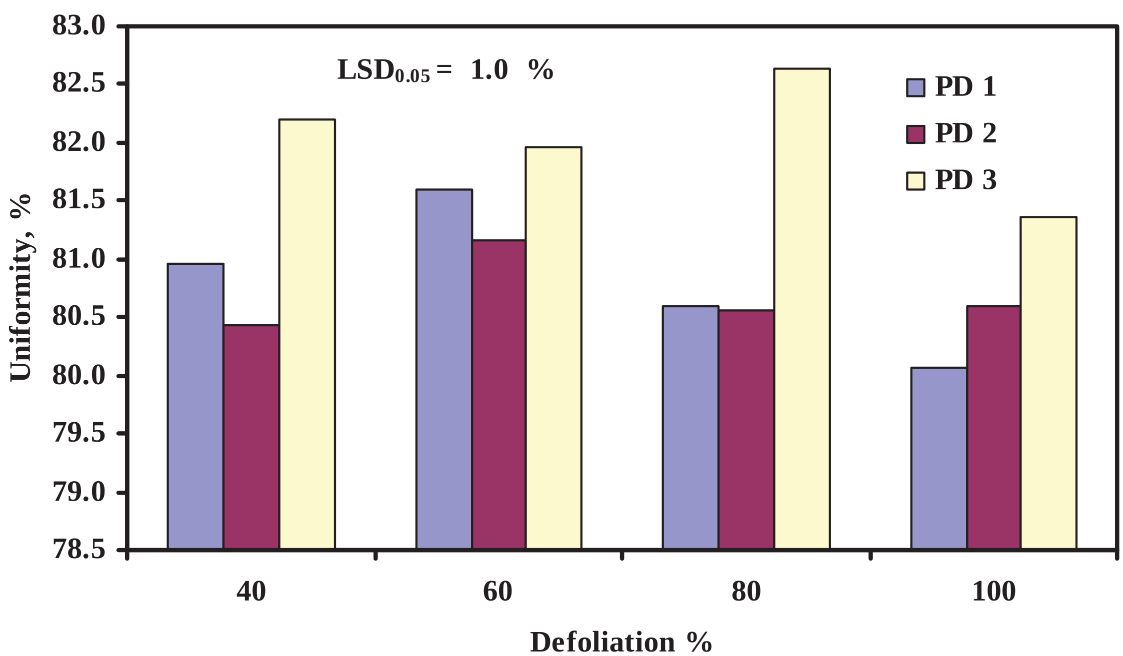

Figure 3. Cotton fiber uniformity values measured across three planting dates and four defoliation times during the 2007 growing season at the Field Crops Unit of E.V. Smith Research Center in Shorter, Alabama.

EVALUATION OF A CORS FOR USE BY ALABAMA PRODUCERS

A. Winstead, S. H. Norwood, J. P. Fulton, and T. Harbuck

Data provided by a Continuously Operating Reference Station (CORS) can be used for Real-Time Kinematic (RTK) applications in agriculture. The main use for CORS in agriculture has been to replace traditional base station use by producers for RTK level guidance systems. Agriculture equipment outfitted with an internet accessible cellular phone or modem (with internet data package) and RTK-level GPS equipment can utilize the around-the-clock data output for their GPS correction signal (Figure 1). A CORS provides extended signal range (with no line-of-sight, only cellular coverage, required), accessibility by a wide range of users, and reduced investment costs for RTK-level technology (i.e. auto-steer systems). Therefore, the objective of this study was to evaluate the accuracy of autoguidance systems utilizing CORS as their correction service.

Courtland CORS Project. In March 2008, the Alabama Cooperative Extension System facilitated a partnership between Lawrence County, Alabama, farmers; the Alabama Department of Transportation; the Lawrence County Board of Education; and Alabama commodity groups (Alabama Cotton Commission and Alabama Wheat and Feed Grain Committee) for installation of the first CORS site designated for agriculture (Figure 2). While the site remains accessible to the public, the primary users have been Alabama producers, making it the first of its kind in the nation.

Figure 1. Tractor equipped with RTK GPS receiver and Internet accessible cellular phone, which receives real-time GPS correction signal from a CORS site in Lawrence County, Alabama.

Results and Planned Efforts. Preliminary data collected on the Auburn Campus suggest that 2 to 4 inch horizontal accuracy can be maintained up to 25 miles from the base station. However, a more thorough investigation is planned during 2009 with compatible autoguidance systems set up to use CORS. RTK auto-steer systems at the Tennessee Valley (Belle Mina, Alabama) and Gulf Coast (Fairhope, Alabama) Research and Extension Center were upgraded in 2008 to make them compatible for use with CORS. Each tractor was upgraded to a Trimble Field Manager Display, RTK GNSS AgGPS 442 Receiver with NavII Controller and 900 MHz radio. Installation of the appropriate modems and data packages is planned for February 2009 with testing to commence shortly thereafter. Research will focus on evaluating the position accuracy, repeatability, and applications of CORS for agriculture during 2009 at both Research and Extension Centers. The dynamic assessment will determine horizontal and vertical position accuracy as a function of distance from the CORS site, accuracy of CORS as compared to a traditional base station, and repeatability of CORS data as compared to RTK base stations.

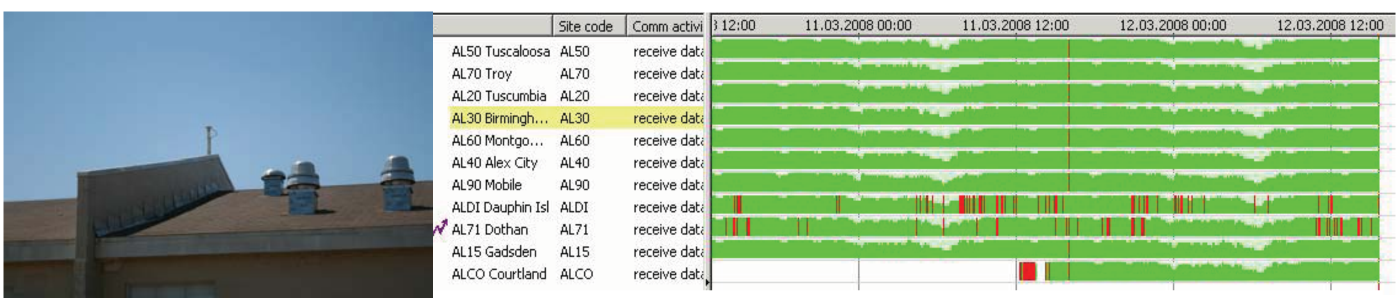

Figure 2. CORS GPS receiver mounted on top of a building in Courtland, Alabama (left), and streaming data output from Courtland station (right).

Evaluation of Variable-Rate Seeding for Cotton

J. P. Fulton, S. H. Norwood, J. N. Shaw, C. H. Burmester, C. Brodbeck, A. Winstead, B. Ortiz, M. H. Hall, and P. L. Mask

This ongoing study was conducted through collaboration with a cooperative farmer in Northern Alabama and covers 2006 through 2008. The objective of this project is to evaluate opportunities for increased yield or profits through variable-rate (VR) seeding for cotton production. This farmer utilizes a cotton and corn rotation while also managing center pivot irrigation on a select portion of managed farmland permitting the comparison of irrigated and dryland cotton production. Selected seeding rates, based on the farmer's traditional seeding rates and recommendations from consultants for both dryland and irrigated fields, included 35,000, 50,000, 65,000, and 80,000 seeds per acre. A 24-row planter equipped with a VR drive system was used. A plot within each field was blocked to provide four replications for each seeding treatment. Treatments were then randomly assigned within each block with a single pass of the planter representing a specific population treatment within the block. Subsequent to planting, stand counts were measured to determine the actual germinated population. Stand count measurements were gathered on each 12-row section of the planter, and counts were collected at three or more places along each of the two sections, depending upon terrain variability. A cotton picker equipped with an AgLeader yield monitor was used to obtain spatial performance data for each plot. Yield and stand count data were statistically analyzed for each year individually, using T-tests and Least Significant Difference ($\alpha = 0.1$) to determine if differences existed between seeding treatments.

Results showed that stand counts were all significantly lower in both irrigated and non-irrigated fields than the targeted seeding rate with the exception of one treatment (35,000 seeds per acre within the irrigated plot). A plant population lower than the target application rate has been a consistent result repeated through the 2006, 2007, and 2008 growing seasons. It has been thought that this could be a result of improper planter calibration or late freezes affecting emergence; however, the reason for the lower than expected actual populations is still unknown. Statistically comparing the actual populations of the four seeding rates indicated that as the target seeding rate was increased, there was a significant increase in the actual population for all four seeding rates in the non-irrigated field. For the irrigated results, a similar trend existed; the two higher seeding rates, 65,000 and 80,000, had significantly higher actual populations that the two lower seeding rates, 35,000 and 50,000.

A significant difference in seed cotton yield between the four seeding rates did not exist for both irrigated and non-irrigated treatments (see table). This outcome was interesting since both irrigated and non-irrigated plots produced significant differences in the actual plant populations in 2006 and 2008 with no differences in yield. In 2008, there were no yield differences between the irrigated and non-irrigated fields.

In summary, similarities were reported for the 2006, 2007, and 2008 growing seasons. On the non-irrigated treatments, the actual populations were all significantly less than the target population during the three growing seasons except for the lowest seeding rate (35,000) in the 2006 and 2007 growing seasons. While significant differences between actual populations did exist for most seeding rates in the non-irrigated treatments (except 35,000, 50,000, and 65,000 in 2007), no significant differences in seed cotton yields were reported for the 2006, 2007, and 2008 growing seasons.

In the irrigated treatments, all actual populations were significantly lower than the target seeding rates throughout the three growing seasons, except for the 35,000 treatment in 2008. Reported actual populations and seed cotton yields for the irrigated treatments during the three growing seasons were not as consistent as with the non-irrigated treatments. For example, during the 2006 growing season there were significant differences between actual populations for all seeding rates, in 2007 only the 35,000 population was significantly lower, and in 2008 the 65,000 and 80,000 populations were significantly higher that the two lower target rates.

Statistically, the results for the non-irrigated and irrigated cotton were similar for 2006, 2007, and 2008 suggesting that increasing seeding rates has minimal impact on yield. A more thorough analysis is being conducted for this study.

Summarized Yield and Emergence Data for 2006, 2007, and 2008[1]

	—Field 1, nonirrigated—		—Field 2, irrigated—	
Treatment	Actual	Yield	Actual	Yield
seed/A	*plants/A*	*lb sc/A*	*plants/A*	*lb sc/A*
		2008		
35,000	25,628 d	2,417 a	32,428 b	2,671 a
50,000	34,558 c	2,373 a	32,888 b	2,684 a
65,000	40,583 b	2,393 a	44,431 a	2,148 a
80,000	47,190 a	2,312 a	48,569 a	2,356 a
		2007		
35,000	38,714 b	1,796 a	27,080 b	2,812 b
50,000	32,815 b	2,293 a	31,508 a	3,136 ab
65,000	39,986 b	2,162 a	42,979 a	3,271 a
80,000	56,701 a	1,878 a	52,490 a	3,256 a
		2006		
35,000	33,251 d	1,651 c	26,455 d	3,457 ab
50,000	40,874 c	1,553 c	37,679 c	2,733 b
65,000	54,813 b	1,560 c	47,335 b	2,928 b
80,000	62,944 a	1,612 c	52,199 a	3,979 a

[1] Statistical comparisons were only performed within each year and column.

Means with similar letters in each column for each year indicates they are not statistically different at the 90 percent confidence level.

THE OLD ROTATION (CIRCA 1896) - 2008

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

The Old Rotation (circa 1896) is the oldest, continuous cotton experiment in the world. Its 13 plots on 1 acre of land on the campus of Auburn University continue to document the long-term effects of crop rotations with and without winter legumes (crimson clover) as a source of nitrogen for cotton, corn, soybean, and wheat.

The 112th year of the Old Rotation experiment continues the trend that began in 1996 when the experiment changed from conventional tillage to conservation tillage and GMO crops. Good yields of most crops were produced in 2008 with irrigation. Non-irrigated cotton and corn suffered through another drought year in Central Alabama.

Erratic yields from the winter legume cover crop (A.U. Robin crimson clover) have puzzled project leaders for the last three or four years. We speculate that residue from the cotton defoliant, Dropp® (thidiazuron) and Ginstar® (thidiazuron + diuron), may be affecting germination and survival of the crimson clover planted after cotton harvest. An alternative defoliant was used in the fall of 2008.

TABLE 1. OLD ROTATION YIELDS, 2008

Plot	Description	Clover dry matter Irrig.	Clover dry matter Non-irrig.	Wheat Non-irrig.	Corn Irrig.	Corn Non-irrig.	Cotton Irrig.	Cotton Non-irrig.	Soybean Irrig.	Soybean Non-irrig.
		lb/A	*lb/A*	*bu/A*	*bu/A*	*bu/A*	*lb/lint/A*	*lb lint/A*	*bu/A*	*bu/A*
1	no N/no legume	0	0				758	444		
2	winter legume	1214	1747				845	706		
3	winter legume	1074	1754				1420	688		
4	cotton-corn	1464	973				1194	714		
5	cotton-corn + N	1532	1201				1446	592		
6	no N/no legume	2423	2675				819	514		
7	cotton-corn	776	1350		49.5	24	corn	corn		
8	winter legume	658	1939				1194	802		
9	cotton-corn + N	1404	1405		184.2	0	corn	corn		
10	3-year rotation	0	0				1481	462		
11	3-year rotation	2506	2831		159.9	0	corn	corn		
12	3-year rotation	0		63.9			wht/sbn	wht/sbn	40.2	28.8
13	cont. cotton/ no legume + N	0					1420	531		
	Mean	***1450***	***1764***		***131.2***	***8***	***1175***	***606***		

TABLE 2. EFFECT OF ROTATION TREATMENT AND IRRIGATION ON COTTON LINT YIELDS, 2003-2008

Treatment	2003 Irrig.	2003 Non-irrig.	2004 Irrig.	2004 Non-irrig.	2005 Irrig.	2005 Non-irrig.	2006 Irrig.	2006 Non-irrig.	2007 Irrig.	2007 Non-irrig.	2008 Irrig.	2008 Non-irrig.
	lint yield lb/A											
No N/no legumes	320	240	500	400	450	470	520	380	540	0	790	480
Legume N only	1000	1150	1200	990	690	850	1140	1300	1040	710	1150	730
120 lb N/A	1040	1200	1610	1180	720	1040	1420	1260	1830	0	1420	530
2-yr rotation/ legume N only	1030	1030	1330	1120	770	1020	1400	1650	1370	920	1990	710
2-yr rotation + legumes + 120 lb N/A	1080	1520	1650	1150	1210	1660	1730	1760	1940	750	1450	530
3-yr rotation/ no N	960	850	1450	360	1060	850	900	900	1660	250	1480	460
P>F for Treatment	≤ 0.01		≤ 0.01		≤ 0.01		≤ 0.01		0.06		0.11	
P>F for Irrigation	0.21 ns		≤ 0.01		0.05		0.60 ns		≤ 0.01		≤ 0.01	

continued

TABLE 2. EFFECT OF ROTATION TREATMENT AND IRRIGATION ON COTTON LINT YIELDS, 2003-2008, CONTINUED

Treatment	Six-yr. mean [1] Irrig.	Six-yr. mean [1] Non-irrig.
	lint yield lb/A	
No N/no legumes	520 d	330 d
Legume N only	1040 c	850 d
120 lb N/A	1340 ab	870 bc
2-yr rotation/ legume N only	1320 ab	1080 ab
2-yr rotation + legumes + 120 lb N/A	1510 a	1250 a
3-yr rotation/ no N	1250 bc	670 c
Overall mean	1060	820
P>F for Treatment = ≤ 0.01		
P>F for Irrigation = ≤ 0.01		

Means within a column and followed by the same letter are not significantly different at P=0.05.

This is the sixth year that irrigation on the Old Rotation could be compared with non-irrigated plots. Irrigation had a highly significant effect on cotton yields in four of the six years. The last two years, 2007 and 2008, have been drought years and dramatic differences are apparent (Table 2). Corn grain yields are more erratic from year to year even with irrigation (Table 3). However, mean corn grain yields over the past six years indicate a highly significant increase due to irrigation. Likewise, mean soybean yields following wheat are increased with irrigation.

Table 3. Effect of Rotation Treatment and Irrigation on Soybean and Corn Grain, 2003-2008

Treatment	2003 Irrigated	2003 Nonirrigated	2004 Irrigated	2004 Nonirrigated	2005 Irrigated	2005 Nonirrigated
	bushels/A					
SOYBEAN YIELD						
3-yr rotation	43.2	41.3	60.6	59.8	48.3	26.9
CORN YIELD						
2-yr rotation/ legume N only	78	82	62	52	62	34
2-yr rotation + legumes + 120 lb N/A	185	164	186	113	133	141
3-yr rotation/ no N	75	86	183	99	52	48
CORN MEAN	112	110	143	88	82	74

Treatment	2006 Irrigated	2006 Non-irrigated	2007 Irrigated	2007 Non-irrigated	2008 Irrigated	2008 Non-irrigated
	bushels/A					
SOYBEAN YIELD						
3-yr rotation	66.1	48.3	61.5	20.6	40.2	28.8
CORN YIELD						
2-yr rotation/ legume N only	62	54	81	46	50	24
2-yr rotation + legumes + 120 lb N/A	154	118	173	42	.184	0
3-yr rotation/ no N	103	74	183	50	160	0
CORN MEAN	106	82	145	46[2]	130	8[2]

Treatment	6-YEAR CORN MEAN[1] Irrigated	6-YEAR CORN MEAN[1] Non-irrig.			6-YEAR SOYBEAN Mean Irrigated	6-YEAR SOYBEAN Mean Non-irrig.
	grain yield, bu/A				*bu/A*	
2-yr rotation/ legume N only	65 c	49 b	--		--	--
2-yr rotation + legumes + 120 lb N/A	169 a	96 a	--		--	--
3-yr rotation/ no N	126 b	59 b		3-yr rotation	53	39.1[3]
Overall mean	120	68[2]				

[1] Values followed by the same letter are not significantly different at P≤ 0.05.
[2] Non-irrigated mean significantly different from irrigated mean at P≤ 0.05.
[3] Non-irrigated mean significantly different from irrigated mean at P≤ 0.001,

THE CULLARS ROTATION (CIRCA 1911) - 2008

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

The Cullars Rotation is the oldest, continuous soil fertility experiment in the southern United States and the second oldest experiment in the world that includes cotton. It was placed on the National Register of Historical Places in 2003. It continues to document the long-term yield trends of five crops in a three-year rotation with 14 soil fertility variables. Each fertility treatment is replicated three times.

On the Marvyn loamy sand where the Cullars Rotation is located, dry weather, particularly early in the growing season, limited yields of wheat, corn and cotton. Timely fall rainfall helped yields of soybean (see table). All corn and cotton plots received 120 pounds total N per acre in split applications except on plots A, B, and C. The complete fertilizer plus micronutrient treatment produced the equivalent of almost three bales of cotton per acre. In spite of the dry fall, soybean yields were generally higher than the irrigated soybean yields on the nearby Old Rotation experiment. The 2005 yields continue a trend of high yields that began about the time we converted this experiment from conventional tillage to conservation tillage in 1997. Conservation tillage includes either in-row subsoiling or paratilling prior to planting wheat, cotton, and corn.

While long-term trends seem to indicate higher yields on the well-fertilized plots, the plots with low levels of one or more nutrient or factor (e.g., plot C [nothing], plot 2 [no P], plot 6 [no K], and plot 8 [no lime]), continue a trend toward lower yields. For example, plot C (nothing) produced very low yields of most crops until recently when we get nothing from this treatment. Yields on the no P, no K, and no lime plots are also decreasing.

CULLARS ROTATION YIELDS, 2008

Plot	Description	Clover dry matter *lb/A*	Wheat *bu/A*	Corn Non-irrig. *bu/A*	Cotton Non-irrig. *lb lint/A*	Soybean Non-irrig. *bu/A*
A	no N/+legume	1320	19.1	35.8	767	43.1
B	no N/no legume	0	18.3	42.3	906	41.3
C	nothing	0	0.0	0.0	0	0.0
1	no legume	0	38.7	39.8	984	40.9
2	no P	282	19.1	0.0	993	10.9
3	complete	2090	45.6	39.8	932	41.8
4	4/3 K	1321	41.0	45.4	906	43.9
5	rock P	1221	38.2	41.4	1106	45.2
6	no K	0	26.6	0.0	0	22.8
7	2/3 K	1038	45.9	42.6	950	42.4
8	no lime	0	15.4	13.4	427	15.5
9	no S	425	50.2	39.5	854	42.7
10	complete + micros	1545	49.1	50.7	845	41.0
11	1/3 K	1164	48.1	33.0	802	41.7

Impact of Crop Rotation on Diseases and Nematode Pests of Cotton, Corn, and Peanut as well as on the Economics of Cotton, Corn, and Peanut Production

A. K. Hagan, K. L. Bowen, K. S. Lawrence, H. L. Campbell, C. D. Monks, D. P. Delaney, and R. W. Goodman

Studies concerning the impact of rotation on disease and nematode pests of cotton, corn, and peanut are in progress at the Plant Breeding Unit of the E.V. Smith Research Center, the Gulf Coast Research and Extension Center, and the Wiregrass Research and Extension Center.

Corn is an excellent bridge host for the cotton root knot nematode between cotton crops. Reproduction rates for this nematode on corn and cotton are similar. Reduced cotton yields are linked with increasing cotton root knot larvae populations that are associated with continuous cotton or cotton – corn rotation patterns. Regardless of the cropping sequence, no intensification of any diseases of cotton or corn has been observed at any study location. Higher yields were noted when cotton was cropped behind at least one year of peanut. Due to nematode suppression and yield gains, peanut is a better rotation partner for cotton than corn in fields where the cotton root knot nematode is present. Corn and cotton are not bridge hosts for peanut root knot nematode, and pod yields are higher where peanut follows one or more years of corn or cotton due reduced disease pressure.

Results are provided here for the Plant Breeding Unit (PBU) and the Gulf Coast Resarch and Extension Center (CGREC).

Table 1. Impact of Counter Insecticide/Nematicide Treatment on Cotton Root Knot Juvenile Counts and Yield of Corn When Averaged Across All Cropping Sequences, PBU, 2008

Treatment and rate/A	Cotton root knot counts[1]	Yield *bu/A*
Counter 15G 6.5 lb	341 a	126 a
Non-treated control	366 a	120 a

[1] Number of J2 cotton root knot (*Meloidogyne incognita* race 3) juveniles per 100cm^3 soil sample.
Means in each column that are followed by the same letter are not significantly different according to Fisher's least significant difference (LSD) test (P=0.05).

Table 2. Impact of Crop Sequence on Cotton Root Knot Nematode Counts and on the Yield of Corn, PBU, 2008

2003	2004	2005	2006	2007	2008	Cotton root knot counts[1]	Yield *bu/A*
Corn	Corn	Corn	Corn	Corn	Corn	298 bcd	106 e
Corn	Corn	Corn	Pnut	Corn	Corn	330 abc	128 bc
Pnut	Corn	Pnut	Corn	Pnut	Corn	74 d	141 ab
Pnut	Pnut	Corn	Pnut	Pnut	Corn	159 cd	151 a
Cttn	Corn	Cttn	Corn	Cttn	Corn	516 ab	113 de
Cttn	Corn	Corn	Cttn	Corn	Corn	362 abc	121 cd
Cttn	Corn	Corn	Corn	Cttn	Corn	528 ab	109 de
Cttn	Cttn	Corn	Cttn	Cttn	Corn	561 a	113 de

[1] Number of J2 cotton root knot (*Meloidogyne incognita* race 3) juveniles per 100cm^3 soil sample.
Means in each column that are followed by the same letter are not significantly different according to Fisher's least significant difference (LSD) test (P=0.05).

Table 3. Impact of Crop Rotation on the Level of Damage Attributed to Diseases and Nematodes of Peanut, PBU, 2008

2003	2004	2005	2006	2007	2008	TSWV[1]	ELS[2]	White mold[1]	Yield *bu/A*
Corn	Pnut	Corn	Pnut	Corn	Pnut	5.0 a	5.1 ab	10.5 b	3967 b
Corn	Corn	Pnut	Corn	Corn	Pnut	3.3 a	5.0 ab	9.0 b	4118 b
Pnut	Pnut	Pnut	Pnut	Pnut	Pnut	3.0 a	5.8 a	22.0 a	2399 c
Cttn	Pnut	Cttn	Pnut	Cttn	Pnut	2.0 a	5.5 ab	6.0 b	4967 ab
Cttn	Cttn	Pnut	Cttn	Cttn	Pnut	2.5 a	4.6 b	6.0 b	5002 a

[1] TSWV and average white mold incidence is expressed as number of hits per 60 foot of row.
[2] Early leaf spot (ELS) was rated using the Florida 1 to 10 scoring system.
Means in each column followed by the same letter are not significantly different according to Fisher's least significant difference (LSD) test (P=0.05).

Table 4. Impact of Crop Sequence on Cotton Yield, PBU, 2008

Crop Sequence						Seed cotton
2003	2004	2005	2006	2007	2008	*lb/A*
Cotton	Cotton	Cotton	Cotton	Cotton	Cotton	2375 b
Peanut	Peanut	Cotton	Peanut	Peanut	Cotton	3178 a
Peanut	Cotton	Peanut	Cotton	Peanut	Cotton	3003 a
Peanut	Cotton	Cotton	Peanut	Cotton	Cotton	2376 b
Cotton	Cotton	Cotton	Peanut	Cotton	Cotton	2450 b
Cotton	Cotton	Cotton	Corn	Cotton	Cotton	2185 b

Means in each column followed by the same letter are not significantly different according to Fisher's least significant difference (LSD) test (P=0.05).

Table 5. Average Yield Response of Corn across All Cropping Sequences to Counter 15G Insecticide/Nematicide, GCREC, 2008

Treatment and rate/A	Yield *bu/A*
Counter 15G 6.5 lb	107.6 a
Non-treated control	108.6 a

Means in each column that are followed by the same letter are not significantly different according to Fisher's least significant difference (LSD) test (P=0.05).

Table 6. Impact of Crop Sequence on the Yield of Corn and Root Knot Nematode Juvenile Counts, GCREC, 2008

2003	2004	2005	2006	2007	2008	Yield *bu/A*
Corn	Corn	Corn	Corn	Corn	Corn	104 d
Corn	Corn	Corn	Pnut	Corn	Corn	109 c
Pnut	Corn	Pnut	Corn	Pnut	Corn	116 a
Pnut	Pnut	Corn	Pnut	Pnut	Corn	111 ab
Cttn	Corn	Cttn	Corn	Cttn	Corn	106 bcd
Cttn	Corn	Corn	Cttn	Corn	Corn	100 d
Cttn	Corn	Corn	Corn	Cttn	Corn	109 bc
Cttn	Cttn	Corn	Cttn	Cttn	Corn	111 ab

Means in each column that are followed by the same letter are not significantly different according to Fisher's least significant difference (LSD) test (P=0.05).

Table 7. Impact of Crop Rotation on the Level of Damage Attributed to Diseases and Nematodes in Peanut, GCREC, 2008

2003	2004	2005	2006	2007	2008	TSWV[1]	ELS[2]	White mold[1]	Yield *bu/A*
Pnut	Pnut	Pnut	Pnut	Pnut	Pnut	3.8 a	4.5 a	3.1 a	4238 b
Corn	Pnut	Corn	Pnut	Corn	Pnut	3.3 a	3.4 b	1.0 b	4953 a
Corn	Corn	Pnut	Corn	Corn	Pnut	3.0 a	3.0 b	1.8 ab	4969 a
Cttn	Pnut	Cttn	Pnut	Cttn	Pnut	4.3 a	3.0 b	1.4 b	4311 b
Cttn	Cttn	Pnut	Cttn	Cttn	Pnut	2.3 a	2.8 b	1.5 ab	4793 a

[1] TSWV and average white mold incidence is expressed as number of hits per 60 foot of row.
[2] Early leaf spot (ELS) was rated using the Florida 1 to 10 scoring system.
Means in each column followed by the same letter are not significantly different according to Fisher's least significant difference (LSD) test (P=0.05).

Table 8. Impact of Moncut 70DF on Peanut Yield and White Mold Incidence Averaged Across All Peanut Cropping Sequences, GCREC, 2008

Treatment and rate/A	White mold[1]	Yield *bu/A*
Moncut 70DF	0.6 b	4659 a
Non-treated Control	3.0 a	4652 a

[1] White mold incidence is expressed as number of hits per 60 foot of row.
Means in each column that are followed by the same letter are not significantly different according to Fisher's least significant difference (LSD) test (P=0.05).

Table 9. Impact of Cropping Sequence on Cotton Yield, GCREC, 2008

Crop Sequence						Seed cotton
2003	2004	2005	2006	2007	2008	*lb/A*
Cotton	Cotton	Cotton	Cotton	Cotton	Cotton	2643 a
Peanut	Peanut	Cotton	Peanut	Peanut	Cotton	2394 a
Peanut	Cotton	Peanut	Cotton	Peanut	Cotton	2439 a
Peanut	Cotton	Cotton	Peanut	Cotton	Cotton	2609 b
Cotton	Cotton	Cotton	Peanut	Cotton	Cotton	2439 b
Cotton	Cotton	Cotton	Corn	Cotton	Cotton	2507 b

Means in each column followed by the same letter are not significantly different according to Fisher's least significant difference (LSD) test (P=0.05).

Sprinkler Irrigation for Site-Specific, Precision Management of Cotton

M. P. Dougherty, A. Abdelgadir, J. P. Fulton, C. H. Burmester, B. E. Norris, D. H. Harkins, L. M. Curtis, and C. D. Monks

A sprinkler irrigation scheduling study initiated in 2006 at the Tennessee Valley Research and Extension Center (TVREC) was continued in 2008. The study evaluates cotton yield response to six irrigation treatments ranging from 0 percent (rainfed) to 125 percent of calculated pan evaporation adjusted for percent canopy cover. In 2007, the study was conducted on 48 plots, 39 feet long and 39 feet wide, arranged in a randomized complete block design with four replications. In 2008, a canola-soybean-cotton rotation was incorporated into 24 of the 48 sprinkler test plots to assess the economic feasibility of adding two oil crops to a northern Alabama cotton rotation. Total seasonal rainfall (June to August) at TVREC for 2008 was 11.27 inches, which was near the normal average of 11.50 inches. Comparable growing season rainfall in 2006 and 2007 was less than 6.5 inches (Figure 1).

Because of higher rainfall in 2008, rainfed, non-irrigated yields were higher in 2008 than in 2006 and 2007 (Figure 2). Due to irrigation malfunction, both the 50 percent and 75 percent irrigation treatments in 2008 were discarded. Due to the same malfunction, very little irrigation water (less than 0.5 inch) was applied to the 100 percent irrigation treatment during August and September. However, yield was not negatively impacted and treatment results are included in Table 1.

All three 2008 irrigation treatments reported in Table 1 significantly increased ($\alpha = 0.10$) seed cotton yield over the rainfed (0 percent) control. Irrigation near 100 percent of calculated pan evaporation adjusted for percent canopy cover resulted in the best yield in all three seasons (Table 1). Average sprinkler irrigated cotton yields were 2.3, 3.5, and 3.1 bales per acre in 2006, 2007, and 2008, respectively, compared to the three-season average of 1.5 bales per acre for rainfed controls. Malfunction of the 2008 irrigation scheduling system has been corrected for the upcoming 2009 season.

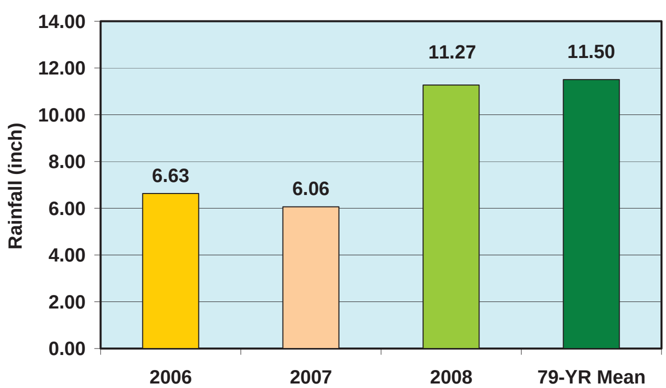

Figure 1. Total seasonal rainfall during the June, July, and August periods versus the 79-year average.

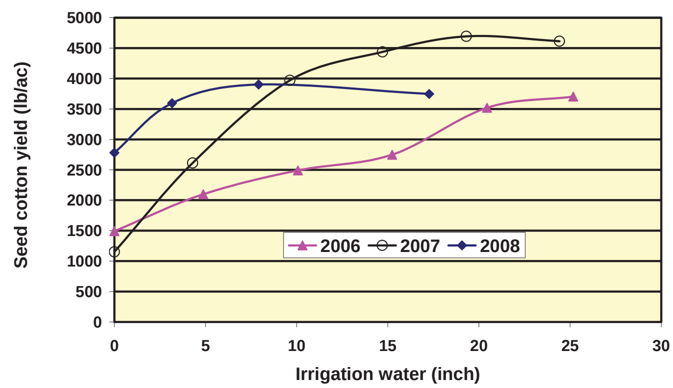

Figure 2. Effect of total amount of irrigation water on seed cotton yield at TVREC during 2006-2008. (Note: In 2008 two irrigation treatments were discarded due to irrigation malfunction.)

Table 1. Irrigation Amounts and Lint Yield for Sprinkler-Scheduling Trials, 2006-08[1]

Irrigation Treatment	2006 Irrig. *in*	2006 Bales/A	2007 Irrig. *in*	2007 Bales/A	2008 Irrig. *in*	2008 Bales/A
0	0.00	1.2	0.00	1.0	0.00	2.3
25 percent	4.87	1.7	4.29	2.2	3.16	3.0
50 percent	10.1	2.0	9.63	3.4	3.70[2] (6.76)	—
75 percent	15.2	2.2	14.7	3.8	5.86[2] (10.3)	—
100 percent	20.4	2.8	19.3	4.0	7.91 (13.9)	3.3
125 percent	25.2	2.9	24.4	3.9	17.3	3.1

[1] In 2006, N=4, turnout = 38 percent. In 2007, N=8, turnout = 41 percent. In 2008, N=4, turnout 40 percent.

[2] In 2008, the irrigation treatments 50 percent and 75 percent were discarded due to irrigation malfunction. Numbers in parentheses indicate target irrigation that was not achieved due to malfunction.

Subsurface Drip Irrigation Fertigation for Site-Specific, Precision Management of Cotton

M. P. Dougherty, A. Abdelgadir, J. P. Fulton, C. H. Burmester, B. E. Norris, D. H. Harkins, L. M. Curtis, and C. D. Monks

A subsurface drip irrigation study was installed at the Tennessee Valley Research and Extension Center (TVREC) in 2005 to evaluate four precision fertigation management scenarios. Approximately 7,500 feet of subsurface drip irrigation tape and four positive displacement liquid fertilizer injectors were installed on five treatments with four replications in randomized complete block design. The twenty treatment plots were made up of eight, 345-foot rows of cotton on a 40-inch row spacing, with drip tape between every other row of cotton. The four fertigation treatments and one non-fertigated control are described in Table 1.

Yield results for 2008, are shown in Figure 1. Total seasonal rainfall at TVREC from June to August 2008 was 11.27 inches, which was near the normal average of 11.50 inches. Thus, seed cotton yields for this season were higher than in 2006 and 2007. The response to fertilizer treatments in 2008 was similar to 2007. In 2008, the 100 percent fertigated treatments (three and four) produced significantly lower (α= 0.1) yields than treatment one (100 percent surface-applied) and treatment five (30 percent surface + 70 percent drip), and they gave comparatively lower yield than treatment two (15 percent surface + 85 percent drip). The non-fertigated control treatment and the fertigated treatments that received surface-applied, preplant nitrogen and potassium (K_2O) responded much better in 2008, possibly due to sufficient rainfall and better downward movement of surface-applied fertilizer. However, higher rains may have also resulted in leaching fertigated nutrients farther out of the root zone. This may explain observed plant yellowing and reduced vegetative growth in treatments 3 and 4 during the season, although soil compaction impeding root growth to fertigated nutrients cannot be ruled out. Treatments one and five were statistically the best yielding treatment in 2008 whereas treatments three and four were the lowest yielding.

Cotton yield (bales per acre), lint quality parameters, and leaf nutrient analyses are presented in Table 2. None of the quality parameters were significantly affected by different fertilizer treatments except for lint length. Lint length in the 100 percent fertigated treatments (4) was significantly higher (α=0.1) than the fertigated treatments that received surface-applied, preplant nitrogen (N) and potassium (K_2O).

Plant uptake for N and K was significantly higher (α=0.1) in the surface-applied control treatment (treatment 1) than all fertigated treatments, with or without surface application. Higher seasonal rainfall in 2008 may have assisted delivery of surface-applied, preplant N and K. Phosphorus, Ca, and Mg contents were not significantly affected by any treatment.

Table 1. Treatment Description, Fertigation Management Trials, 2008

Treatment[1]	Description
1. Control - drip irrigated, with all fertilizers surface applied	*Preplant* N and K at 60 pounds per acre
	Post-Plant N (75 pounds per acre) sidedressed at early square
2. Timing 1 – with surface preplant fertilizer	*Preplant* 20 pounds of N and K (surface)
	Drip 40 pounds N,K – square to bloom (25 days)
	Drip 75 pounds N,K – bloom to 25 days
3. Drip timing 1 – no preplant fertilizer	*Planting Drip* 20 pounds N,K
	Drip 40 pounds N,K – square to bloom (25 days)
	Drip 75 pounds N,K – bloom to 25 days
4. Drip timing 2 – no preplant fertilizer	*Planting Drip* 20 pounds N,K
"spoon-fed"	*Drip* 40 pounds N,K – square to bloom (25 days)
	Drip 75 pounds N,K – bloom to 40 days
5. Timing 2 – with surface preplant fertilizer	*Preplant* 40 pounds of N and K (surface)
	Drip 95 pounds N,K – square through bloom (50 days)

[1] All treatments received 135 pounds per acre of nitrogen and potassium (K_2O), 20 pounds per acre of sulfur, and l.0 pound per acre of boron. Phosphorus fertilizer was surface-applied to maintain P at high soil test levels. Drip fertilizer was 8-0-8-1.2S-0.06B made using 32 percent liquid N, potassium thiosulfate, fertilizer grade KCL, Solubor, and water.

Table 2. Lint Yield and Quality Analysis, Cotton Fertigation Management Trials, 2008

Treatment[1]	Yield *bales/A*	Mic	Length	Strength	Uniformity	N %	P %	K %	Ca %	Mg %
1	3.9 a	4.62 a	1.10 b	27.2 a	84.2 a	4.32 a	0.28 a	1.20 a	2.27 a	0.26 a
2	3.5 b	4.78 a	1.07 c	27.2 a	83.2 a	3.36 c	0.27 a	1.09 b	2.22 a	0.26 a
3	3.4 b	4.75 a	1.11 ab	28.5 a	84.1 a	3.24 c	0.28 a	1.13 b	2.26 a	0.25 a
4	3.3 b	4.58 a	1.13 a	28.4 a	84.5 a	3.35 c	0.30 a	1.14 b	2.36 a	0.26 a
5	3.8 a	4.65 a	1.09 bc	28.9 a	84.0 a	3.57 b	0.28 a	1.13 b	2.28 a	0.26 a

[1]Treatment 1. Surface applied N-P-K with drip irrigation (control).
Treatment 2. Preplant 20 pounds N-K surface with two N-K drip timings.
Treatment 3. 20 lb N-K drip at planting with two N-K drip timings (to 25 days after bloom).
Treatment 4. 20 lb N-K at planting with two N-K drip timings (to 40 days after bloom).
Treatment 5. Preplant 40 pounds N-K surface with one N-K drip timing (square through bloom).
Different subscripts denote statistical difference (α=0.1). N=4. Turnout = 40 percent.

Evaluating Pressure Compensating Subsurface Drip Irrigation for No-Till Row Crop Production on Rolling, Irregular Terrain

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This investigation was conducted on a 12-acre field located at the Tennessee Valley Research and Extension Center (TVREC), Belle Mina, Alabama. The two major objectives were to evaluate cotton production on rolling terrain irrigated with subsurface drip irrigation (SDI) in conjunction with cover crops and to evaluate spatial yield variability as related to water distribution and topography. The experimental design was a randomized block design with two irrigation treatments (irrigated and non-irrigated) and two cover crop treatments (cover and no cover) with four replications (Table 1). Each of the four treatments was replicated four times. Plots measured 27 feet by 1250 feet with SDI tape on 80-inch spacing (every other row of 40-inch cotton) and buried at an average depth of 13 inches. Plots receiving a cover crop treatment were planted with rye at a rate of 90 pounds per acre on November 2, 2007. The cover crop was desiccated on March 25, 2008. Cotton, variety ST 4554 B2RF, was planted on April 21, 2008. Yield and quality data were analyzed to determine significant differences (α=0.10).

In 2008, irrigated treatments were scheduled based on daily application of 90 percent of daily pan evaporation, adjusted for percent crop canopy cover. However, with the dry early growing season, the daily amount was increased to maintain sufficient soil moisture within the rooting zone. Similarly, in 2007 the 90 percent pan adjusted for crop canopy was used but modified in mid-June to increase the application to more than two times the 90 percent level due to obvious plant development problems caused by extremely low soil moisture. Insufficient soil moisture monitoring in 2007 made it difficult to identify crop water deficiencies in advance of visible plant stress in early June. Soil moisture monitoring was initiated in 2008; however, due to delays with moisture profiler tube installation, monitoring did not commence until May 2. While there were some differences in soil moisture between the treatments, discrepancies existed making it difficult to evaluate the adequacy of irrigation scheduling. However, soil moisture sensing did provide feedback to ensure subsoil moisture content was maintained in order to minimize vertical water loss.

Significant yield differences were measured between the irrigated and non-irrigated treatments as well as between the cover and no-cover treatments (Table 1). As in 2007, irrigated yields were significantly higher than non-irrigated yields with 2008 irrigated treatments yielding as high as 54 percent more than non-irrigated yields. Irrigated treatment yields averaged approximately 3.3 bales per acre in 2008.

A noteworthy difference between 2007 and 2008 yields is the significant difference between the cover and no-cover treatments for both irrigated and non-irrigated. The plots with the cover crops yielded 22 percent and 9 percent higher than the plots without cover crops for the non-irrigated and irrigated treatments, respectively. In 2007 significant differences were not found between cover crop treatments.

A quality analysis was conducted by harvesting 50 cotton bolls collected at six locations within each plot in 2007. Quality factors considered were micronaire, strength, uniformity, and lint length (Table 2). There were significant differences between the irrigated and non-irrigated treatments for all quality factors, which also existed in the 2007 quality data (Table 3). In 2008 micronaire values for the non-irrigated plots ranged between 5.1 and 5.4 (Table 2), signifying a gin discount. Uniformity and lint length were significantly higher on irrigated plots, with uniformity classifying as high on the irrigated plots and intermediate on the non-irrigated plots. No significant differences existed between the irrigated plots with a cover crop compared to irrigated plots without a cover crop. Micronaire, strength, uniformity, and lint length were significantly different for the cover and no-cover, non-irrigated treatments. Strength for the non-irrigated, no-cover treatment was significantly higher than strength for any of the other treatments.

In summary, irrigated treatments in the 2008 growing season had significantly higher yields (46 to 54 percent greater) than non-irrigated treatments comparable to similar yield differences (66 percent) observed in 2007. The winter cover crop plots also had significantly higher yields (9 to 22 percent) over the plots without a cover crop. Results of the 2008 quality data indicated that micronaire, lint uniformity, and lint length were significantly higher on irrigated than non-irrigated plots, a result also observed in 2007.

TABLE 1. YIELD AVERAGES PER TREATMENT, 2007 AND 2008

Treatment	2007 Seed cotton *lb/A*	2007 Lint bales *bales/A*	2008 Seed cotton *lb/A*	2008 Lint bales *bales/A*
Irrigated / Cover	3574.8 a	3.1	4476.4 a	3.5
Irrigated / No Cover	3350.0 b	2.9	4067.4 b	3.2
Non-Irrigated / Cover	1187.9 b	1.0	2410.4 c	2.0
Non-Irrigated / No Cover	1119.3 b	1.0	1866.1 d	1.5

Mean yields with similar letters indicate they are not statistically different at the 90 percent confidence level.

TABLE 2. QUALITY AVERAGES PER TREATMENT, 2008

Treatment	Mic.[1]	Strength *g/Tex*	Uniformity *%*	Length *in*
Irrigated / Cover	4.5 a	28.3 a	83.4 a	1.1 a
Irrigated / No Cover	4.7 a	28.2 a	83.6 a	1.1 a
Non-Irrigated / Cover	5.1 b	29.9 b	82.7 b	1.1 b
Non-Irrigated / No Cover	5.4 c	27.8 a	82.0 c	1.0 c

[1] Values between 3.5 and 4.9 are not discounted at the gin.

Mean yields with similar letters indicate they are not statistically different at the 90 percent confidence level.

TABLE 3. QUALITY AVERAGES PER TREATMENT, 2007

Treatment	Mic.[1]	Strength *g/Tex*	Uniformity *%*	Length *in*
Irrigated / Cover	4.7 a	30.0 a	82.9 a	1.10 a
Irrigated / No Cover	4.6 a	29.4 a	83.0 a	1.11 a
Non-Irrigated / Cover	3.3 b	26.3 b	79.6 b	1.05 b
Non-Irrigated / No Cover	3.1 c	26.1 b	80.9 c	1.08 c

[1] Values between 3.5 and 4.9 are not discounted at the gin.

Mean yields with similar letters indicate they are not statistically different at the 90 percent confidence level.

Cotton Soil Fertility on Alabama Black Belt Soils

C. C. Mitchell, G. Huluka, R. P. Yates, and J. Holliman

Soil fertility research with cotton has not been conducted on the fine-textured, often calcareous soils of the Alabama Black Belt Prairie region in several decades although as much as 30,000 acres of cotton are being planted on these soils. Most fine-textured, Black Belt soils test low in P and high or very high in K if recognized analytical techniques are used that are appropriate for these highly buffered, often calcareous soils. Nevertheless, cotton growers in this area sometime suspect K deficiency in spite of following the soil test recommendation. Very little research has been conducted to verify soil test calibration or recommendations for cotton on these soils.

The purpose of this experiment was to identify optimum rates of N, P_2O_5, and K_2O for cotton on Black Belt soils. Another objective not covered in this paper was to develop soil test calibration for P and K for cotton on this soil.

This experiment was laid out in 2004 and was designed to complement the "Rates of NPK Experiment" (circa 1929) on other outlying units of the Alabama Agricultural Experiment Station. The site is on an acid, Vaiden clay (very fine, smetitic, thermic, Vertic Hapludalfs) at the Black Belt Research and Extension Center in Marion Junction, Alabama. Initial soil tests from the site indicated a very uniform site typical of unfertilized Black Belt area cropland (Table 1). Phosphorus was rated low using the Mississippi/Lancaster extract. Potassium was rated very high.

The experiment consisted of six N rates, four P rates, five K rates and a no-lime treatment and an unfertilized treatment replicated four times in a randomized block design (Table 2). Plots were 15 × 25 feet with five 36-inch wide rows. Because of disappointing yields in 2005 when cotton was planted no-till into a rye cover crop and excessive rainfall, the decision was made to switch to a ridge tillage system with no cover crop for 2006 and beyond. All the P and K and half of total N were applied within one week of planting in late April. Complement of N was applied in mid-June. Lint yields were estimated by hand-picking 20 feet from the two middle rows in each plot. Relative yields are yields compared to the mean yield of treatment 5, the control treatment, which received 90-100-100 pounds N-P_2O_5-K_2O per acre each year.

The 2008 growing season started out as the third drought year in a row for this area. Late summer rains resulted in relatively good cotton lint yields. Early defoliation due to leaf spot was noted in August, especially on the low K treatments (Figure 1). Excessive rainfall and anaerobic soil conditions dramatically limited cotton lint yields in 2005. Drought severely limited yields in 2006, but critical rainfall in July resulted in somewhat higher yields in 2007 (Table 2). Yields were from hand-picked plots. If the 2006 and 2007 crops had been machine harvested, very little of the lint would have been saved because of hard locks and weak bolls.

Lint Quality. Cotton lint quality was measured in 2006, 2007, and 2008 on selected treatments by USDA AMS Cotton Program Birmingham Classing Office. There were no differences in mean fiber quality due to soil fertility treatment in 2006 and 2007, but there were differences in 2008 (Table 3).

N rates. Because of the higher yields and significant differences in treatment on yields in 2007 and 2008, these data are probably more relevant to producers (Table 2). Optimum total N rates in the two dry years, 2006 and 2007, appear to be around 60 pounds N per acre, although rates above 30 pounds N per acre produced relative yields above 95 percent of maximum. In 2008, optimum yields were closer to the currently recommended 90 pounds total N per acre. There was a more dramatic response to N rates in 2005 but yields were low due to excessive rainfall and denitrification losses on these poorly drained soils. On-farm tests in 2003 when excessive rainfall also limited yields, showed that delaying N application until sidedressing could almost double the yield potential of cotton. In these tests, optimum N rate was 120 pounds N per acre as a sidedress.

P_2O_5 rates. One would have anticipated more dramatic responses to rates of P than we found in these tests because of the low soil test P rating. Except for the low-yielding, wet year of 2005, there was very little yield response to added P. This calls into question the current low rating for this soil test value for cotton. The definition of a low soil test rating indicates that the soil will produce less than 75 percent of its potential without fertilization of that nutrient. Without P in 2006, 2007, and 2008, relative cotton lint yields were above 80 percent.

K_2O rates. In spite of the fact that this soil initially tested very high in K, there were significant increases in yield with higher rates of K_2O up to 100 pounds per acre in 2005, 2007, and 2008. These results provide credibility to grower's claims that additional K seems to increase yields even though the soils are rated very high for K. There may be justification to change soil test K ratings for these soils and increase K recommendations for cotton. In fact, without added K in 2005, 2007, and 2008, relative yields were at or below 50 percent of highest yields with K fertilization. According to 1994 research, a soil test rating of very low for a nutrient would be associated with a soil capable of producing only 50 percent of optimum yields without additional fertilization of that nutrient. This soil should be rated very low in K instead of very high. At this rating, current recommendations for cotton would be up to 120 pounds K_2O per acre.

Leaf spot diseases. In early August of 2008, foliar leaf spot diseases (Cercospora /Alternaria complex) were apparent in the low K plots and by mid-August, many of these plots had defoliated due to the diseases. While this is the first time these diseases have been found in the four years of this experiment, it did appear to be much more severe in the low K treatments.

In summary, this site has been plagued with extreme weather conditions and poor cotton yields in two out of four years. However, these conditions are not unlike that faced by most producers on these soils. Significant differences in 2007 and 2008 with reasonable, non-irrigated cotton lint yields suggest a need for modification of soil test ratings for both P and K on these soils. Phosphorus may be currently rated too low and potassium may be rated too high for cotton on these soils. Currently recommended total N rates for cotton on these soils, 90 pounds N per acre, is certainly not too high. Since these are the only established soil fertility variable plots on the Black Belt Research and Extension Center, we hope that they will be maintained indefinitely as is the "Rates of NPK" experiment at six other Alabama locations to provide more conclusive evidence for changes in soil test calibration for similar Alabama soils.

TABLE 1. INITIAL, MEAN PLOW-LAYER SOIL TEST VALUE (N=4) FROM SITE TAKEN IN 2004

Extract used	Soil pH	P	K	Mg	Ca
		mg/kg and rating[1]			
Mehlich-1	6.0	4 Very Low	88 High	35 High	2330 (not rated)
Miss/Lancaster	6.0	16 Low	180 V. High	60 High	10,000+

[1]Adams et al., 1994

TABLE 2. FERTILIZER TREATMENTS AND COTTON LINT YIELDS ON A VAIDEN CLAY IN WEST ALABAMA, 2005-2008

Treatment number	Description	Rate of nutrients applied N	P_2O_5	K_2O	Cotton lint yields 2005	2006	2007[1]	2008[1]
		lb/A						
				N rates				
1	No N	0	100	100	177	311	870 bcd	960 cde
2	Low N	30	100	100	214	380	1040 ab	1070 bcd
3	Intermediate N	60	100	100	265	403	990 abc	1220 abc
5	Control	90	100	100	388	393	1076 abc	1350 ab
4	High N	120	100	100	237	400	1037 ab	1340 ab
6	No S/VH N	150	100	100	320	387	1040 ab	1360 ab
				P rates				
7	No P	90	0	100	280	378	910 abcd	1300 ab
8	Very low P	90	20	100	205	394	940 abcd	1350 ab
9	Low soil P	90	40	100	274	375	1091 a	1260 abc
10	Intermediate P	90	60	100	233	388	1027 ab	1460 a
5	Control	90	100	100	388	393	1076 abc	1340 ab
				K rates				
11	No K	90	100	0	157	353	585 f	600 f
12	Very low K	90	100	20	170	324	784 de	770 edf
13	Low K	90	100	40	253	295	803 cde	1030 bcd
14	Intermediate K	90	100	60	341	335	922 abcd	1030 bcd
15	High K	90	100	80	319	349	806 cde	1150 abc
5	Control	90	100	100	388	393	1076 ab	1340 ab
				Other treatments				
16	No lime	90	100	100	196	413	1027 ab	1350 ab
17	Nothing	0	0	0	160	300	649 ef	670 ef
L.S.D P≤ 0.1					***135***	***ns***	—	—

[1] Values followed by the same letter are not significantly different at P≤ 0.05.

TABLE 3. FIBER QUALITY FROM SELECTED TREATMENTS

Treatment no. and description	Lint *(%)*	Micronaire	Length	Strength	Uniformity
		2006			
Mean of all	47	4.60	97.0	26.9	81.9
		2007			
Mean of all	43	3.97	1.02	26.4	81.9
		2008[1]			
1. No N	49 a	4.05 a	1.04 a	27.5 ab	81.9 ab
4. 120 lb N/A	46 bc	4.22 a	1.07 a	28.8 a	83.0 a
7. No P	47 b	4.18 a	1.04 a	27.8 ab	81.0 b
11. No K	45 c	3.15 b	1.06 a	26.7 b	80.5 b
15. 80 lb K_2O/A	46 bc	3.78 ab	1.04 a	28.8 a	82.0 ab

[1] Values within the same column followed by the same letter are not significantly different at P < 0.05.

Figure 1 (left). Cotton in a “no K” treatment that was completely defoliated by September 1 due to leaf spot disease first noticed on August 1 (right).

Alternative Nitrogen Sources for Cotton

C.C. Mitchell, K. S. Balkcom, and C. H. Burmester

Several alternative nitrogen (N) sources, rates of N, and amendments were evaluated at Prattville, Alabama, on cotton in 2008.

Nitrogen rates reported in Figure 1 are for sidedress application only. Dry urea produced the highest yield, averaging 1100 pounds lint per acre (Figure 1). Ammonia volatilization was measured from selected topdress N materials for two weeks after they were applied on July 8, 2008. A commercially available, controlled-release N material, Nitamin Nfusion®, was included in the study. This material is recommended to be applied with liquid N or some other readily available N source, but we used it as a topdress N application. All plots except the no-N plots received 40 pounds N at planting. Loss of urea from volatilization was also very low for dry urea, less than 5 pounds N per acre out of 80 pounds applied over a two-week period (Figure 2). Ammonia loss from liquid UAN solutions was the highest (20 pounds N per acre out of 80 applied). Dry urea likely dropped below the rolled rye cover crop residue whereas broadcast UAN solution was sprayed on top of the rye residue. Agrotain® (AG) appeared to reduce volatilization losses from urea but not from the UAN solution, but the results were erratic.

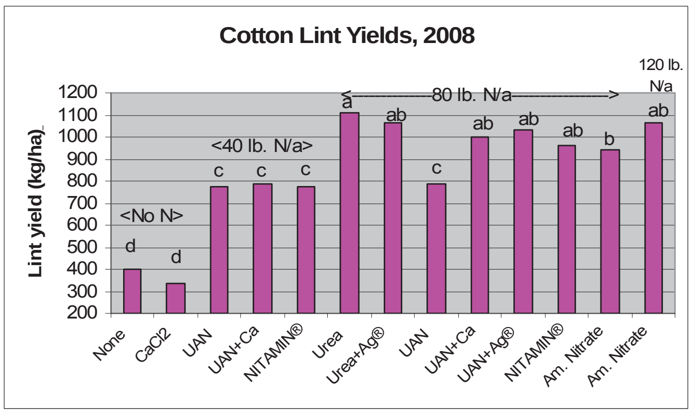

Figure 1. Effect of sources of topdress N on cotton lint yields at Prattville in 2008.

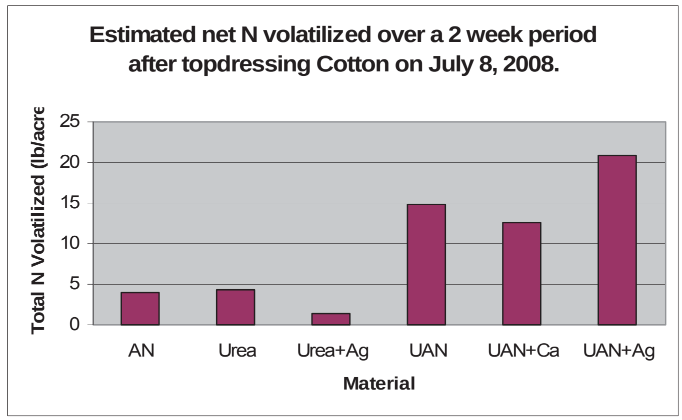

Figure 2. Estimated net N loss from ammonia volatilization over a two-week period following topdressing of cotton on July 8, 2008.

INSECT MANAGEMENT

Effectiveness of Different Insecticides in Controlling Spider Mites and Aphids Infesting Cotton

T. Reed

A strip trial to assess the efficacy of acaricides in suppressing spider mites was conducted at Greenbrier, Alabama, near the Limestone and Madison county line. Acaricides were applied on June 19, 2008 between 7 p.m. and 8:15 p.m. with a CO_2 backpack sprayer that delivered 14 gallons of water per acre at 29 psi using TX 10 nozzles. Individual plots were 64 feet long and four rows wide. Plots were arranged in the order treatments are listed in Table 1. There was one untreated row between each plot. Mites were counted on June 23 (four days posttreatment) using a microscope. Fifteen leaves were collected from the two middle rows of each plot, placed in a zip-lock bag, transported to the lab in a cooler with ice, and inspected immediately. Mites were counted at the base of each leaf in an area between the leaf veins that was shaped like an equilateral triangle with 1 inch sides (Table 1).

Aphid chemicals were applied to 38-inch row cotton using a CO_2 back pack sprayer that delivered 11.34 gallons per acre at 26 psi using TX 10 nozzles. Treatments were applied on Tuesday, July 8, 2008 from 5.45 p.m. to 7.15 p.m. No wind was occurring at time of application. A total of 0.9 inches of rain fell the next afternoon. Plots were 20 feet long with two rows per plot. There were four repetitions per treatment with plots arranged in a randomized complete block design. One row was used as an untreated buffer between each plot. Aphids were counted on the third uppermost leaf from each of 10 plants per plot. Fungal disease significantly reduced aphid numbers at six days postapplication. Cotton was harvested from 10 row feet in each plot and weighed on October 22, 2008 (Table 2).

The mean number of aphids counted in each of the four insecticide treatments was significantly less than that in the untreated check three days postapplication (Pr>F = 0.10, LSD = 36.4). Differences in yield could be attributed to an inconsistent stand in one of the Carbine plots and one of the Trimax Pro plots and not due to efficacy in controlling aphids.

Table 1. Effectiveness of Insecticides in Controlling Spider Mites

Treatment	Rate *lb a.i./A*	Average no. mites[1]	Reduction[2] *%*
Curacron 8E	0.75	1.53	78
Brigade 2EC	0.08	1.87	73
Untreated		6.87	
Lorsban 4E	0.5	4.13	40
Oberon 2SC	0.5	2.07	52
Untreated		4.33	
Curacron 8E	0.75	3.40	21

[1] Number of mites per 0.36 square inch. Average for 15-leaf sample.
[2] Percent reduction relative to nearest untreated plot.

Table 2. Effectiveness of Insecticides in Controlling Aphids

Treatment	Rate *lb a.i./A*	Mean no. aphids per leaf 3 days postapplication	Mean no. aphids per leaf 6 days postapplication	Seed cotton yield *lb/A*
Check		165 a	32	4428 ab
Carbine	0.088	122 b	12	4181 ab
Trimax Pro	0.047	115 b	7	4062 b
Leverage	0.079	108 b	14	4987 a
acetamiprid	0.05	98 b	14	4637 ab

STINK BUG RESIDUAL CONTROL WITH VARYING CLASSES OF CHEMISTRY

R. H. Smith

A trial established in 2008 at the Wiregrass Research and Extension Center (WREC) with a double peanut interface was utilized in a replicated study to determine the residual effectiveness of varying classes of chemistry when the treatments were made at set intervals of three, five, seven, and nine weeks of bloom. A phosphate (Bidrin) was compared to a pyrethroid (Discipline) and a combination of a pyrethroid (Karate) + a neonicotinoid (Centric). Weekly measurements of internal boll damage were made and yields taken.

Approximately 56 percent of the quarter-size diameter bolls had internal stink bug injury when this trial was initiated on August 19 (third week of bloom). All treatments were applied on the same schedule (every other week) continuing from week three of bloom through week nine. Dates of application were August 19, Septmenber 2, September 16, and October 3. A total of four applications were made for each treatment. The last evaluation was made seven days following application number four. Plots were harvested on November 18.

The damage in each treatment tracked relatively close together throughout the trial (see table). It could be concluded, based on the results of this test, that when stink bugs are migrating into cotton daily from an adjacent host crop, the spray interval is more important than the type of chemistry used. Little differences were measured between the residual of a phosphate (Bidrin), a pyrethroid (Discipline), or a tank mixture of two chemical classes (pyrethroid [Karate] and neonicotinoid [Centric]) in this trial conducted under heavy and continuous stink bug pressure.

When yields were taken at maturity, some differences were noted. In each stacked replicate, the Discipline yields were lower than the other two treatments. However, some of this yield variabilty may be explained by factors other than stink bug damage. The first replicate of Bidrin that yielded 2962 pounds per acre was located on one end of the field that had soils with better moisture-holding capacity. The fourth replicate of Discipline yielding 1670 pounds per acre was located on the other end of the field, which was adjacent to another peanut field. Therefore, this plot actually had peanuts on both sides plus the end. On the average, Bidrin-treated plots yielded slightly higher while Discipline-treated plots yielded lower than the Karate + Centric-treated plots. However, based on stink bug damage recorded, these differences may not be related to stink bug control.

PERCENT INTERNAL BOLL DAMAGE AND SEED COTTON YIELD, 2008

Treatment	Rate	Week of bloom								Avg.	Seed
		3[1]	4	5[1]	6	7[1]	8	9[1]	10	weeks	cotton
	oz/A	%								4-10	*lb/A*
1. Bidrin	5.33	56	37	47	20	13	20	23	23	26	2246
2. Discipline	4	56	27	40	40	13	27	20	10	25	1750
3. Karate + Centric	5	56	30	43	17	13	17	23	27	24	2091

[1] Spray applications.

Stink Bug Threshold Verification Trial (Late Planting Date)

R. H. Smith

The bug complex, specifically multiple stink bug species in Alabama and the southeastern U.S., has increased in importance following boll weevil eradication and the introduction of transgenic cottons. Much knowledge has been gained about stink bugs, but many questions concerning sampling, thresholds, and their movement from crop to crop or through the farmscape remain. This is particularly true concerning the interface of cotton and alternate stink bug hosts. A major objective of this project is to update and or advance management strategies for stink bugs in Alabama and the Southeast.

A trial was established in 2008 at the Wiregrass Research and Extension Center in Headland, Alabama. Cotton for this trial was planted late, June 12, in order to have economic stink bug pressure throughout the entire boll production season. This would be representative of many fields planted in the coastal plains of the southeastern U.S., following a winter crop of wheat.

One eight-row strip of cotton (1400 feet in length), planted with a double peanut interface, was utilized to evaluate four different threshold regimes: 20 percent internal boll damage; dynamic threshold (ranging from 10 to 50 percent boll damage, depending on the week of bloom); aggressively sprayed; and untreated. Treatments were replicated four times. Weekly boll damage counts were made and yields taken. Applications of a pyrethroid plus phosphate (Bidrin) were made to each treatment as needed from the third through the ninth week of bloom. The cotton for this trial was planted in an eight-row strip through the middle of a peanut field so that both sides of the plot would be susceptible to the movement of stink bugs from peanuts. This situation presented a worst case scenario in which to evaluate stink bug thresholds.

This test was initiated the third week of bloom, as soon as some bolls reached the stage of stink bug injury susceptibility. The injury level was 52 percent internal injury on August 19 when treatments were initiated. Three weekly sprays were required in all treatments to bring stink bug damage below the 20 percent level. The 20 percent internal threshold was not treated, based on damage, for the next two weeks. However, stink bug populations rebounded and applications were required on weeks eight and nine. The dynamic threshold triggered and was sprayed four consecutive weeks (weeks three, four, five, and six). The stink bug injury in these plots never rebounded to treatable levels again, resulting in a total of only four sprays rather than five, as was made to the 20 percent internal injury threshold. The aggressively sprayed plots (applications made weekly) received a total of seven total sprays. However the seasonal injury level (averaged over the seven weeks of trial) was only slightly less than the dynamic threshold seasonal average. Both the dynamic and aggressively sprayed thresholds had slightly less damage than the 20 percent internal injury threshold.

The average stink bug boll injury in the untreated, over the seven weeks of this trial, was 73 percent, which demonstrates the extremely high pressure encountered. Based on the results of this trial, conducted under a worst case situation, the dynamic threshold proved to be the most economical and efficacious treatment evaluated.

Yields were taken at maturity. All threshold treatments were greatly superior to the untreated by about 2000 pounds of seed cotton per acre. Few differences were recorded between the dynamic threshold and aggressively sprayed (four total sprays versus seven). Both out-yielded the plots treated at the 20 percent injury threshold by about 200 pounds of seed cotton per acre.

In summary, when considering the number of sprays needed, the level of damage incurred, and the yields, the dynamic threshold was the most economical and reasonable threshold to follow.

Table 1. Date of Treatment Applications

Threshold treatment	Application dates	Total treatments
1. Untreated		0
2. 20 percent internal boll damage	8/19, 8/28, 9/2, 9/23, 9/30	5
3. Dynamic threshold	8/19, 8/28, 9/2, 9/8	4
4. Aggressively sprayed	8/19, 8/28, 9/2, 9/8, 9/15, 9/23, 9/30	7

Table 2. Percent Internal Boll Damage and Seed Cotton Yield, 2008

Treatment	Number of applications	Date and week of bloom: 19 Aug wk. 3	28 Aug wk. 4	2 Sep wk. 5	8 Sep wk. 6	15 Sep wk. 7	23 Sep wk. 8	30 Sep wk. 9	Avg. weeks 4-9	Seed cotton yield
		%								lb/A
1. Untreated	0	52[1]	58	75	70	80	82	75	73	897
2. 20 percent internal damage	5	52[2]	38[2]	38[2]	8	2	30[2]	22[2]	23	2740
3. Dynamic threshold	4	52[2]	30[2]	48[2]	12[2]	8	8	0	18	2964
4. Aggressively sprayed	7	52[2]	40[2]	35[2]	2[2]	5[2]	0[2]	2[2]	14	2942

[1]Ten quarter-size diameter bolls were collected and observed for internal injury weekly from each of four replicates.
[2]Applications made with Bidrin (4 ounces per acre) + Bifenthrin (3.2 ounces per acre).

STINK BUG THRESHOLD VERIFICATION TRIAL (NORMAL PLANTING DATE)

R. H. Smith

A trial to evaluate management strategies for stink bugs was established in 2008 at the Wiregrass Research and Extension Center in Headland, Alabama. Cotton utilized in this test was planted on May 15, which is within the normal planting window for southeast Alabama. Eight rows, approximately 1400 feet in length, along the border of the field interfacing with peanuts were utilized for this trial. This was done so that the plot would be susceptible to the movement of stink bugs from peanuts. This situation presented a worst case scenario under which to evaluate stink bug thresholds.

Stink bug controls were initiated on August 12, about the third week of bloom, when boll damage was about 11 percent. Four threshold regimes were evaluated until there were no longer any bolls susceptible to stink bug injury. Untreated plots received no controls, while the aggressively sprayed received four. The 20 percent internal injury and dynamic threshold each received three sprays. Boll damage counts were taken weekly and few differences were noted between treated threshold regimes. By the end of the season the damage in the untreated plots reached 88 percent, which demonstrated the level of stink bug pressure experienced in this trial. Based on the results of this trial, it could be concluded that under heavy pressure, as experienced along the cotton-peanut interface border, the treatment threshold followed is not as important as long as stink bug damage is maintained to a minimal level. There was no advantage to the aggressively sprayed regime over the 20 percent or dynamic threshold.

Yields were taken at maturity and followed the same trends as did the stink bug damage. All treated plots yielded more than the untreated while there were few differences in yield between the three treated regimes.

It might be noted that when cotton is planted within a normal plant date window, the length of period when bolls are susceptible to stink bug injury is about three to four weeks along a cotton-peanut interface border.

TABLE 1. DATE OF TREATMENT APPLICATIONS

Threshold treatment	Application dates	Total treatments
1. Untreated		0
2. 20 percent internal boll damage	8/12, 8/19, 9/2	3
3. Dynamic threshold	8/12, 8/19, 9/2	3
4. Aggressively sprayed	8/12, 8/19, 8/27, 9/2	4

TABLE 2. PERCENT INTERNAL BOLL DAMAGE AND SEED COTTON YIELD

Treatment	Number of applications	——Date and week of bloom—— 12 Aug wk. 3	19 Aug wk. 4	25 Aug wk. 5	2 Sep wk. 6	Average damage	Seed cotton yield
		%					*lb/A*
1. Untreated	0	11[1]	48	40	88	59	1285
2. 20 percent Internal Damage	3	11[2]	20[2]	8	15[2]	14	2513
3. Dynamic Threshold	3	11[2]	15[2]	3	18[2]	12	2627
4. Aggressively Sprayed	4	11[2]	20[2]	10[2]	20[2]	15	2555

[1] Ten quarter-size diameter bolls were collected and observed for internal injury weekly from each of four replicates.
[2] Applications made with Bidrin (4 ounces per acre) + Bifenthrin (3.2 ounces per acre).

Systems Technology Trial, Prattville, Alabama

R. H. Smith

A small plot trial was conducted at the Prattville Agricultural Research Unit to compare genetically altered varieties, conventional varieties, and the new lepidopterous chemistry. Several Bt varieties were compared to conventional varieties with and without over-sprays for caterpillar pests. Delta Pine, Stoneville, and Phytogen biotech varieties were compared to conventional Delta Pine and Bronco varieties over-sprayed for bollworms and tobacco budworms. Insecticides evaluated were Coragen and Belt. Both test areas were over-sprayed as needed for bug and sucking pests. Bollworm and tobacco budworm larvae and damage counts were made. Yields were taken at maturity and plots were arranged in a randomized complete block design.

Only one generation of bollworms infested this trial area in 2008. Furthermore, since the test area did not require an early season application for bug and/or sucking pests, beneficial insects were still present when the bollworm flight occurred about July 20. This minimized worm damage in this trial when compared to other trials on the same research farm that was over-sprayed prior to July 20.

On August 4, seven days after the initial application to treatments seven and eight, square damage was greatest in the conventional plots (treatments six, nine, and ten) that were untreated for worms. Live larvae found on the same date showed similar trends.

Yields from these treatments showed quite a bit of variability between replicates. This likely was caused by the differences in moisture-holding capacity of the soil. Even though the final yields were considered good, there was an extended dry period in August which limited the yield potential of full-season varieties.

In general, the varieties with Bt technology and the conventional varieties that were over-sprayed one time for worm control yielded more than the conventional varieties, where no worm control was applied. The conventional variety, Bronco 7139 unsprayed, was the lowest yielding treatment in this trial. Only moderate differences were found among any of the varieties containing the Bt gene (either single or stacked).

The conventional varieties in this test were not over-sprayed prior to the July worm pressure to better reflect what growers planting conventional varieties in central Alabama are doing in their general production operations.

Damage and Seed Cotton Yields

Variety	Treatment/Rate	No. damaged/ 10 squares 7 DAA[1]	No. live larvae/ 10 squares 7 DAA	Seed cotton yield *lb/A*
1. DP161 B2RF	Untreated	0	0.25	3156
2. DP143 B2RF	Untreated	0	0	3012
3. ST4554 B2RF	Untreated	0	0	2964
4. PHY 485 WRF	Untreated	0.25	0	3288
5. DP 555 BG/RR	Untreated	0.75	0	3048
6. DP174 RF	Untreated	2.75	1.5	2784
7. DP491	Coragen 0.088 lb/A	0.75	0.5	3180
8. DP491	Belt 3.0 oz/A	1.25	0.25	3168
9. DP491	Untreated	4.0	0.75	2880
10. Bronco 7139	Untreated	5.25	0.75	2652

[1] Days after application.

Systems Technology Trial, WREC, Headland, Alabama

R. H. Smith

A trial was conducted in 2008 at the Wiregrass Research and Extension Center to compare genetically altered varieties, conventional varieties, and the new lepidopterous chemistry. Several Bt varieties were compared to conventional varieties with and without over-sprays for caterpillar pests. Delta Pine, Stoneville, and Phytogen varieties were compared to conventional Delta Pine and Bronco varieties over-sprayed with all labeled chemical classes for bollworms and tobacco budworms. Insecticides evaluated were Coragen, Belt, Tracer, Steward, Denim, and Karate. The test area was over-sprayed as needed for bug and sucking pests. Bollworm and tobacco budworm larvae and damage counts were made. Yields were taken at maturity and plots were arranged in replicated adjacent strips.

The first application was well timed on larvae one to four days old. Based on the species of moths observed, most of the population on July 8 was the tobacco budworm species. The second application was made one week later and the population had shifted to approximately 50 percent budworm and 50 percent bollworm.

At the first evaluation (seven days after the first application), the least square damage was found in the varieties with Bt technology. The most effective over-sprays were Coragen, Tracer, and Belt. Note that a low rate of Coragen was made on application number one due to a miscalculated rate. Karate Z, as expected against budworms, was the least effective treatment and not greatly different than the untreated control.

Another square damage evaluation was made (eight days after the second application). Again the overspray with Karate Z was similar to the untreated control. The varieties with Bt technology continued to show the least square damage. Only slight differences were recorded between the remaining Lepidopteron insecticides. Coragen (0.088 pounds a.i.), Steward, and Tracer had the least square damage.

Based on the results of this trial, it could be concluded that Lepidoptera over-sprays, when well timed to target small larvae, can be as effective as the Bt technology in reducing damage.

Square Damage

Variety	Insecticide	Rate		Square damage	
		App. 1	App. 2	7 DAA#1	8 DAA#2
		lb/a.i./A		%	
1. PHY 485 WRF				0	1
2. DP 161 BG2RF				2	1
3. ST 4554 B2RF				0	0
4. DP 555 BG/RR				0	2
5. DP 174 RF	Coragen	0.016[1]	0.088	0	3
6. DP 174 RF	Coragen	0.011[1]	0.088	11	9
7. DP 174 RF	Belt	2.5 oz	2.5 oz	4	7
8. DP 174 RF	Steward	0.11	0.11	8	3
9. DP 174 RF	Tracer	0.063	0.063	2	3
10. DP 174 RF	Denim	0.01	0.01	12	7
11. DP 174 RF	Karate	0.04	0.04	28	40
12. DP 174 RF	Untreated			32	42

[1] Rates were miscalculated.

WEED MANAGEMENT

Evaluation of Herbicides for Palmer Amaranth Control in Cotton, Headland, Alabama, 2008

M. G. Patterson

Cotton, variety DPL 141 B2RF, was planted at the Wiregrass Research and Extension Center in Headland, Alabama, in early May 2008 in a field that was heavily infested with Palmer amaranth (*Amaranthus palmeri*). Although there are biotypes of this weed that are resistant to the ALS class of herbicides (Staple, Envoke, Cadre, Classic, etc.) and glyphosate (Roundup, etc.), the population at Headland has not shown resistance to date.

Soil-applied and foliar-applied herbicides were evaluated for Palmer amaranth activity on this site. The trial site has been maintained in reduced tillage for the past 21 years. A strip till planting system was used and all production practices including soil fertility, disease, and insect control were maintained by Research Center personnel for optimum cotton production. The site was irrigated several times during the growing season using a lateral move irrigation system and specifically used to activate the PRE herbicides after planting. Lasso MT, an older herbicide not registered in cotton, was evaluated alone and in combination with Cotoran or Reflex. Lasso works using the same mode of action as Dual. In addition to the herbicides applied in the following table, the entire trial site including the untreated control was oversprayed with Roundup Weathermax at the rate of 32 fluid ounces per acre in early August after all weed control evaluations were obtained.

Pigweed control from soil-applied preemergence treatments was good to excellent three weeks after planting (to four-leaf cotton). However, by seven weeks after planting without a follow up treatment of Roundup + metolachlor (Parrlay) applied at the four-leaf cotton stage the control began to decline significantly, resulting in significant yield loss (see the table). Lasso proved to be an effective and safe herbicide for soil residual control of pigweed in this trial.

The results of this study clearly show that postemergence control is needed to control Palmer amaranth and obtain optimum cotton yields. In light of the development of herbicide resistant pigweed in Georgia, a logical approach would be to integrate both soil-applied and foliar herbicide programs using different modes of action to try to maintain season long control. Prowl + Reflex PRE or Prowl + Cotoran PRE followed by Roundup + metholachlor early postemergence followed by lay-by herbicide application would be such a program. Although this program will work in areas where glyphosate-resistant pigweed is not yet present, a program using glufosinate (Ignite) herbicide in Liberty-Link cotton may be required in fields with glyfosinate-resistant weeds.

Evaluation of Herbicides for Control of Palmer Amaranth

Treatment[1]	Rate/A	Timing[2]	Control % 5/28	Control % 6/13	Control % 7/17	Seed cotton *lb/A*
Prowl + Reflex	2 pt + 1.5 pt	PPI	98	90	42	2122
Prowl + Reflex followed by Roundup Wmax + Parrlay	2 pt + 1.5 pt 22 oz + 1.3 pt	PRE POT 4L	97	99	97	3517
Prowl + Cotoran	2 pt + 2 pt	PRE	97	63	20	960
Prowl + Cotoran followed by Roundup Wmax + Parrlay	2 pt + 2 pt 22 oz + 1.3 pt	PRE POT 4L	93	97	91	3549
Lasso + Cotoran	3 pt + 2 pt	PRE	98	88	56	2606
Lasso + Cotoran followed by Roundup Wmax	3 pt + 2 pt 22 oz + 1.3 pt	PRE POT 4L	94	98	83	3340
Lasso	3 pt	PRE	93	72	48	1468
Untreated	—	—	0	0	0	0

[1] Treatments applied in 15 gallons of water per acre with flat fan nozzles. PRE treatments applied 5/7; POT 4L treatments applied 5/29. Lasso = alachlor, Reflex = fomesafen, Parrlay = metolachlor, Cotoran = fluometuron, Roundup Wmax = glyphosate.

[2] PPI = preplant incorporated, PRE = preemergence, POT 4L = post over the top at four-leaf cotton stage.

Residual Influence of Primary Tillage on Weed Control and Cotton Yield

M. G. Patterson and C. D. Monks

Tillage systems including (1) moldboard plowing followed by disking with Prowl at 2 pints per acre followed by field cultivation, (2) disking twice with Prowl followed by field cultivation, (3) no-till with Prowl preemergence after planting, and (4) no-till without Prowl were evaluated for weed control and cotton yield over a three-year period beginning in 2006. These tillage systems were initiated in early May 2006 at the E.V. Smith Research Center. The trial was planted in Delta Pine 143 B2RF Roundup Ready Flex cotton in 2006 and 2007 and Delta Pine 141 B2RF in 2008. Preemergence herbicides including Cotoran, Caparol, or none were applied after planting. Postemergence herbicides used following preemergence herbicides included either glyphosate (Roundup Weathermax at 22 fluid ounces per acre) or none. The trial area was infested with annual grasses (goosegrass and crabgrass) and spiny pigweed. Visual weed control and seed cotton yields were obtained. The test area was replanted in 2007 and 2008 using no-till planting across the entire test area to determine the residual effects of primary tillage conducted in 2006.

Weed control (not shown) and seed cotton yields in 2006 were higher overall for the plots that received moldboard plowing, regardless of the preemergence or postemergence herbicides applied after tillage operations (see the table). No-till without Prowl resulted in lower overall weed control and seed cotton yield. This tillage influence carried over somewhat to 2007 with the same trend as in 2006. Continuing the trial into 2008 shows that the yield increase attributed to primary tillage over no-till in 2006 and 2007 did not carry over into the third year. However, the advantage of applying Prowl herbicide in 2008 and previous years is evident (average 1634 pounds with Prowl versus 1110 pounds without Prowl in 2008, with an overall average yield decrease of 37 percent for the three-year period when Prowl was not used). Although preemergence herbicides provided better overall early-season control for all systems, the use of glyphosate postemergence was required for optimum weed control and cotton yield.

Tillage Effects on Seed Cotton Yield Averaged over Herbicide Treatments

	2006		2007		2008	
Tillage System	Yield	Change[1]	Yield	Change	Yield	Change
	lbA	*%*	*lbA*	*%*	*lbA*	*%*
Inversion, Disk, Prowl	2713	0	2389	0	1597	0
Disk twice, Prowl	2061	-24	2064	-14	1650	+3
No-till, Prowl	1987	-27	2147	-10	1656	+3
No-till, No Prowl	1442	-47	1574	-34	1110	-30

[1] Change % = relative to inversion, disk, prowl.

Early Season Pigweed Control in Conservation Tillage Cotton

A. J. Price, C. D. Monks, and M. G. Patterson

Conservation-tillage systems are primarily used to address concerns about soil erosion, soil quality, and water availability. Cotton acreage in conservation tillage systems is estimated to be 30 percent in the U.S. and approaches 60 percent in the southeastern U.S. The use of cover crops in conservation tillage offers many advantages, one of which is weed suppression through physical barrier as well as chemical allelopathic effects. Cereal rye (*Secale cereale* L.) is one of the most common winter cover crops recommended for cotton production in the U.S.

Recently, glyphosate resistant Palmer amaranth *(Amaranthus palmeri)* has been discovered in Arkansas, Georgia, North Carolina, South Carolina, and Tennessee and populations in Alabama may also be resistant. Current resistant Palmer amaranth control recommendations in Georgia rely on soil applied herbicides. However, conservation tillage systems are disadvantaged due to herbicide interception by winter cover residue. An alternative method may be to band herbicides over the drill, thus protecting cotton yield while reducing inputs. Previous research has also shown that high amounts of residue can inhibit weed germination and emergence. We hypothesize that pigweed control will be higher in high-residue systems versus low residue systems and at control levels equivalent to conventional tillage systems utilizing soil applied herbicides. Therefore, field studies were conducted evaluating pigweed density, biomass, and cotton yield provided by two tillage systems containing four winter residue amounts in the conservation tillage system and four herbicide systems.

Identical field experiments were established at the E.V. Smith Research Center (EVSRC) located near Shorter, Alabama, and at the Tennessee Valley Research and Extension Center (TVREC) near Bella Mina, Alabama, in the fall of 2006 and fall 2007. The experimental design was a randomized complete block, having a split block restriction on randomization, with three treatment replicates. Native populations of Palmer amaranth and redroot pigweed *(Amaranthus hybridus)* were present at E. V. Smith and Tennessee Valley locations, respectively. However, an additional 120,000 seed of each respective pigweed species was broadcast early spring over each plot at each location to assure an adequate seedbank.

The experiment involved two tillage systems, four winter residue amounts in the conservation-tillage system, and four herbicide regimes. Parallel strips consisted of four conservation-tillage treatments: high, medium, and low amounts of cereal rye plus a winter fallow treatment, as well as a conventional tillage treatment that was left fallow prior to spring tillage. The three cereal rye residue amounts were generated by utilizing three fall planting dates: two and four weeks prior to and on the historical average first frost. The rye was established with a no-till drill at a seeding rate of 89 pounds per acre; fifty pounds of nitrogen (N) as ammonium nitrate was applied to rye in fall after establishment. Additionally, perpendicular strips consisted of four herbicide regimes: (1) S-metolachlor at 1 pound per acre applied broadcast preemergence (PRE) application followed by glyphosate at 1 pound a.i. per acre applied postemergence (POST) followed by a LAYBY application of diuron at 1 pound a.i. per acre + MSMA at 2 pounds a.i. per acre + 0.25 percent (v/v) NIS, (2) S-metolachlor at 1 pound per acre applied banded PRE followed by glyphosate at 1 pound per acre POST followed by a LAYBY application of diuron at 1 pound per acre + MSMA at 2 pounds per acre + 0.25 percent (v/v) NIS, (3) glyphosate applied at 1 pound per acre POST followed by a LAYBY application of diuron at 1 pound per acre + MSMA at 2 pounds per acre + 0.25 percent (v/v) NIS, and (4) a non-treated control.

In the spring, the rye cover crop as well as weeds in the winter fallow treatment were terminated using glyphosate at 1 pound a. i. per acre and flattened prior to cotton seeding with a mechanical roller-crimper to form a dense residue mat on the soil surface. Cover biomass from each plot was measured immediately before termination; the above-ground portion of the rye cover was clipped from one randomly selected 0.25-m^2 section in each plot, dried, and weighed.

The cotton variety DP 555 BG/RR was seeded at E.V. Smith following within-row subsoiling all plots with a narrow-shanked parabolic subsoiler, equipped with pneumatic tires to close the subsoil channel. Subsoiling was necessary because this location had a well-developed hardpan. The cotton variety DP 444 BG/RR was direct-seeded at Tennessee Valley. The conventional tillage treatment was prepared with multiple disk passes and cotton was seeded with a four-row planter equipped with row cleaners and double-disk openers at both locations. Both experimental areas were exposed to extreme drought, and the experimental area at E.V. Smith received minimal supplemental irrigation so that the experiment was not terminated. At both locations, plots consisted of four rows, each 25 feet long with a 40-inch row spacing.

Evaluations also included pigweed density, dry weight and fresh weight before and after POST and LAYBY herbicide applications, cotton stand establishment, and height. Cotton seed lint yields were determined by machine-harvesting the middle two rows of each plot with a spindle picker.

Winter Cover Crop Biomass and Weed Density. In 2007, at both locations, the highest rye biomass was attained following the earliest planting date and the lowest biomass was attained following the latest planning date. At Tennessee Valley, biomass yields of 7750, 6598, and 5742 pounds per acre were attained for planting dates one, two and three, respectively. At Tennessee Valley, the highest pigweed density (434,413 plants per acre) was observed following the winter fallow conservation-tillage (WF) treatment. The second highest densities were observed following the third planning date (199,595 plants per acre) and the conventional-tillage (CT) (226,701 plants per acre) treatments. The lowest densities followed the first (36,437 plants per acre) and second planting dates (49,798 plants per acre). At E.V. Smith, biomass yields of 7526, 5401, and 3723 pounds per acre were attained for planning dates one, two, and three, respectively. At E.V. Smith, the highest pigweed density again followed the winter fallow conservation-tillage treatment (322,672 plants per acre). The second highest density followed the conventional-tillage treatment (234,818 plants per acre). All three conservation-tillage systems provided lower densities ranging between 85,020 and 93,118 plants per acre compared to both the winter fallow conservation tillage and conventional tillage treatments.

Similar to 2007, in 2008 at the Tennessee Valley location, the highest rye biomass was attained following the earliest planting date and the lowest biomass was attained following the latest planning date. At Tennessee Valley, biomass yields of 8410, 7863, and 7315 pounds per acre were attained for planting dates one, two, and three, respectively. Also similar to 2007 at Tennessee Valley, the highest pigweed density (20,918 plants per acre) was observed following the winter fallow conservation-tillage (WF) treatment. The second highest densities were observed following the conventional-tillage (CT) treatment (11,470 plants per acre). Interestingly, the lowest densities followed the third (2,025 plants per acre) and second planting dates (2,700 plants/ per acre), which both had lower cover biomass than the first planting date (4,703 plants per acre). At E.V. Smith, biomass yields of 6540, 6876, and 2374 pounds per acre were attained for planning dates one, two, and three, respectively. At E.V. Smith, the highest pigweed density again followed the winter fallow conservation-tillage treatment (44,197 plants per acre) and the conventional-tillage treatment (95,980 plants per acre). All three conservation-tillage systems provided lower densities ranging between 29,690 and 9,945 plants per acre compared to both the winter fallow conservation tillage and conventional tillage treatments. Overall, pigweed germination was substantially less in 2008 compared to 2007.

Winter Cover Crop Biomass and Pigweed Biomass. In 2007 there were differences between locations; thus, pigweed species biomass response was significant. At Tennessee Valley, redroot pigweed biomass generally reflected pigweed density, with the highest pigweed biomass (240 pounds per acre) attained in winter fallow conservation tillage and conventional tillage (178 pounds per acre) treatments. Planting date three resulted in 1816 pounds biomass per acre while planting dates one and two resulted in ≤ 2.7 pounds biomass per acre. At E.V. Smith, similar Palmer amaranth biomasses were observed in the winter fallow conservation tillage (75 pounds per acre) and conventional tillage treatments (85 pounds per acre). Densities of 54 pounds per acre and 49 pounds per acre were observed in planting date treatments one and two, respectively. However, the third planning date which provided similar pigweed density compared to planning dates one and two provided the lowest pigweed biomass (22 pounds per acre). Because the experimental area experienced severe drought stress throughout the season, the larger pigweed in the earlier planting dates may be due to increased moisture conservation provided by the higher mulch residue attained in these treatments, resulting in larger plants.

In 2007 there were differences between location; thus, pigweed species biomass response was significant. At Tennessee Valley, redroot pigweed biomass generally reflected pigweed density, with the highest pigweed biomass (467 pounds per acre) attained in winter fallow conservation tillage. The second highest biomass was attained in the highest winter cover biomass treatment (190 pounds per acre) and the conventional tillage (181 pounds per acre) treatments. Planting dates two and three resulted in similar biomass, 36 and 42 pounds biomass per acre, respectively. At E.V. Smith, the highest Palmer amaranth biomass was observed in the winter fallow conservation tillage (633 pounds per acre) treatment. The lowest biomass (82 pounds per acre) was observed in planting date two that also provided the highest biomass.

Cotton Yield. In 2007 at Tennessee Valley and E.V. Smith, cotton yield was not dependent on pigweed density or pigweed biomass (data not shown). Additionally, all conservation-tillage treatments yielded more seed cotton than the conventional tillage treatment.

Similar to 2007, in 2008 at Tennessee Valley and E.V. Smith, cotton yield was not dependent on pigweed density or pigweed biomass. However, the highest yield was attained under conventional tillage followed by winter fallow. Yield decreases are likely attributed to stand reductions due to hair-pinning of the rye cover crop into the seed furrow at planting. Results at E.V. Smith are similar to those observed in 2007, again cotton yield was not dependent on pigweed density or pigweed biomass.

The following conclusions can be drawn:

- Increasing amounts of winter cover biomass can decrease early season pigweed density in conservation-agriculture systems, thus allowing for a size differential between pigweed and crop for future herbicide applications.
- Conservation-agriculture systems that do not utilize high-residue winter cover crops may have increased pigweed densities.
- Weed control provided by shallow tillage is similar to conservation-agriculture systems that have moderate amounts of residue; systems with maximum levels of residue will have fewer pigweed.

DISEASE MANAGEMENT

Evaluation of Seed Treatment Combinations with Seed Quality for Seedling Disease Management in Cotton in North Alabama, 2008

K. S. Lawrence, S. R. Moore, W. S. Gazaway, G. W. Lawrence, C. H. Burmester, and B. E. Norris

Experimental seed treatments were evaluated for the management of cotton seedling disease in a naturally infested field on the Tennessee Valley Research and Extension Center in Belle Mina, Alabama. The field has a history of cotton seedling disease incidence and is colonized by *Rhizoctonia solani, Pythium* spp., *Thielaviopsis basicola,* and *Fusarium* spp. The soil type is a Decatur silt loam (24 percent sand, 49 percent silt, and 28 percent clay). The seed treatments were applied to the seed by Bayer to DPL 444BG/RR cotton seed. Temik 15G (5 pounds per acre) was applied at planting on April 15 in the seed furrow with chemical granular applicators attached to the planter. Plots consisted of two rows, 25 feet long with a 40-inch row spacing, and were arranged in a randomized complete block design with five replications. 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 two and four weeks after planting on May 1 and May 15. The skip indexes were also recorded at four weeks after planting. Population densities of the nematodes were determined by taking ten soil cores, 1 inch in diameter and 6 inches deep, collected across the entire plot in a systematic sampling pattern. Nematodes were extracted using the gravity sieving and sucrose centrifugation technique. Plots were harvested on October 3. Data were statistically analyzed by GLM and means compared using Fisher's protected least significant difference test ($P \leq 0.10$). Monthly average maximum temperatures from planting in mid-April through harvest in early October were 71.7, 78.4, 89.3, 91.1, 88.3, and 83.3 degrees F with average minimum temperatures of 48.9, 57.3, 65.9, 67.5, 66.4, and 63.5 degrees F, respectively. Rainfall accumulation for each month was 3.6, 4.0, 2.6, 2.3, 4.8, and 0.8 inches with a total of 18.2 inches.

The drought continued in 2008 but was not as severe as in 2007. Seedling disease pressure was moderate. Plant stand was not different between any fungicide combinations or seed quality at 14 or 28 days after planting. All plant stands were within the optimum range of two to three plants per foot of row; thus, seedling disease was not severe enough to reduce the untreated controls (treatments one and five) to below two seed per foot of row. The skip index or the uniformity of the stand was improved ($P \leq 0.10$) in the RTU Baytan Thiram + Allegiance high seed quality (treatment two) and RTU Baytan Thiram, Allegiance, + Trilex (treatment seven) or Dynasty (treatment eight) low quality seed as compared to the untreated control high quality seed (treatment one). Seed cotton yields varied by 593 pounds per acre at harvest with an average of 4293 and 4346 pounds per acre of seed cotton produced over the fungicide treatments in the high and low seed qualities, respectively. The use of fungicides increased yield numerically by 129 pounds per acre in the high quality seed and by 119 pounds per acre in the low quality seed.

Yield, Skip Index, and Stand Count of Cotton in North Alabama, 2008

No.	Treatment	Seed quality	—Stand/1-ft row[1]— 1 May	15 May	Skip index[2] 15 May	Seed cotton *lb/A*
1	Untreated	High	2.5	2.1	2.3 a	4160
2	RTU Baytan Thiram + Allegiance	High	2.3	2.4	1.0 b	4569
3	TRT 2 Trilex advanced	High	2.0	2.3	1.8 a	4325
4	TRT 2 Dynasty CST	High	2.3	2.3	2.0 a	3977
5	Untreated	Low	2.7	2.2	2.0 a	4225
6	RTU Baytan Thiram + Allegiance	Low	2.4	2.6	1.3 a	4296
7	TRT 2 Trilex advanced	Low	2.6	2.6	1.0 b	4361
8	TRT 2 Dynasty CST	Low	2.4	2.8	1.0 b	4374
	LSD (P≤ 0.10)		***NS[3]***	***NS***	***1.1***	***NS***
	Standard Deviation		***4.3***	***5.0***	***0.9***	***480.2***
	CV		***18.0***	***20.8***	***57.7***	***11.2***

[1] Stand counted from 10 feet of row and averaged.

[2] Skip index is the uniformity of the cotton plant population across the row. Empty spaces of 1 row foot are given the value of 1 and each empty space increases the value up to 25.

[3] NS indicates that there was no significant difference ($P \leq 0.10$). Means within columns followed by different letters are significantly different according to Fisher's LSD ($P \leq 0.10$).

Efficacy of Experimental Compounds on the Fusarium Wilt Complex in Central Alabama, 2008

N. S. Sekora, K. S. Lawrence, J. D. Castillo, S. R. Moore, and S. Nightengale

Experimental seed treatments were evaluated for management of the fusarium wilt complex on cotton at the Plant Breeding Unit of the E. V. Smith Research Center near Tallassee, Alabama. The field site soil was Kalmia loamy sand soil type. At a soil depth of 4 inches on April 22 (day of planting), the soil temperature was 69.6 degrees F with adequate moisture. All seed treatments were applied by the manufacturer. Granular applicators attached to the planter also applied Temik 15G (5 pounds per acre) in the seed furrow at planting to all plots. All other production practices for herbicides, fertilizers, and insecticides were carried out as recommended by the Alabama Cooperative Extension System. Plots consisted of a randomized complete block arrangement of five blocks containing two 25-foot rows spaced 40 inches apart for each treatment. Nematode samples were taken by collecting ten soil cores (each 1 inch in diameter and 6 inches deep) randomly from within the rows of each plot. Nematodes were extracted from the soil samples by gravity sieving and sucrose centrifugation. Test plots were harvested on September 18. Fisher's protected least significant difference (LSD) test was used for pairwise means comparisons and the SAS General Linear Models program was used for analysis of variance. Monthly rainfall totals for April through September were 0.13, 2.50, 1.98, 4.97, 9.92, and 0.72 inches, respectively. Total rainfall over the growing season was 20.1 inches. Average monthly maximum temperatures for April through September were 80.6, 84.5, 93.6, 92.5, 89.7, and 89.4 degrees F, respectively, and average minimum temperatures were 54.4, 60.9, 68.2, 70.0, 71.1, and 71.2 degrees F, respectively.

Stand counts at 30 days after planting ranged from 89 to 134 plants per row within a plot. Treatment seven had a significantly higher mean stand count than treatment six and treatment nine, but it was similar to the other treatments. Vigor among treatments was similar to that of the control (data not shown). Fusarium wilt incidence was higher in treatment nine plots than treatment one, treatment six, and treatment eleven plots. The average number of plants demonstrating Fusarium wilt symptoms was 30 plants per plot with a range of three to 62 plants. Though differences in counts of *M. incognita*/150cm^3 soil were observed at 30 days after planting, no differences were present at 114 days after planting. Harvest counts resembled those for total *M. incognita* over the season, so only total counts are presented. For the season, treatment three and treatment eight had significantly higher populations of *M. incognita* than treatment two, treatment four, treatment nine, and treatment eleven. The highest number of *M. incognita* per 150cm^3 soil within a plot was 8343 individuals, but the average was 1945 individuals per 150cm^3 across all plots for the season. Plot yields ranged from 627 to 3694 pounds per acre with a mean of 2224 pounds per acre. Treatment three had a significantly higher yield than treatment one, treatment four, treatment six, and treatment nine. Six of the eleven treatments showed similar yields to both the control and treatment three.

EFFICACY OF EXPERIMENTAL COMPOUNDS ON THE FUSARIUM WILT COMPLEX IN CENTRAL ALABAMA, 2008

	Treatment	Rate	Rate Unit	Stand/ 25-ft row 20 May	Fusarium wilt incidence[1] 14 Aug	Total number of *M. incognita*/150cm³	Seed cotton yield *(lb/A)* 17 Sep
1	Cruiser 5 FS	0.342	mg ai/seed	108.8 ab	23.4 b	1993 ab	1955 b
2	Apron XL 3 LS	7.5	g ai/100 kg	106.8 ab	31.4 ab	1251 b	2460 ab
	Maxim 4 FS	2.5	g ai/100 kg				
	Systhane 40 WP	21.0	g ai/100 kg				
	Cruiser 5 FS	0.342	mg ai/seed				
3	Apron XL 3 LS	7.5	g ai/100 kg	112.6 ab	36.4 ab	3368 a	2768 a
	Maxim 4 FS	2.5	g ai/100 kg				
	A9625	1.0	g ai/100 kg				
	Cruiser 5 FS	0.342	mg ai/seed				
4	Apron XL 3 LS	7.5	g ai/100 kg	108.6 ab	29.7 ab	1406 b	1846 b
	Maxim 4 FS	2.5	g ai/100 kg				
	Systhane 40 WP	21.0	g ai/100 kg				
	A9625	1.0	g ai/100 kg				
	Cruiser 5 FS	0.342	mg ai/seed				
5	Allegiance-FL	15.0	g ai/100 kg	106.2 ab	33.0 ab	1916 ab	2485 ab
	Baytan 30	10.0	g ai/100 kg				
	Thiram 42-S	31.0	g ai/100 kg				
	Cruiser 5 FS	0.342	mg ai/seed				
6	Allegiance-FL	15.0	g ai/100 kg	103.8 b	25.0 b	1823 ab	1972 b
	Baytan 30	10.0	g ai/100 kg				
	Thiram 42-S	31.0	g ai/100 kg				
	A9625	1.0	g ai/100 kg				
	Cruiser 5 FS	0.342	mg ai/seed				
7	Apron XL 3 LS	7.5	g ai/100 kg	115.4 a	30.2ab	1715 ab	2158 ab
	Maxim 4 FS	2.5	g ai/100 kg				
	Systhane 40 WP	21.0	g ai/100 kg				
	Dynasty CST 125 FS	0.03	mg ai/seed				
	A9625	1.0	g ai/100 kg				
	Cruiser 5 FS	0.342	mg ai/seed				
8	Allegiance-FL	15.0	g ai/100 kg	111.4 ab	26.6 ab	3322 a	2179 ab
	Baytan 30	10.0	g ai/100 kg				
	Thiram 42-S	31.0	g ai/100 kg				
	Dynasty CST 125 FS	0.03	mg ai/seed				
	A9625	1.0	g ai/100 kg				
	Cruiser 5 FS	0.342	mg ai/seed				
9	Allegiance-FL	15.0	g ai/100 kg	103.4 b	39.8 a	1514 b	1883 b
	Baytan 30	10.0	g ai/100 kg				
	Thiram 42-S	31.0	g ai/100 kg				
	Cruiser 5 FS	0.342	mg ai/seed				
	Allegiance-FL	15.0	g ai/100 kg				
	Baytan 30	10.0	g ai/100 kg				
	Trilex Flowable	10.0	g ai/100 kg				
10	Apron XL 3 LS	7.5	g ai/100 kg	113.0 ab	27.4 ab	1978 ab	2287 ab
	Maxim 4 FS	2.5	g ai/100 kg				
	Systhane 40 WP	21.0	g ai/100 kg				
	Cruiser 5 FS	0.342	mg ai/seed				
	Allegiance-FL	15.0	g ai/100 kg				
	Baytan 30	10.0	g ai/100 kg				
	Trilex Flowable	10.0	g ai/100 kg				
11	Apron XL 3 LS	7.5	g ai/100 kg	109.0 ab	24.2 b	1112 b	2408 ab
	Maxim 4 FS	2.5	g ai/100 kg				
	Systhane 40 WP	21.0	g ai/100 kg				
	A14635	20.0	g ai/100 kg				
	Cruiser 5 FS	0.342	mg ai/seed				
	LSD ($P \leq 0.10$)			***9.90***	***13.6***	***1713.5***	***737***

[1] Average number of plants with Fusarium wilt symptoms per plot.
Means followed by the same letters are not significantly different according to Fisher's LSD ($P \leq 0.10$).

EFFICACY OF EXPERIMENTAL COMPOUNDS ON EARLY SEASON COTTON DISEASES IN NORTH ALABAMA, 2008

S. R. Moore and K. S. Lawrence

Selected experimental seed treatments were evaluated to determine their efficacy against early season cotton diseases in north Alabama. The soil was a Decatur silt loam (23 percent sand, 49 percent silt, and 28 percent clay) with a history of seedling diseases. Soil temperature was 62.1 degrees F at a 4-inch depth on the day of planting, with adequate soil moisture. All fungicide treatments were applied to the seed by the manufacturer. For the high incidence disease trial, plots were infested with millet seed inoculated with *Rhizoctonia solani* and *Pythium ultimum,* while for the low incidence disease trial, plots were left naturally infested. Temik 15G (7.0 pounds per acre) was applied at planting on April 15 in the seed furrow with chemical granular applicators attached to the planter. For each trial plots consisted of four rows, each 25 feet long with 40-inch row spacing, and plots were arranged in a randomized complete block design with five replications. Standard herbicides, insecticides, and fertility production practices, as recommended by the Alabama Cooperative Extension System, were used. Stand counts were recorded 21 and 35 days after planting to determine stand density and percent seedling loss resulting from cotton seedling diseases. Plots were harvested on September 30. Data were analyzed using the generalized linear models (GLM) procedure, and means compared using Fisher's protected least significant difference (LSD) test.

Seedling disease pressure was high for early planted cotton in north Alabama in 2008. At 21 days after planting, 85 percent of all seeds planted in the high disease pressure trial did not emerge compared to 30 percent in the low disease pressure trial. Under low disease pressure, all treatments produced cotton seedling stands comparable to the Cruiser 5 FS-treated control at 21 and 35 days after planting. Skip indices for low disease pressures were also comparable to the Cruiser 5 FS-treated control at 35 days after planting and all fungicide seed treatments yielded as well as the Cruiser 5 FS-treated control. Under high disease pressure, all treatments with the exception of treatment three (treatment one + Apron XL 3 LS + Maxim 4 FS + A9625) increased cotton seedling stands at 21 days after planting compared to the Cruiser 5 FS-treated plots.

At 35 days after planting, cotton seedling stands were significantly increased by treatments five (treatment one + Allegiance FL, Baytan 30 + Thiram 42 S), seven (treatment four + Dynasty CST125 FS), eight (treatment six + Dynasty CST125 FS), nine (treatment five + Allegiance FL + Baytan 30 + Trilex Flowable), ten (treatment two + Allegiance FL + Baytan 30 + Trilex Flowable), and eleven (treatment two + A16148) compared to the Cruiser 5 FS-treated control. These treatments also produced significantly lowered skip indices compared to the Cruiser 5 FS-treated control. All fungicide seed treatments with the exception of treatment three (treatment one + Apron XL 3 LS + Maxim 4 FS + A9625) produced significantly higher yields than the Cruiser 5 FS-treated control by an average of 2613.3 pounds seed cotton per acre.

Yield, Skip Index, and Stand Count of Cotton in North Alabama Trial, 2008

Treatment	Rate/seed	Rate unit	Stand/10-ft row 21 DAP[1]	Stand/10-ft row 35 DAP	Skip index[2]	Yield *lb/A*
Low Disease Pressure						
1. Cruiser 5 FS	0.34	mg/seed	22.4 a	20.4 a	1.8 a	3700 a
2. Apron XL 3 LS + Maxim 4 FS +	0.075 + 0.025	g/kg seed	27.4 a	28.0 a	1.8 a	3855 a
Systhane 40 WP +	0.21	g/kg seed				
Cruiser 5 FS	0.34	mg/seed				
3. Apron XL 3 LS + Maxim 4 FS +	0.075 + 0.025	g/kg seed	27.6 a	25.0 a	1.6 a	3684 a
A9625 +	0.01	g/kg seed				
Cruiser 5 FS	0.34	mg/seed				
4. Apron XL 3 LS + Maxim 4 FS +	0.075 + 0.025	g/kg seed	29.4 a	26.4 a	0.8 a	4016 a
Systhane 40 WP + A9625 +	0.21 + 0.01	g/kg seed				
Cruiser 5 FS	0.34	mg/seed				
5. Allegiance-FL + Baytan 30	0.15 + 0.1	g/kg seed	26.0 a	24.8 a	0.6 a	4378 a
Thiram 42 S +	0.31	g/kg seed				
Cruiser 5 FS	0.34	mg/seed				
6. Allegiance-FL + Baytan 30	0.15 + 0.1	g/kg seed	26.4 a	28.6 a	0.6 a	4226 a
Thiram 42 S + A9625 +	0.31 + 0.01	g/kg seed				
Cruiser 5 FS	0.34	mg/seed				
7. Apron XL 3 LS + Maxim 4 FS +	0.075 + 0.025	g/kg seed	29.4 a	29.4 a	0.4 a	4122 a
Systhane 40 WP + A9625 +	0.21 + 0.01	g/kg seed				
Dynasty CST125 FS +	0.03	mg/seed				
Cruiser 5 FS	0.34	mg/seed				
8. Allegiance-FL + Baytan 30 +	0.15 + 0.1	g/kg seed	27.2 a	29.2 a	1.0 a	4095 a
Thiram 42 S + A9625 +	0.31 + 0.01	g/kg seed				
Dynasty CST125 FS +	0.03	mg/seed				
Cruiser 5 FS	0.34	mg/seed				
9. Allegiance-FL + Baytan 30 +	0.15 + 0.1	g/kg seed	24.6 a	25.2 a	0.6 a	4239 a
Thiram 42 S + Allegiance-FL +	0.31 + 0.15	g/kg seed				
Baytan 30 + Trilex Flowable +	0.05 + 0.1	g/kg seed				
Cruiser 5 FS	0.34	mg/seed				
10. Apron XL 3 LS + Maxim 4 FS +	0.075 + 0.025	g/kg seed	28.2 a	27.8 a	1.0 a	4134 a
Systhane 40 WP + Allegiance-FL +	0.21 + 0.15	g/kg seed				
Baytan 30 + Trilex Flowable +	0.05 + 0.1	g/kg seed				
Cruiser 5 FS	0.34	mg/seed				
11. Apron XL 3 LS + Maxim 4 FS +	0.075 + 0.025	g/kg seed	29.4 a	26.0 a	0.6 a	4342 a
Systhane 40 WP + A16148 +	0.21 + 0.2	g/kg seed				
Cruiser 5 FS	0.34	mg/seed				
LSD ($P \leq 0.10$)			***5.9***	***5.5***	***1.1***	***570***
High Disease Pressure						
1. Cruiser 5 FS	0.34	mg/seed	0 e	0 c	9.8 a	0 e
2. Apron XL 3 LS + Maxim 4 FS +	0.075 + 0.025	g/kg seed	4.6 cd	3 abc	8.8 ab	1549 cd
Systhane 40 WP +	0.21	g/kg seed				
Cruiser 5 FS	0.34	mg/seed				
3. Apron XL 3 LS + Maxim 4 FS +	0.075 + 0.025	g/kg seed	0.2 e	1.6 bc	8.8 ab	508 de
A9625 +	0.01	g/kg seed				
Cruiser 5 FS	0.34	mg/seed				
4. Apron XL 3 LS + Maxim 4 FS +	0.075 + 0.025	g/kg seed	4.0 d	3.8 abc	7.6 ab	1875 bcd
Systhane 40 WP + A9625 +	0.21 + 0.01	g/kg seed				
Cruiser 5 FS	0.34	mg/seed				
5. Allegiance-FL + Baytan 30	0.15 + 0.1	g/kg seed	6.4 abcd	5.2 ab	6.8 b	1850 bcd
Thiram 42 S +	0.31	g/kg seed				
Cruiser 5 FS	0.34	mg/seed				
6. Allegiance-FL + Baytan 30	0.15 + 0.1	g/kg seed	5.4 bcd	3.8 abc	7.8 ab	2255 abc
Thiram 42 S + A9625 +	0.31 + 0.01	g/kg seed				
Cruiser 5 FS	0.34	mg/seed				
7. Apron XL 3 LS + Maxim 4 FS +	0.075 + 0.02	g/kg seed	7.8 abc	7.2 a	6.8 b	3637 a
Systhane 40 WP + A9625 +	0.21 + 0.0	g/kg seed				
Dynasty CST125 FS +	0.03	mg/seed				
Cruiser 5 FS	0.34	mg/seed				
8. Allegiance-FL + Baytan 30 +	0.15 + 0.1	g/kg seed	9.4 a	7.8 a	6.2 b	3492 ab
Thiram 42 S + A9625 +	0.31 + 0.01	g/kg seed				
Dynasty CST125 FS +	0.03	mg/seed				
Cruiser 5 FS	0.34	mg/seed				
9. Allegiance-FL + Baytan 30 +	0.15 + 0.1	g/kg seed	7.8 abc	7.6 a	6.4 b	2727 abc
Thiram 42 S + Allegiance-FL +	0.31 + 0.15	g/kg seed				
Baytan 30 + Trilex Flowable +	0.05 + 0.1	g/kg seed				
Cruiser 5 FS	0.34	mg/seed				

continued

YIELD, SKIP INDEX, AND STAND COUNT OF COTTON IN NORTH ALABAMA TRIAL, 2008, CONT.

Treatment	Rate/seed	Rate unit	——Stand/10-ft row—— 21 DAP[1]	35 DAP	Skip index[2]	Yield *lb/A*
High Disease Pressure, cont.						
10. Apron XL 3 LS + Maxim 4 FS +	0.075 + 0.025	g/kg seed	8.6 ab	5.0 ab	7.4 ab	3005 abc
Systhane 40 WP + Allegiance-FL+	0.21 + 0.15	g/kg seed				
Baytan 30 + Trilex Flowable +	0.05 + 0.1	g/kg seed				
Cruiser 5 FS	0.34	mg/seed				
11. Apron XL 3 LS + Maxim 4 FS +	0.075 + 0.025	g/kg seed	8.6 ab	7.2 a	6.2 b	3131 abc
Systhane 40 WP + A16148 +	0.21 + 0.2	g/kg seed				
Cruiser 5 FS	0.34	mg/seed				
LSD (P≤ 0.10)			***2.4***	***2.7***	***1.6***	***1000***

[1] Days after planting.
[2] Skip index indicates uniformity of plants in the row, calculated as the total length of row without plants at 35 DAP.
Means within columns followed by different letters are significantly different according to Fisher's LSD ($P \leq 0.10$).

EFFICACY OF COMBINATION SEED TREATMENTS ON EARLY SEASON COTTON DISEASES IN NORTH ALABAMA, 2008

S. R. Moore and K. S. Lawrence

Selected seed treatment combinations were evaluated to determine their efficacy against early season cotton diseases in north Alabama. The soil was a Decatur silt loam (23 percent sand, 49 percent silt, and 28 percent clay) with a history of seedling diseases. Soil temperature was 62.1 degrees F at a 4-inch depth on the day of planting, with adequate soil moisture. All fungicide treatments were applied to the seed by the manufacturer. Temik 15G (7.0 pounds per acre) was applied at planting on April 15 in the seed furrow with chemical granular applicators attached to the planter. Each plot consisted of four rows, each 25 feet long with 40-inch row spacing, and plots were arranged in a randomized complete block design with five replications. Standard herbicides, insecticides, and fertility production practices, as recommended by the Alabama Cooperative Extension System, were used. Stand counts were recorded 21 and 35 days after planting to determine stand density and percent seedling loss. Plots were harvested on September 30. Data were analyzed by using the generalized linear models (GLM) procedure, and means compared using Fisher's protected least significant difference (LSD) test.

Seedling disease pressure was high for early planted cotton in north Alabama in 2008. At 21 days after planting, 55 percent of all seeds planted did not emerge. All fungicide seed treatments produced significantly higher cotton seedling stands in comparison to the untreated check at 21 days after planting with no significant differences among seed treatments. At 35 days after planting, all fungicide seed treatments produced cotton seedling disease stands statistically comparable to the untreated check. Treatments four (treatment two + Trilex FL + Baytan 30 + Allegiance FL) and five (treatment two + Dynasty CST) had significantly lower skip indices compared to the untreated check. Yields were significantly increased over the untreated check by treatments six (treatment three + Vortex FL) and eight (treatment two + Vortex FL + Baytan 30 + Allegiance FL) by an average of 1045 pounds seed cotton per acre All other treatments produced yields comparable to the untreated check.

YIELD, SKIP INDEX, AND STAND COUNT OF COTTON IN NORTH ALABAMA TRIAL, 2008

Treatment	Rate/seed	Rate unit	——Stand/10-ft row—— 21 DAP[1]	35 DAP	Skip index[2]	Yield *lb/A*
1. Untreated			10.8 b	13.4 a	4.0 a	3263 b
2. RTU Baytan Thiram +	1.9	g/kg seed	17.0 a	18.4 a	2.4 ab	4026 ab
Allegiance FL	0.47	g/kg seed				
3. RTU Baytan Thiram +	1.9	g/kg seed	18.2 a	18.0 a	2.6 ab	3743 ab
Allegiance FL +	0.47	g/kg seed				
Trilex Advanced FS300	1.0	g/kg seed				
4. RTU Baytan Thiram +	1.9	g/kg seed	17.6 a	21.6 a	1.4 b	4024 ab
Allegiance FL + Trilex FL +	0.47 + 0.4	g/kg seed				
Baytan 30 + Allegiance FL	0.16 + 0.47	g/kg seed				
5. RTU Baytan Thiram +	1.9	g/kg seed	21 a	20.0 a	1.2 b	3995 ab
Allegiance FL + Dynasty CST	0.47 + 2.5	g/kg seed				
6. RTU Baytan Thiram +	1.9	g/kg seed	16.8 a	19.0 a	2.2 ab	4291 a
Allegiance FL +	0.47	g/kg seed				
Trilex Advanced FS300 +	1.0	g/kg seed				
Vortex FL	0.12	g/kg seed				
7. RTU Baytan Thiram +	1.9	g/kg seed	20.0 a	16.6 a	2.6 ab	3952 ab
Allegiance FL +	0.47	g/kg seed				
Trilex Advanced FS300 +	1.0	g/kg seed				
Kodiak FL	0.31	g/kg seed				
8. RTU Baytan Thiram +	1.9	g/kg seed	17.6 a	18.4 a	1.8 ab	4580 a
Allegiance FL + Vortex FL +	0.47 + 0.12	g/kg seed				
Baytan 30 + Allegiance FL	0.16 + 0.16	g/kg seed				
LSD ($P \leq$ 0.10			***4.1***	***4.4***	***1.4***	***518***

[1] Days after planting.

[2] Skip index indicates uniformity of plants in the row, calculated as the total length of row without plants at 35 DAP.

Means within columns followed by different letters are significantly different according to Fisher's LSD ($P \leq$ 0.10).

Evaluation of the Experimental Compound V-10116 on Early Season Cotton Diseases in North Alabama, 2008

S. R. Moore and K. S. Lawrence

Selected experimental seed treatments were evaluated to determine their efficacy against early season cotton diseases in north Alabama. The soil was a Decatur silt loam (23 percent sand, 49 percent silt, and 28 percent clay) with a history of seedling diseases. Soil temperature was 62.1 degrees F at a 4-inch depth on the day of planting, with adequate soil moisture. All fungicide treatments were applied to the seed by the manufacturer. For the high incidence disease trial, plots were infested with millet seed inoculated with *Rhizoctonia solani* and *Pythium ultimum,* while for the low incidence disease trial, plots were left naturally infested. Temik 15G (7.0 pounds per acre) was applied at planting on April 15 in the seed furrow with chemical granular applicators attached to the planter. For each of the low and high disease pressure trials, each plot consisted of four rows, each 25 feet long with 40-inch row spacing, and plots were arranged in a randomized complete block design with five replications. Standard herbicides, insecticides, and fertility production practices, as recommended by the Alabama Cooperative Extension System, were used. Stand counts were recorded 21 and 35 days after planting (DAP) to determine stand density and percent seedling loss. Plots were harvested on September 30. Data were analyzed by using the generalized linear models (GLM) procedure, and means compared using Fisher's protected least significant difference (LSD) test.

Seedling disease pressure was high for early planted cotton in north Alabama in 2008. At 21 days after planting, 89 percent of all seeds planted in the high disease pressure trial did not emerge compared to 45 percent in the low disease pressure trial. Under low disease pressure, all fungicide seed treatments produced comparable cotton seedling stands at 21 and 35 days after planting, as well as comparable skip indices at 35 days after planting. There were no significant differences in yields in the low disease pressure trials. Under high disease pressure, treatment eight (V-10182 + V-10209) produced significantly higher cotton seedling stands than all other treatments at 21 days after planting with the exception of treatment ten (V10178 + treatment five).

At 35 days after planting, treatment eight (V-10182 + V-10209) again produced significantly higher cotton seedling stands than all other treatments. Treatment ten (V10178 + treatment five) produced significantly higher cotton seedling stands than treatments six (V-10116 + V-10209) and seven (V-10116 + V10209). Skip indices taken at 35 days after planting were comparable to the untreated check for all fungicide seed treatments. Yields were significantly higher for treatment eight (V-10182 + V-10209) than all other treatments by an average of 3114.1 pounds seed cotton per acre. Treatment ten (V10178 + treatment five) and treatment six (V-10116 + V-10209) yielded significantly higher than all other treatments by an average of 2358 pounds seed cotton per acre.

YIELD, SKIP INDEX, AND STAND COUNT OF COTTON IN NORTH ALABAMA TRIAL, 2008

Treatment	Rate/seed	Rate unit	Stand/10-ft row 21 DAP[1]	Stand/10-ft row 35 DAP	Skip index[2]	Yield *lb/A*
Low Disease Pressure						
1. Untreated			18.6	18.0	2.8	3304
2. Baytan 30	0.1	g/kg seed	18.2	20.0	3.2	4295
3. Allegiance FL	0.15	g/kg seed	21.2	20.0	2.8	3538
4. Baytan 30 + Allegiance FL	0.1 + 0.15	g/kg seed	21.2	21.4	1.6	4103
5. V-10116 + V-10209	0.1 + 0.15	g/kg seed	24.8	24.6	0.4	3871
6. V-10116 + V-10209	0.15 + 0.15	g/kg seed	17.8	17.8	3.2	3708
7. V-10116 + V-10209	0.2 + 0.15	g/kg seed	20.6	19.4	3.0	3960
8. V-10182 + V-10209	0.15 + 0.15	g/kg seed	22.0	24.0	0.8	4158
9. V-10178 + V-10209	0.5 + 0.15	g/kg seed	22.0	18.2	2.8	3838
10. V-10178 + V-10116 + V-10209	0.5 + 0.1 0.15	g/kg seed g/kg seed	22.0	23.6	1.6	4358
11. V-10202 + V-10209	0.1 + 0.15	g/kg seed	23.4	22.6	2.8	4133
LSD (P≤ 0.10)			***NS[3]***	***NS***	***NS***	***NS***
High Disease Pressure						
1. Untreated			0.2 d	1.0 d	8.8	233 f
2. Baytan 30	0.1	g/kg seed	2.2 cd	2.8 cd	7.6	836 ef
3. Allegiance FL	0.15	g/kg seed	0.0 d	0.8 d	8.6	187 f
4. Baytan 30 + Allegiance FL	0.1 + 0.15	g/kg seed	3.4 cd	3.6 cd	8.0	1324 def
5. V-10116 + V-10209	0.1 + 0.15	g/kg seed	2.8 cd	3.8 cd	7.6	2107 cde
6. V-10116 + V-10209	0.15 + 0.15	g/kg seed	5.8 bc	5.6 bc	8.4	2855 bc
7. V-10116 + V-10209	0.2 + 0.15	g/kg seed	5.6 bc	5.8 bc	8.2	2260 cd
8. V-10182 + V-10209	0.15 + 0.15	g/kg seed	10.0 a	13.6 a	7.0	4757 a
9. V-10178 + V-10209	0.5 + 0.15	g/kg seed	3.0 cd	2.4 cd	7.8	1459 def
10. V-10178 + V-10116 + V-10209	0.5 + 0.1 0.15	g/kg seed g/kg seed	9.2 ab	8.8 b	8.4	3601 b
11. V-10202 + V-10209	0.1 + 0.15	g/kg seed	5.6 bc	3.2 cd	6.6	1566 def
LSD (P≤ 0.10)			***2.6***	***2.7***	***NS***	***883***

[1] Days after planting.
[2] Skip index indicates uniformity of plants in the row, calculated as the total length of row without plants at 35 DAP.
[3] NS indicates that there was no significant difference (P≤ 0.10).
Means within columns followed by different letters are significantly different according to Fisher's LSD (P ≤ 0.10).

Evaluation of the Experimental Compound V-10190 on Early Season Cotton Diseases in North Alabama, 2008

S. R. Moore and K. S. Lawrence

Selected experimental seed treatments were evaluated to determine their efficacy against early season cotton diseases in north Alabama. The soil was a Decatur silt loam (23 percent sand, 49 percent silt, and 28 percent clay) with a history of seedling diseases. Soil temperature was 62.1 degrees F at a 4-inch depth on the day of planting with adequate soil moisture. All fungicide treatments were applied to the seed by the manufacturer. For the high incidence disease trial, plots were infested with millet seed inoculated with *Rhizoctonia solani* and *Pythium ultimum,* while for the low incidence disease trial, plots were left naturally infested. Temik 15G (7.0 pounds per acre) was applied at planting on April 15 in the seed furrow with chemical granular applicators attached to the planter. For each trial, each plot consisted of four rows, each 25 feet long with 40-inch row spacing, and plots were arranged in a randomized complete block design with five replications. Standard herbicides, insecticides, and fertility production practices, as recommended by the Alabama Cooperative Extension System, were used. Stand counts were recorded 21 and 35 days after planting to determine stand density and percent seedling loss. Plots were harvested on September 30. Data were analyzed by using the generalized linear models (GLM) procedure, and means compared using Fisher's protected least significant difference (LSD) test.

Seedling disease pressure was high in north Alabama for early planted cotton in 2008. At 21 days after planting, 93 percent of all seed planted in high disease pressure trials did not emerge compared to 44 percent in the low disease pressure trial. Under low disease pressure, all fungicide seed treatments were comparable to the untreated check in cotton seedling stands at 21 and 35 days after planting, as were skip indices at 35 days after planting. Seed cotton yields were comparable to the untreated check for all treatments. Under high disease pressure, treatment four (Baytan 30 + Allegiance) and treatment seven (V-10116 + V-10209) had significantly higher cotton seedling stands at 21 days after planting. All fungicide seed treatments had cotton seedling stands and skip indices comparable to the untreated check at 35 days after planting. Yields were improved by the experimental treatment seven (V-10116 + V-10209), which was comparable to the industry standard treatment four (Baytan 30 + Allegiance). Treatments two (Baytan 30), four (treatment one + treatment two), five (V-10178 + V-10209), six (V-10178 + V-10208), eleven (V-10182 + V-10209), and twelve (V-10182 + V-10209) produced similar yields, averaging an increase of 1484 pounds seed cotton per acre.

Yield, Skip Index, and Stand Count of Cotton in North Alabama Trial, 2008

Treatment	Rate/seed	Rate unit	Stand/10-ft row 21 DAP[1]	Stand/10-ft row 35 DAP	Skip index[2]	Yield *lb/A*
Low Disease Pressure						
1. Untreated			19.6	19.8	0.2	4553
2. Baytan 30	0.1	g/kg seed	24.6	22.0	3.0	4161
3. Allegiance FL	0.15	g/kg seed	19.6	20.8	2.8	4162
4. Baytan 30 + Allegiance FL	0.1 + 0.15	g/kg seed	21.2	21.2	2.4	4432
5. V-10178 + V-10209	0.5 + 0.15	g/kg seed	23.0	26.4	3.6	4284
6. V-10178 + V-10208	0.5 + 0.15	g/kg seed	21.4	24.0	3.6	4418
7. V-10116 + V-10209	0.1 + 0.15	g/kg seed	21.2	22.6	4.0	4158
8. V-10190 + V-10209	0.1 + 0.15	g/kg seed	22.2	18.6	1.6	4173
9. V-10190 + V-10209	0.15 + 0.15	g/kg seed	19.8	21.8	0.8	3945
10. V-10190 + V-10209	0.2 + 0.15	g/kg seed	20.2	23.8	0.8	4323
11. V-10182 + V-10209	0.1 + 0.15	g/kg seed	24.0	25.6	3.6	3988
12. V-10182 + V-10209	0.2 + 0.15	g/kg seed	19.4	22.2	2.8	4610
LSD ($P \leq 0.10$)			***NS[3]***	***NS***	***NS***	***NS***
High Disease Pressure						
1. Untreated			0.2 c	2.0	10.0	165 c
2. Baytan 30	0.1	g/kg seed	3.2 abc	1.6	7.6	2019 ab
3. Allegiance FL	0.15	g/kg seed	0.2 c	2.4	9.6	349 c
4. Baytan 30 + Allegiance FL	0.1 + 0.15	g/kg seed	5.6 a	1.8	7.8	2397 ab
5. V-10178 + V-10209	0.5 + 0.15	g/kg seed	3.8 abc	1.4	7.4	1969 ab
6. V-10178 + V-10208	0.5 + 0.15	g/kg seed	3.4 abc	1.0	20.6	1513 b
7. V-10116 + V-10209	0.1 + 0.15	g/kg seed	6.0 a	1.2	7.0	2645 a
8. V-10190 + V-10209	0.1 + 0.15	g/kg seed	0.4 c	1.6	10.0	381 c
9. V-10190 + V-10209	0.15 + 0.15	g/kg seed	0.8 bc	1.4	9.8	457 c
10. V-10190 + V-10209	0.2 + 0.15	g/kg seed	0.6 bc	1.6	9.4	618 c
11. V-10182 + V-10209	0.1 + 0.15	g/kg seed	4.2 ab	1.4	8.0	15496 b
12. V-10182 + V-10209	0.2 + 0.15	g/kg seed	3.2 abc	2.0	8.0	1818 ab
LSD ($P \leq 0.10$)			***2.2***	***NS***	***NS***	***628***

[1] Days after planting.

[2] Skip index indicates uniformity of plants in the row, calculated as the total length of row without plants at 35 DAP.

[3] NS indicates that there was no significant difference ($P \leq 0.10$).

Means within columns followed by different letters are significantly different according to Fisher's LSD ($P \leq 0.10$).

Evaluation of the Experimental Compound V-10208 on Early Season Cotton Diseases in North Alabama, 2008

S. R. Moore and K. S. Lawrence

Selected experimental seed treatments were evaluated to determine their efficacy against early season cotton diseases in north Alabama. The soil was a Decatur silt loam (23 percent sand, 49 percent silt, and 28 percent clay) with a history of seedling diseases. Soil temperature was 62.1 degrees F at a 4-inch depth on the day of planting, with adequate soil moisture. All fungicide treatments were applied to the seed by the manufacturer. For the high incidence disease trial, plots were infested with millet seed inoculated with *Rhizoctonia solani* and *Pythium ultimum,* while for the low incidence disease trial, plots were left naturally infested. Temik 15G (7.0 pounds per acre) was applied at planting on April 15 in the seed furrow with chemical granular applicators attached to the planter. For each of the low and high disease pressure trials, each plot consisted of four rows, each 25 feet long with 40-inch row spacing, and plots were arranged in a randomized complete block design with five replications. Standard herbicides, insecticides, and fertility production practices, as recommended by the Alabama Cooperative Extension System, were used. Stand counts were recorded 21 and 35 days after planting to determine stand density and percent seedling loss. Plots were harvested on September 30. Data were analyzed by using the generalized linear models (GLM) procedure, and means compared using Fisher's protected least significant difference (LSD) test.

Seedling disease pressure was high for early planted cotton in north Alabama in 2008. At 21 days after planting, 97 percent of all seeds planted in the high disease pressure trial did not emerge, compared to 38 percent in the low disease pressure trial. Under low disease pressure, all fungicide seed treatments produced cotton seedling stands comparable to the untreated check. Cotton seedling stand and skip indices at 35 days after planting were comparable for all treatments, as were seed cotton yields. Under high disease pressure, treatment nine (V-10230 100 FS 0.55 g/kg seed) and treatment ten (V-10230 100 FS 0.65 g/kg seed) produced significantly higher cotton seedling stands than all other treatments at 21 and 35 days after planting. Skip indices at 35 days after planting were comparable for all treatments. Treatments nine (V-10230 100 FS 0.55 g/kg seed) and ten (V-10230 100 FS 0.65 g/kg seed) produced significantly higher yields than all other treatments.

Yield, Skip Index, and Stand Count of Cotton in North Alabama Trial, 2008

Treatment	Rate/seed	Rate unit	Stand/10-ft row 21 DAP[1]	Stand/10-ft row 35 DAP	Skip index[2]	Yield *lb/A*
Low Disease Pressure						
1. Untreated			22.2 ab	18.8	3.0	4038
2. Allegiance FL	0.15	g/kg seed	28.8 a	23.4	0.8	3926
3. V-10208 3.6 FS	0.05	g/kg seed	22.2 ab	20.6	1.6	4261
4. V-10208 3.6 FS	0.075	g/kg seed	20.4 b	20.6	1.8	4255
5. V-10208 3.6 FS	0.1	g/kg seed	22.2 ab	21.0	2.0	3954
6. V-10208 3.6 FS	0.15	g/kg seed	25.6 ab	21.4	1.4	4186
7. V-10208 3.6 FS	0.2	g/kg seed	23.2 ab	22.4	1.6	3965
8. V-10208 3.6 FS	0.25	g/kg seed	28.6 a	23.2	1.8	4085
9. V-10230 100 FS	0.55	g/kg seed	23.2 ab	19.2	2.4	4115
10. V-10230 100 FS	0.65	g/kg seed	24.6 ab	20.6	1.8	4099
11. V-10280 100 FS	0.15	g/kg seed	22.2 ab	22.4	1.2	4209
12. V-10280 0.83 SC	0.15	g/kg seed	21.2 b	18.6	2.8	3793
13. V-10231 100 FS	0.15	g/kg seed	24.4 ab	24.0	2.4	4270
LSD (P≤ 0.10)			***4.0***	***NS[3]***	***NS***	***NS***
High Disease Pressure						
1. Untreated			0.8 b	0.4 b	10.0	158 b
2. Allegiance FL	0.15	g/kg seed	0.2 b	0.4 b	10.0	0 b
3. V-10208 3.6 FS	0.05	g/kg seed	0.8 b	0.6 b	9.6	118 b
4. V-10208 3.6 FS	0.075	g/kg seed	0.6 b	0.6 b	10.0	157 b
5. V-10208 3.6 FS	0.1	g/kg seed	0.4 b	0.4 b	10.0	80 b
6. V-10208 3.6 FS	0.15	g/kg seed	0.2 b	0.6 b	9.8	123 b
7. V-10208 3.6 FS	0.2	g/kg seed	0.2 b	0 b	10.0	0.0 b
8. V-10208 3.6 FS	0.25	g/kg seed	0 b	0 b	9.8	0.0 b
9. V-10230 100 FS	0.55	g/kg seed	4.4 a	3.2 a	8.8	1382 a
10. V-10230 100 FS	0.65	g/kg seed	3.4 a	2.8 a	8.8	1358 a
11. V-10280 100 FS	0.15	g/kg seed	1.0 b	0.6 b	9.8	170 b
12. V-10280 0.83 SC	0.15	g/kg seed	0.4 b	0.2 b	10.0	61 b
13. V-10231 100 FS	0.15	g/kg seed	0.8 b	0.6 b	10.0	196 b
LSD (P≤ 0.10)			***1.0***	***1.0***	***NS***	***549***

[1] Days after planting.
[2] Skip index indicates uniformity of plants in the row, calculated as the total length of row without plants at 35 DAP.
[3] NS indicates that there was no significant difference (P≤ 0.10).
Means within columns followed by different letters are significantly different according to Fisher's LSD (P ≤ 0.10).

EVALUATION OF COTTON SEEDLING DISEASE MANAGEMENT IN NORTH ALABAMA, 2008

S. R. Moore and K.S. Lawrence

Selected seed treatments were evaluated to determine their efficacy against early season cotton diseases in north Alabama. The soil was a Decatur silt loam (23 percent sand, 49 percent silt, and 28 percent clay) with a history of seedling diseases. Soil temperature was 62.1 degrees F at a 4-inch depth on the day of planting, with adequate soil moisture. All fungicide treatments were applied to the seed by the manufacturer. For the high incidence disease trial, plots were infested with millet seed inoculated with *Rhizoctonia solani* and *Pythium ultimum,* while for the low incidence disease trial, plots were naturally infested. Temik 15G (7 pounds per acre) was applied at planting on April 15 in the seed furrow with chemical granular applicators attached to the planter. For each of the low and high disease pressure trials, each plot consisted of four rows, each 25 feet long with 40-inch row spacing, and plots were arranged in a randomized complete block design with five replications. Standard herbicides, insecticides, and fertility production practices, as recommended by the Alabama Cooperative Extension System, were used. Stand counts were recorded 21 and 35 days after planting to determine stand density and percent seedling loss. Plots were harvested on September 30. Data were analyzed by using the generalized linear models (GLM) procedure, and means compared using Fisher's protected least significant difference (LSD) test.

Seedling disease pressure was high in north Alabama for early planted cotton in 2008. At 21 days after planting, 88 percent of all seed planted in the high disease pressure trials did not emerge compared to 57 percent in the low disease pressure trial. Under low disease pressure, treatment two (Baytan 30 + Allegiance FL + Vortex FL) produced significantly higher cotton seedling stand than the untreated check, while all other treatments were comparable to the untreated check at 21 days after planting. At 35 days after planting, treatment five (treatment four + Trilex FL) produced significantly higher cotton seedling stands than the untreated check while all other treatments were comparable to the untreated check. Skip indices for treatments four (Baytan 30 + Allegiance FL +Vortex FL), five (treatment four + Trilex FL), and six (Dynasty CST) were significantly lower than the untreated check at 35 days after planting. Yields averaged 688.5 pounds seed cotton per acre higher than the untreated check. Under high disease pressure, all fungicide seed treatments produced significantly higher cotton seedling stands than the untreated check at 21 and 35 days after planting. Skip indices at 35 days after planting were comparable to the untreated check. All fungicide seed treatments produced significantly higher yields than the untreated check at an average of 2233.2 pounds seed cotton per acre.

YIELD, SKIP INDEX, AND STAND COUNT OF COTTON IN NORTH ALABAMA TRIAL, 2008

Treatment	Rate/seed	Rate unit	Stand/10-ft row 21 DAP[1]	Stand/10-ft row 35 DAP	Skip index[2]	Yield *lb/A*
Low Disease Pressure						
1. Untreated			11.6 b	13.6 b	4.0 a	505
2. Baytan 30 + Allegiance FL +	0.104 + .155	g/kg seed	20.4 a	20.6 ab	2.2 ab	4205
Vortex FL	0.025	g/kg seed				
3. Trilex Advanced FS 300 +	0.05	g/kg seed	18.0 ab	20.6 ab	2.2 ab	4017
Baytan 30 + Allegiance FL +	0.104 + .155	g/kg seed				
Vortex FL	0.025	g/kg seed				
4. Baytan 30 + Allegiance FL +	0.207 + .31	g/kg seed	16.2 ab	19.8 ab	1.8 b	4317
Vortex FL	0.5	g/kg seed				
5. V Baytan 30 + Allegiance FL +	0.207 + .31	g/kg seed	18.2 ab	22.2 a	1.2 b	4115
Vortex FL + Trilex FL	0.5 + 0.05	g/kg seed				
6. Dynasty CST	0.32	g/kg seed	14.4 ab	20.6 ab	1.4 b	4314
LSD (P≤ 0.10)			***5.1***	***4.9***	***1.5***	***NS[3]***
High Disease Pressure						
1. Untreated			0.4 d	0.4 c	6.4 a	53 d
2. Baytan 30 + Allegiance FL +	0.104 + .155	g/kg seed	4.6 bc	4.0 b	7.6 a	2002 b
Vortex FL	0.025	g/kg seed				
3. Trilex Advanced FS 300 +	0.05	g/kg seed	6.2 ab	4.0 b	7.4 a	2536 a
Baytan 30 + Allegiance FL +	0.104 + .155	g/kg seed				
Vortex FL	0.025	g/kg seed				
4. Baytan 30 + Allegiance FL +	0.207 + .31	g/kg seed	6.8 ab	6.8 a	6.2 a	3002 a
Vortex FL	0.5	g/kg seed				
5. V Baytan 30 + Allegiance FL +	0.207 + .31	g/kg seed	7.4 a	7.2 a	6.2 a	2888 a
Vortex FL + Trilex FL	0.5 + 0.05	g/kg seed				
6. Dynasty CST	0.32	g/kg seed	3.2 c	2.6 b	8.2 a	970 c
LSD (P≤ 0.10)			***1.8***	***1.4***	***2.4***	***520***

[1] Days after planting.
Skip index indicates uniformity of plants in the row, calculated as the total length of row without plants at 35 DAP.
[3] NS indicates that there was no significant difference (P≤ 0.10).
Means within columns followed by different letters are significantly different according to Fisher's LSD (P ≤ 0.10).

Performance of Selected Cotton Varieties against the Root-Knot Nematode in Central Alabama, 2008

N. S. Sekora, K. S. Lawrence, J. D. Castillo, S. R. Moore, C. H. Burmester, and S. Nightengale

Cotton varieties were tested to determine yield response to root-knot nematode. The field site at the Plant Breeding Unit of the E.V. Smith Research Center had Kalmia loamy sand soil type. At a 4-inch soil depth on April 22 (day of planting), soil temperature was 69.6 degrees F with adequate moisture. The manufacturer applied all fungicide seed treatments. All other treatments were applied at planting with a chemical applicator, and Temik 15G (5 pounds per acre) was applied in the seed furrow by granular applicators attached to the planter. Plots consisted of a randomized complete block arrangement of two 25-foot rows spaced 40 inches apart. Nematode samples were taken by randomly collecting ten soil cores (each 1 inch in diameter and 6 inches deep) from the two rows of each plot. Nematodes were extracted from the soil samples by gravity sieving and sucrose centrifugation. All other production practices for herbicides, fertilizers, and insecticides were carried out as recommended by the Alabama Cooperative Extension System. Plots were harvested on September 17. The SAS General Linear Models program was used for analysis of variance, and Fisher's protected least significant difference (LSD) test was used for paired-means comparisons. Monthly average minimum temperatures were 54.4, 60.9, 68.2, 70.0, 71.1, and 71.2 degrees F, respectively; average maximum temperatures for April through September were 80.6, 84.5, 93.6, 92.5, 89.7, and 89.4 degrees F, respectively. Monthly rainfall totals for April through September were 0.13, 2.50, 1.98, 4.97, 9.92, 0.72 inches, respectively. Total rainfall over the growing season was 20.1 inches.

Moderate conditions for *M. incognita* disease severity were present this year. At 28 days after planting, stand counts were significantly higher for DP 162 B2RF, DP 174 RF, and DP 161 B2RF than both DP 147 RF and DP 444 BG/RR. No significant difference among varieties was observed in vigor at 28 days after planting. Numbers of *M. incognita*/150cm^3 soil were similar among varieties throughout the growing season. The average number of *M. incognita* at the end of the season was 303 nematodes/150cm^3 of soil. Plot yields ranged from 1162 to 3189 pound per acre with a mean of 2125 pounds per acre. Yield for DP 174 RF was significantly higher than DP 147 RF, but not so from the remaining treatments. Though not significantly different, DP 174 RF also had the lowest populations of *M. incognita* at harvest and the lowest total population over the season.

Performance of Selected Cotton Varieties against the Root-Knot Nematode in Central Alabama, 2008

Variety	Stand/ 25-ft row 20 May	Vigor[1] 20 May	Total number of nematodes/150cm^3 *M. incognita* 20 May	*M. incognita* 8 Aug	*M. incognita* 17 Sep	Seed yield *lb/A* 17 Sep
1. DP 147 RF	77.4 b	2.4	46.4	77.3	370.8	1741 b
2. DP 162 B2RF	89.0 a	2.4	15.5	170.0	216.3	2180 ab
3. DP 174 RF	82.2 a	3.0	46.4	155.0	185.4	2477 a
4. DP 161 B2RF	87.8 a	3.0	15.5	139.1	293.6	2308 ab
5. DP 444 BG/RR	71.0 b	2.6	46.4	108.2	448.1	1920 ab
LSD (P ≤ 0.10)	***9.09***	***0.64***	***61.2***	***97.6***	***281.1***	***610***

[1] Vigor ratings based on 1-5 scale, one being least vigorous and 5 being the most vigorous.

Means followed by the same letters are not significantly different according to Fisher's LSD (P ≤ 0.10).

On-Farm Field Trials to Test the Effectiveness of Seed Nematacides for Managing Reniform and Root-Knot Nematodes on Cotton in Alabama

L. Kuykendall, J. Clary, W. C. Birdsong, B. Dillard, C. D. Monks, and D. P. Delaney

Cotton yield-reducing levels of both reniform and root-knot nematodes continue to infest and grow in all major cotton growing areas of Alabama. Cotton yield loss is variable but is documented to be significant. Except in severe stress conditions, yield loss from nematode damage is not visible. Seed-applied nematacide treatments are gaining popularity with growers as they have only been commercially available for one and four years for Aeris and Avicta, respectively. The question remains: Are seed-applied nematacides a viable alternative to the proven and traditional nematacides of 3 to 5 gallons of Telone and 5 to 7 pounds Temik in furrow?

When conducted with objective and non-biased tests, on-farm large plot cotton nematode trials give growers, extension agents and spectialist, consultants, and suppliers a basis for making nematode management decision.

Fields for these trials with selected farmer cooperators were sampled prior to planting to confirm nematode pressure. All trial fields chosen had very high populations of either reniform or root-knot nematodes, except the E.V. Smith trial which had a moderate population level. Seed from the same seed lot was used for all treatments within each trial. Gaucho Grande was included as an untreated check treatment with no nematicide claims. All test treatments were planted in three to four randomized replications per location. Due to stand problems following flooding conditions, the E.V. Smith trial was not weighed at harvest. In general all locations had enough soil moisture to achieve an adequate stand; all locations had varied dry conditions that dictated the crop response to the late summer tropical moisture.

Cotton yields ranged from below average to outstanding. The Walt Corcoran and the Mark and Ron Taylor trials exhibited a numerical spread of 145 and 73 pounds lint cotton respectively between the treatments. The Richard Edgar and Carl and Paul Taylor trials showed little change between the treatments with lint cotton yield. The two-year average does show an advantage of the seed nematicide treatments when compared to the standard 5 pounds of Temik and untreated check treatments. Longer term studies over many years and trials still favor the proven and traditional nematicide treatments of 5 pounds Temik and 3 to 5 gallons of Telone when compared to an untreated non-nematicide check. However these data give more promise to the seed nematicide treatments as an alternative to the traditional proven nematicide treatments.

Table 1. Location of Trials, Nematode Information, and Planting and Harvest Dates

Farmer Cooperator	County	Extension Agronomist	Variety	Nematode Species	Nematodes/ 100cm^3 soil	Planting Date	Harvest Date
Walt Corcoran	Barbour	William Birdsong/Brandon Dillard	DP555BR	Root-knot		4/23/08	10/21/08
Richard Edgar	Elmore	Leonard Kuykendall	DP143B2RF	Reniform	1030	5/6/08	10/20/08
Carl and Paul Taylor	Elmore	Leonard Kuykendall/Jeff Clary	DP164B2RF	Reniform	3686	4/22/08	10/29/08
Mark and Ron Taylor	Elmore	Leonard Kuykendall/Jeff Clary	DP164B2RF	Reniform	2282	4/22/08	10/3/08
E.V. Smith	Macon	Leonard Kuykendall/Jeff Clary	DP555BR	Root-knot	55	5/22/08	NA

Table 2. Pounds Lint Cotton Per Acre: Change from UTC (Untreated Check)

Farmer-Cooperator	No. reps.	Gaucho UTC	Aeris	Avicta	Temik 5 lb
Richard Edgar	3	548	-12	+ 9	+ 9
Carl & Paul Taylor	4	996	+ 4	+ 19	- 28
Mark & Ron Taylor	3	1417	+ 48	- 5	- 25
Walt Corcoran	4	936	+117	-28	+62
Average			+ 39	-1	+5
Two-year average[1]			+ 61	+ 17	+6

[1] Same field in 2007, except Edgar is adjoining field

Cotton Response to NemOut® for Reniform Nematode Management in South Alabama, 2008

J. D. Castillo, K. S. Lawrence, S. R. Moore, and J. R. Akridge

This trial was conducted to determine cotton response to the biological nematicide NemOut® (*Paecilomyces lilacinus* strain 251) to control the reniform nematode *(Rotylenchulus reniformis)*. The test was carried out near Huxford, Alabama. Two-row plots were arranged in a randomized complete block design with seven treatments and six repetitions. The chemical nematicide standards were applied at cotton planting on May 29, 2008, and NemOut® was applied at the three- to seven-cotton leaf stage. All plots were maintained throughout the season with standard herbicide, insecticide, and fertility production practices as recommended by the Alabama Cooperative Extension System. Stand and vigor evaluations were recorded at 34 days after planting on June 4. Stand counts were made on the number of plants in a 10-foot row and vigor evaluations were visually rated on a 1 to 5 visual scale, where 1 represents a poor vigor and 5 represents highest vigor. Soil samples were taken from each plot at 34, 63, 96, and 155 days after planting. A 150 cm^3 subsample from each plot was processed and reniform nematodes were extracted by the sucrose centrifugation-flotation methods, and counted under the inverted microscope. Entire plots were harvested mechanically 150 days after planting on October 13. Data were statistically analyzed by GLM and means compared using Fisher's protected least significant difference test.

Seasonal rainfall and temperature were generally good for the cropping period. Monthly average maximum temperatures from June to September were 93.4, 92.8, 93.5, and 88 degrees F, and average minimum temperature were 69.2, 71.4, 71.4, and 67.3 degrees F. Total rainfall from June to September was 7.3, 5, 9.4, and 1.7 inches. The total rainfall for the growing season was 23.5 inches. In the stand and vigor evaluations there were no differences between the treatments. Initial populations of the reniform nematode were low for all the treatments. In the evaluation 63 days after planting, populations of reniform nematode from the treatment with Avicta at 0.15 g.a.i./seed (treatment three), were higher than the treatment with Temik 15G + NemOut® at 0.10 pound per acre (treatment four). However, 96 days after planting, treatment with Temik 15G + NemOut® at 0.10 pound per acre (treatment four) contained higher numbers of reniform nematodes than treatments with Temik 15G (treatment two) and Avicta + NemOut® at 0.15 pound per acre (treatment seven). At harvest time, reniform populations in the treatment with Temik 15G (treatment two) were lower than populations in the control (treatment one) and Avicta (treatment three) treatments. Seed cotton yields varied by 317 pounds per acre at harvest with an average of 2804 pounds per acre of seed cotton produced over all nematicide treatments. Statistically cotton yields were similar among all the nematicides and the untreated control.

Cotton Response to NemOut® for Reniform Nematode Management in South Alabama, 2008

Treatment	Rate	Stand 34 DAP[2]	Vigor 34 DAP	*Rotylenchulus reniformis*/150 cm^3 34 DAP	63 DAP	96 DAP	155 DAP	Yield *lb/A*
1. Control		32.3	1.8	206	3260 ab	10133 ab	3039 a	2790
2. Temik 15 G	5.00 lb/A	29.1	3.2	373	1777 ab	6142 b	1095 b	2570
3. Avicta	0.15[1]	32.2	1.7	425	5377 a	9824 ab	3245 a	2754
4. Temik 15 G	5.00 lb/A	29.2	2.2	425	1691 b	12579 a	1803 ab	2693
NemOut 3-7 Leaf stage	0.10 lb/A							
5. Temik 15 G	5.00 lb/A	33.0	2.8	451	2395 ab	9605 ab	2150 ab	2804
NemOut 3-7 Leaf stage	0.15 lb/A							
6. Avicta	0.15[1]	34.2	1.8	309	4836 ab	10944 ab	1803 ab	2881
NemOut 3-7 Leaf stage	0.10 lb/A							
7. Avicta	0.15[1]	32.2	2.2	322	3245 ab	6116 b	2627 ab	2754
NemOut 3-7 Leaf stage	0.15 lb/A							
LSD ($P \leq 0.05$)		***NS[3]***	***NS***	***NS***	***3650.3***	***5996.1***	***1648***	***NS***

[1] Avicta is a seed treatment placed on the seed by the manufacturers at a rate of 0.15 mg a.i. per seed.
[2] Days after planting.
[3] NS indicates that there was no significant difference ($P \leq 0.10$).
Means within columns followed by different letters are significantly different according to Fisher's LSD ($P \leq 0.10$).

EVALUATION OF AERIS SEED TREATMENT FOR RENIFORM NEMATODE MANAGEMENT IN COTTON IN NORTH ALABAMA, 2008

K. S. Lawrence, S. R. Moore, C. H. Burmester, and B. E. Norris

Experimental seed treatments were evaluated for the management of reniform nematodes in a naturally infested producer's field near the Tennessee Valley Research and Extension Center in Belle Mina, Alabama. The field has a history of reniform nematode infestation, and the soil type is a Decatur silty loam (24 percent sand, 49 percent silt, 28 percent clay). The seed treatments were applied to ST 4554 Flex B2 cotton seed by Bayer. Temik 15G (5 pounds per acre) was applied at planting on April 30 in the seed furrow with chemical granular applicators attached to the planter. Plots consisted of two rows, 25 feet long with a 40-inch row spacing, and were arranged in a randomized complete block design with five replications. All plots were maintained throughout the season with standard herbicide, insecticide, and fertility production practices as recommended by the Alabama Cooperative Extension System. Population densities of the reniform nematode were determined at 35, 63, 97, and 154 days after planting. Ten soil cores, 1 inch in diameter and 6 inches deep, were collected from the two rows of each plot in a systematic sampling pattern. Nematodes were extracted using the gravity sieving and sucrose centrifugation technique. Plots were harvested on October 3. Data were statistically analyzed by GLM and means compared using Fisher's protected least significant difference test ($P \leq 0.10$). Monthly average maximum temperatures from planting in late April through harvest in early October were 71.1, 78.4, 89.3, 91.1, 88.3, and 83.3 degrees F with average minimum temperatures of 48.9, 57.3, 65.9, 67.5, 66.4, and 62.5 degrees F, respectively. Rainfall accumulation for each month was 3.6, 4.0, 2.6, 2.3, 4.8, and 0.8 inches with a total of 18.2 inches.

The drought continued in 2008 but was not as severe as in 2007. Thus, reniform nematode pressure was moderate. Reniform nematode numbers at planting averaged 1500 vermiform life stages per 150 cm^3 of soil at planting. Plant stand was not reduced by any nematicide application and all stands were within the optimum range of three plants per foot of row. Plant vigor was visually improved in all plots with a nematicide application as compared to the untreated control (treatment one). Reniform numbers were lower ($P \leq 0.10$) at 35 days after planting in all treatments with Temik 15G (treatments four, five, six, and eight). However a lack of rainfall in June reduced nematode collection efficiency and no differences were observed between any treatments. By August all nematicide treatments except for the Aeris + Temik 15 G sidedress (treatment six) supported lower reniform numbers ($P \leq 0.10$) as compared to the untreated control. By harvest reniform numbers had dropped in all treatments, but the lowest numbers were observed in Abermectin + Temik 15 G combinations (treatments five and seven). Seed cotton yields varied by 595 pounds per acre at harvest with an average of 3150 pounds per acre of seed cotton produced over all nematicide treatments. The Aeris seed treatment (treatment two) and Abermectin + Temik 15G (treatment 5) produced greater yields ($P \leq 0.10$) than the untreated control and the Temik 15 G treatment alone.

EFFECT OF COTTON SEED TREATMENTS ON STAND, PLANT VIGOR, NEMATODE NUMBERS AND SEED COTTON YIELD

Treatment	Rate	Stand/1-ft row[1] 13 May	Plant vigor[2] 4 Jun	—*Rotylenchulus reniformis*/150cm³ soil— 4 Jun	2 Jul	5 Aug	6 Oct	Seed cotton *lb/A*
1. Untreated		3.2	2.3 b	3172.4 a	479.0	3043.6 a	1236.2 a	2819 b
2. Aeris	0.75 mg ai/seed	2.6	3.5 a	1668.8 ab	262.7	1776.8 b	1900.4 a	3299 a
3. Abermectin	500.4 mg ai/seed	2.8	3.3 a	2070.2 ab	370.8	1776.8 b	1112.2 a	3114 ab
4. Aeris	0.75 mg ai/seed	3.0	3.7 a	1437.0 b	401.7	1452.4 b	1328.6 a	3138 ab
Temik 15G	5 lb/A							
5. Abermectin	500.4 mg ai/seed	3.0	3.9 a	880.8 b	247.2	1375.2 b	741.8 b	3413 a
Temik 15G	5 lb/A							
6. Aeris	0.75 mg ai/seed	2.5	3.7 a	1220.6 b	309.0	2147.8 ab	1405.8 a	3183 ab
Temik 15G SD[3]	5 lb/A							
7. Abermectin	500.4 mg ai/seed	2.9	3.4 a	2209.4 ab	216.3	1761.4 b	865.2 b	3037 ab
Temik 15G SD	5 lb/A							
8. Temik 15G	5 lb/A	3.1	3.7 a	1143.6 b	432.6	2256.0 b	1143.2 a	2883 b
LSD (P≤ 0.10)		***NS[4]***	***0.6***	***1546.7***	***NS***	***1227.8***	***767.7***	***378***
SD		***3.9***	***0.5***	***1437.7***	***274.4***	***1141.3***	***713.56***	***381.2***
CV		***13.5***	***15.5***	***83.3***	***80.7***	***58.6***	***58.65***	***11.3***

[1] Stand counted from 10 feet of row and averaged.
[2] Plant vigor ratings scale from 1 to 5 with 5 being the most vigorous and 1 the least.
[3] Sidedress application.
[4] NS indicates that there was no significant difference (P≤ 0.10).
Means within columns followed by different letters are significantly different according to Fisher's LSD (P ≤ 0.10).

Evaluation of Experimental Seed Treatment Combinations for Reniform Nematode Management in Cotton in North Alabama, 2008

K. S. Lawrence, S. R. Moore, C. H. Burmester, and B. E. Norris

Experimental seed treatments were evaluated for the management of reniform nematodes in a naturally infested producer's field near the Tennessee Valley Research and Extension Center in Belle Mina, Alabama. The field has a history of reniform nematode infestation, and the soil type is a Decatur silty loam (24 percent sand, 49 percent silt, 28 percent clay). The seed treatments were applied to DPL444BG/RR cotton seed by Syngenta. Temik 15G (5 pounds per acre) was applied at planting on April 30 in the seed furrow with chemical granular applicators attached to the planter. Plots consisted of two rows, 25-foot long with a 40-inch row spacing, and were arranged in a randomized complete block design with five replications. All plots were maintained throughout the season with standard herbicide, insecticide, and fertility production practices as recommended by the Alabama Cooperative Extension System. Population densities of the reniform nematode were determined at 35, 63, 97, and 154 days after planting. Ten soil cores, 1 inch in diameter and 6 inches deep, were collected from the two rows of each plot in a systematic sampling pattern. Nematodes were extracted using the gravity sieving and sucrose centrifugation technique. Plots were harvested on October 3. Data were statistically analyzed by GLM and means compared using Fisher's protected least significant difference test ($P \leq 0.10$). Monthly average maximum temperatures from planting in late April through harvest in early October were 71.1, 78.4, 89.3, 91.1, 88.3, and 83.3 degrees F with average minimum temperatures of 48.9, 57.3, 65.9, 67.5, 66.4, and 62.5 degrees F, respectively. Rainfall accumulation for each month was 3.6, 4.0, 2.6, 2.3, 4.8, and 0.8 inches with a total of 18.2 inches.

The drought continued in 2008 but was not as severe as in 2007. Thus reniform nematode pressure was moderate. Reniform nematode numbers at planting averaged 1716 vermiform life stages per 150 cm^3 of soil at planting. Plant stand was not affected by any nematicide application and all stands were in the optimum range of three plants per foot of row. Plant vigor was visually improved in A15436, Dynasty CST 125 FS, Cruiser 5 FS, AVICTA 4.17 FS, + A9890 (treatment six) as compared to the control A15436 + Cruiser 5 FS (treatment one). Reniform numbers were lower ($P \leq 0.10$) at 30 days after planting on June 4 in the combination treatment of A15436, Allegiance-FL, Baytan 30 Trilex F, STO15273, and STP17217 (treatment nine) and A15436 + Temik 15G (treatment ten). However a lack of rainfall in June reduced nematode collection efficiency and no differences were observed between any treatments. By August the combination treatment of A15436, Allegiance-FL, Baytan 30 Trilex F, STO15273, and STP17217 (treatment nine) supported higher nematode numbers than all other treatments. At harvest reniform numbers had dropped in all treatments. Seed cotton yields varied by 499 pounds per acre at harvest with an average of 3480 pounds per acre of seed cotton produced over all nematicide treatments. None of the experimental seed treatment nematicides nor the standard A15436 + Temik 15 G (treatment ten) increased yield ($P \leq 0.10$) as compared to the control. Nematode numbers did not increase to levels as seen in this field in previous years probably due to the lack of rainfall in June and July.

EFFECT OF EXPERIMENTAL SEED TREATMENTS ON STAND, PLANT VIGOR, NEMATODE NUMBERS, AND SEED COTTON YIELD

Treatment	Rate	Stand/1-ft row[1] 13 May	Plant vigor[2] 4 Jun	—*Rotylenchulus reniformis*/150cm^3 soil— 4 Jun	2 Jul	5 Aug	6 Oct	Seed cotton *lb/A*
1. A15436	31 g ai 100 kg seed	3.4	3.1 b	2441.0 a	309.0	2259.4 b	386.3	3513 a
Cruiser 5 FS	0.342 mg ai/seed							
2. A15436	31 g ai 100 kg seed	3.4	3.1 b	1746.0 a	231.7	2225.0 b	479.0	3496 a
Cruiser 5 FS	0.342 mg ai/seed							
A9625	1.0 g ai 100 kg seed							
3. A15436	31 g ai 100 kg seed	3.7	3.5 ab	2101.4 a	448.1	2849.0 b	401.7	3327 b
Dynasty CST 125 FS	0.034 mg ai/seed							
Cruiser 5 FS	0.342 mg ai/seed							
AVICTA 4.17 FS	0.145 mg ai/seed							
4. A15436	31 g ai 100 kg seed	3.9	3.4 ab	2462.6 a	293.5	1591.4 b	401.7	3238 b
Dynasty CST 125 FS	0.034 mg ai/seed							
Cruiser 5 FS	0.342 mg ai/seed							
AVICTA 4.17 FS	0.145 mg ai/seed							
A9625	1.0 g ai 100 kg seed							
5. A15436	31 g ai 100 kg seed	3.7	3.7 ab	1699.6 a	401.7	2410.4 b	587.1	3529 a
Cruiser 5 FS	0.342 mg ai/seed							
A9890	40 g ai 100 kg seed							
6. A15436	31 g ai 100 kg seed	3.4	4.1 a	1282.4 ab	401.7	1884.8 b	247.2	3590 a
Dynasty CST 125 FS	0.034 mg ai/seed							
Cruiser 5 FS	0.342 mg ai/seed							
AVICTA 4.17 FS	0.145 mg ai/seed							
A9890	40 g ai 100 kg seed							
7. A15436	31 g ai 100 kg seed	3.9	3.2 b	2054.8 a	448.1	2518.4 b	324.5	3420 b
Dynasty CST 125 FS	0.034 mg ai/seed							
Cruiser 5 FS	0.342 mg ai/seed							
AVICTA 4.17 FS	0.145 mg ai/seed							
A9890	40 g ai 100 kg seed							
A9625	1.0 g ai/100 kg seed							
8. Mertect 500 SC	20.0 g 100 kg seed	3.7	3.9 ab	1653.2 a	401.7	1529.6 b	170.0	3429 b
A15436	31 g ai 100 kg seed							
Dynasty CST 125 FS	0.034 mg ai/seed							
Cruiser 5 FS	0.342 mg ai/seed							
AVICTA 4.17 FS	0.145 mg ai/seed							
9. A15436	31 g ai 100 kg seed	3.7	3.5 ab	1251.4 b	463.5	5006 a	664.35	3539 a
Allegiance –FL	15.0 g 100 kg seed							
Baytan 30	5.0 g 100 kg seed							
Trilex Flowable	10 g ai/100 kg seed							
STP15273	0.375 mg ai/seed							
STP17217	0.375 mg ai/seed							
10. A15436	31 g ai 100 kg seed	3.3	3.7 ab	1050.6 b	185.4	1730.6 b	463.5	3737 a
Temik 15 G	5 lb/A							
LSD ($P \leq 0.10$)		***NS[3]***	***0.5***	***1610.7***	***NS***	***2058.2***	***NS***	***264***
SD		***0.6***	***0.5***	***1589.3***	***263.4***	***1932.5***	***344.9***	***248***
CV		***1.6***	***13.7***	***87.1***	***73.5***	***80.5***	***83.6***	***7.1***

[1] Stand counted from 10 feet of row and averaged.
[2] Plant vigor ratings scale from 1 to 5 with 5 being the most vigorous and 1 the least.
[3] NS indicates that there was no significant difference ($P \leq 0.10$).
Means within columns followed by different letters are significantly different according to Fisher's LSD ($P \leq 0.10$).

Evaluation of Experimental Nematicide Seed Treatments for Reniform Nematode Management in Cotton in North Alabama, 2008

K. S. Lawrence, S. R. Moore, C. H. Burmester, and B. E. Norris

Experimental seed treatment nematicides were evaluated for the management of reniform nematodes in a naturally infested producer's field near the Tennessee Valley Research and Extension Center in Belle Mina, Alabama. The field has a history of reniform nematode infestation, and the soil type is a Decatur silty loam (24 percent sand, 49 percent silt, 28 percent clay). The seed treatments were applied to DPL444BG/RR cotton seed by Syngenta. Temik 15G (5 pounds per acre) was applied at planting on April 30 in the seed furrow with chemical granular applicators attached to the planter. Plots consisted of two rows, 25-foot long with a 40-inch row spacing, and were arranged in a randomized complete block design with five replications. All plots were maintained throughout the season with standard herbicide, insecticide, and fertility production practices as recommended by the Alabama Cooperative Extension System. Population densities of the reniform nematode were determined at 35, 63, 97, and 154 days after planting. Ten soil cores, 1 inch in diameter and 6 inches deep, were collected from the two rows of each plot in a systematic sampling pattern. Nematodes were extracted using the gravity sieving and sucrose centrifugation technique. Plots were harvested on October 3. Data were statistically analyzed by GLM and means compared using Fisher's protected least significant difference test ($P \leq 0.10$). Monthly average maximum temperatures from planting in late April through harvest in early October were 71.1, 78.4, 89.3, 91.1, 88.3, and 83.3 degrees F with average minimum temperatures of 48.9, 57.3, 65.9, 67.5, 66.4, and 62.5 degrees F, respectively. Rainfall accumulation for each month was 3.6, 4.0, 2.6, 2.3, 4.8, and 0.8 inches with a total of 18.2 inches.

The drought continued in 2008 but was not as severe as in 2007. Reniform nematode pressure was moderate and secondary to the lack of rainfall during bloom. Reniform nematode numbers at planting averaged 1716 vermiform life stages per 150 cm^3 of soil at planting. Plant stand was not affected by any nematicide application as compared to the control A15436 + Cruiser 5 FS (treatment one) and all stands were in the optimum range of three plants per foot of row. Plant vigor was visually improved ($P \leq 0.10$) in six of the eight seed treatments as compared to the control A15436 + Cruiser 5 FS (treatment one). The A15436, Dynasty CST 125 FS, A16115, + EXC3405 (treatment eight) appeared to suffer some phytotoxicity. Reniform numbers were lower ($P \leq 0.10$) at 30 days after planting on June 4 in the combination treatment of A15436, Dynasty 100FS + A16115 (treatment five) as compared to A15436, Allegiance-FL, Baytan 30 Trilex F, STO15273, and STP17217 (treatment nine) but not the control A15436 + Cruiser 5 FS (treatment one). However a lack of rainfall in June and July reduced nematode numbers below expected populations and no differences were observed between any treatments. The total reniform numbers across the season were reduced 60 percent in the A15436, Dynasty 100FS + A16115 (treatment five) as compared to the control A15436 + Cruiser 5 FS. Seed cotton yields varied by 462 pounds per acre at harvest with an average of 2031 pounds per acre of seed cotton produced over all nematicide treatments. None of the experimental seed treatment nematicides nor the standard A15436 + Temik 15 G (treatment two) increased yield ($P \leq 0.10$) as compared to the control A15436 + Cruiser 5 FS (treatment one). However, A15436, Dynasty 100FS + A16115 (treatment six); A15436, A16115, Dynasty 100FS + EXC3405 (treatment seven); and A15436, Allegiance-FL, Baytan 30 Trilex F, STO15273, and STP17217 (treatment nine) increased yields ($P \leq 0.10$) as compared to the A15436, Dynasty CST 125 FS, A16115, + EXC3405 (treatment eight), which had appeared to suffer some phytotoxicity early in the season.

EFFECT OF NEMATICIDE SEED TREATMENTS ON STAND, PLANT VIGOR, NEMATODE NUMBERS, AND SEED COTTON YIELD

Treatment	Rate	Stand/1-ft row[1] 13 May	Plant vigor[2] 4 Jun	—*Rotylenchulus reniformis*/150cm³ soil— 4 Jun	2 Jul	5 Aug	6 Oct	Seed cotton *lb/A*
1. A15436	31.0 g ai/100 kg	3.78	3.0 b	2008.3 a	339.9	988.8	972.1	2159
Cruiser 5 FS	0.342 mg ai/seed							
2. A15436	31.0 g ai/100 kg	3.42	3.4 a	679.8 a	139.1	633.8	885.8	1925
Temik 15 G	5 lb/A							
3. A15436	31.0 g ai/100 kg	3.84	3.6 a	1514.1 a	92.7	726.0	978.5	1854
Dynasty 100 FS	0.034 mg ai/seed							
Cruiser 5 FS	0.342 mg ai/seed							
AVICTA 4.17 FS	0.145 mg ai/seed							
4. A15436	31.0 g ai/100 kg	4.04	3.2 ab	1436.9 a	309.0	954.0	1091.8	2010
Dynasty 100 FS	0.034 mg ai/seed							
A16115	0.5 mg ai/seed							
5. A15436	31.0 g ai/100 kg	3.22	3.6 a	339.9 b	216.3	509.8	664.4	1970
Dynasty 100 FS	0.034 mg ai/seed							
A16115	0.5 mg ai/seed							
6. A15436	31.0 g ai/100 kg	3.60	3.5 a	741.6 a	123.6	1128.2	1313.3	2213
Dynasty 100 FS	0.034 mg ai/seed							
A16115	0.5 mg ai/seed							
7. A15436	31.0 g ai/100 kg	3.46	3.4 a	973.4 a	293.6	1637.6	1339.0	2227
A16115	0.5 mg ai/seed							
Dynasty 100 FS	0.034 mg ai/seed							
EXC3405	29.57 ml/100 kg							
8. A15436	31.0 g ai/100 kg	3.44	2.0 c	1529.6 a	154.5	1313.4	1313.3	1787
Dynasty 100 FS	0.034 mg ai/seed							
A16115	0.5 mg ai/seed							
EXC3405	29.57 ml/100 kg							
9. A15436	31.0 g ai/100 kg	3.30	3.4 a	2302.1 a	139.1	1498.8	1066.1	2249
Allegaince-LS	15.0 g ai/100 kg							
Baytan 30	5.0 g ai/100 kg							
Trilex F	10.0 g ai/100 kg							
STP15273	0.375 mg ai/seed							
STP17217	0.375 mg ai/seed							
LSD (P ≤ 0.10)		***NS[3]***	***0.3***	***1811.1***	***NS***	***NS***	***NS***	***NS***
SD		***4.9***	***0.3***	***1687.5***	***240.0***	***1136.1***	***832.3***	***387.7***
CV		***13.8***	***9.0***	***131.8***	***119.5***	***108.9***	***77.8***	***19.0***

[1] Stand counted from 10 feet of row and averaged.
[2] Plant vigor ratings scale from 1 to 5 with 5 being the most vigorous and 1 the least.
[3] NS indicates that there was no significant difference (P≤ 0.10).
Means within columns followed by different letters are significantly different according to Fisher's LSD (P ≤ 0.10).

Evaluation of Starter Fertilizer as a Means for Reniform Nematode Control in South Alabama, 2008

N. S. Sekora, K. S. Lawrence, J. D. Castillo, S. R. Moore, and J. R. Akridge

Evaluations were carried out at a field site in Huxford, Alabama with sandy loam soil. At the soil depth of 4 inches on May 6 (day of planting), soil temperature was 75 degrees F with adequate moisture. The manufacturer applied all fungicide seed treatments. All other treatments were applied with a chemical applicator attached to the planter. Temik 15G (5 pounds per acre) was applied in the seed furrow at planting by granular applicators attached to the planter. Plots consisted of a randomized complete block arrangement of two 25-foot rows spaced 40 inches apart. Nematode samples were taken by collecting ten soil cores (each 1 inch in diameter and 6 inches deep) randomly from the two rows of each plot. Nematodes were extracted from the soil samples by gravity sieving and sucrose centrifugation. All other production practices for herbicides, fertilizers, and insecticides were carried out as recommended by the Alabama Cooperative Extension System. Test plots were harvested on October 10. The SAS General Linear Models program was used for analysis of variance, and Fisher's protected least significant difference (LSD) test was used for pairwise means comparisons. Average maximum temperatures for May 6 through October 10 were 87.4, 93.3, 92.8, 90.4, 88.0, and 83.9 degrees F, respectively, and average minimum temperatures were 64.8, 69.6, 71.5, 71.4, 67.3, and 59.4 degrees F, respectively. Rainfall totals for May 6 through October 10 were 2.80, 7.32, 5.04, 9.46, 1.68, and 1.61 inches, respectively. Total rainfall over the growing season was 27.9 inches.

Moderate conditions were present for *Rotylenchulus reniformis* impact this year. At both 29 days after planting and 44 days after planting, no difference was observed in *R. reniformis* numbers within plots. However, differences in *R. reniformis* numbers were observed at both 77 days after planting and at harvest. Numbers at 77 days after planting ranged from 1236 to 8729 nematodes/150cm^3 soil. Treatment one plots (nitrogen) had significantly fewer nematodes/150cm^3 soil than treatment two (nitrogen phosphorus) and treatment three (worm tea of fermented worm castings) plots. Overall, all of the treatments were similar to the control at 77 days after planting. At harvest, treatment three (worm tea) had significantly lower populations of *R. reniformis* per 150cm^3 soil than the control and both nitrogen-based treatments. The decreased populations did not impact yield, since no significant difference in yield was observed among treatments. Plot yields ranged from 2213 to 3551 pounds per acre with a mean of 2861 pounds per acre.

Evaluation of Starter Fertilizer as a Means for Reniform Nematode Control in Southern Alabama, 2008

Treatment	Vigor[1] 4 Jun	Total number of nematodes/150cm^3 soil: *R. reniformis* 4 Jun	*R. reniformis* 9 Jul	*R. reniformis* 11 Aug	*R. reniformis* 10 Oct	Seed yield *lb/A* 10 Oct
1. Nitrogen 20 lb/A	3.3	185.4	1514.1	1993.0 b	3460.8 a	2874
2. Nitrogen 20 lb/A Phosphorus 19 lb/A	3.6	185.4	1081.5	4357.0 a	4171.5 a	2837
3. Worm tea	3.7	401.7	818.9	4511.6 a	1931.3 b	2817
4. Control	3.5	525.3	1622.3	3692.8 ab	3182.7 a	2916
LSD (P ≤ 0.10)	***NS[2]***	***NS***	***NS***	***2022.2***	***1102.5***	***NS***

[1] Vigor ratings based on 1-5 scale, 1 being least vigorous and 5 being the most vigorous.
[2] NS indicates that there was no significant difference (P≤ 0.10).
Means within columns followed by different letters are significantly different according to Fisher's LSD (P ≤ 0.10).

Evaluation of Starter Fertilizer as a Means for Reniform Nematode Control in North Alabama, 2008

N. S. Sekora, K. S. Lawrence, J. D. Castillo, S. R. Moore, C. H. Burmister, and B. E. Norris

The field site was a sandy loam soil. The soil temperature was 70.0 degrees F with adequate moisture at a soil depth of 4 inches on April 29 (day of planting). The manufacturer applied all fungicide seed treatments and all other treatments were applied with a chemical applicator attached to the planter. Temik 15G (5 pounds per acre) was applied in the seed furrow at planting by granular applicators attached to the planter. Plots consisted of a randomized complete block arrangement of blocks with two 25-foot rows spaced 40 inches apart per plot. Nematode samples were taken by collecting ten soil cores (each 1 inch in diameter and 6 inches deep) randomly from the rows within each plot. Nematodes were extracted from the soil samples by combined gravity sieving and sucrose centrifugation. All other production practices for herbicides, fertilizers, and insecticides were carried out as recommended by the Alabama Cooperative Extension System. Test plots were harvested on September 18. The SAS General Linear Models program was used for analysis of variance, and Fisher's protected least significant difference (LSD) test was used for pairwise treatment mean comparisons. Average monthly maximum temperatures for April 29 through October 3 were 65.0, 78.4, 89.3, 91.1, 88.3, 88.0, 78.0 degrees F, respectively, and average minimum temperatures were 38.0, 57.3, 65.9, 67.5, 66.4, 67.3, and 46.7 degrees F, respectively. Total rainfall over the growing season was 15.5 inches and monthly rainfall totals for April 29 through October 10 were 0.00, 4.00, 2.66, 2.26, 4.81, 1.68, and 0.00 inches, respectively.

Growing conditions for cotton were moderate this year, but dry during the bloom period. Initial populations of *Rotylenchulus reniformis* at 36 days after planting were significantly lower in the treatment one (nitrogen) plots than treatment four (control), though not significantly different from treatment two (nitrogen phosphorus) or treatment three (worm tea of fermented worm castings). Populations of *R. reniformis* per 150cm^3 soil showed no significant difference among treatments at both 65 days after planting and 96 days after planting. At harvest, treatment one (nitrogen) and treatment four (control) had significantly lower populations of *R. reniformis* than treatment three (worm tea). Treatment two (nitrogen phosphorus) was not significantly different from any other treatment. The population differences among treatments at harvest did not impact yield. Though no significant difference in yield was observed among treatments, plot yields ranged from 3136 to 4710 pounds per acre with a mean of 4147 pounds per acre. Differences among treatments were likely not observed due to drought conditions at the test site during the cotton bloom period.

Evaluation of Starter Fertilizer as a Means for Reniform Nematode Control in North Alabama, 2008

Treatment	Stand/25-ft row	Total number of nematodes/150cm^3 soil				Seed yield
		R. reniformis	*R. reniformis*	*R. reniformis*	*R. reniformis*	*lb/A*
	13 May	4 Jun	3 Jul	5 Aug	6 Oct	3 Oct
1. Nitrogen 20 lb/A	55.6	324.6 b	185.4	1483.2	216.3 b	4052
2. Nitrogen 20 lb/A Phosphorus 19 lb/A	48.4	880.6 ab	160.0	1143.3	339.9 ab	4120
3. Worm tea	53.8	648.8 ab	216.3	2024.0	664.4 a	4226
4. Control	50.2	1143.2 a	200.9	1606.8	170.0 b	4191
LSD (P ≤ 0.10)	***NS[1]***	***585.8***	***NS***	***NS***	***440.4***	***NS***

[1] NS indicates that there was no significant difference (P≤ 0.10).

Means within columns followed by different letters are significantly different according to Fisher's LSD (P ≤ 0.10).

EVALUATION OF AERIS SEED TREATMENT AND GRANULAR NEMATICIDES FOR RENIFORM NEMATODE MANAGEMENT IN SOUTH ALABAMA, 2008

K. S. Lawrence, S. R. Moore, J. D. Castillo, N. S. Sekora, and J. R. Akridge

Experimental seed treatments were evaluated for the management of reniform nematodes in a naturally infested producer's field near Huxford, Alabama. The field has a history of reniform nematode infestation, and the soil type is a Ruston very fine sandy loam (59 percent sand, 33 percent silt, 8 percent clay). The seed treatments were applied to ST 4554 Flex B2 cotton seed by Bayer Crop Science. Temik 15G (5 pounds per acre) was applied at planting on May 6 in the seed furrow with chemical granular applicators attached to the planter. Plots consisted of two rows, 25 feet long with 3-foot row spacing, and were arranged in a randomized complete block design with six replications. All plots were maintained throughout the season with standard herbicide, insecticide, and fertility production practices as recommended by the Alabama Cooperative Extension System. Population densities of the reniform nematode were determined at 30, 63, 96, and 155 days after planting. Ten soil cores, 1 inch in diameter and 6 inches deep, were collected from the two rows of each plot in a systematic sampling pattern. Nematodes were extracted using the gravity sieving and sucrose centrifugation technique. Plots were harvested on October 3. Data were statistically analyzed by GLM and means compared using Fisher's protected least significant difference test ($P \leq 0.10$). Monthly average maximum temperatures from planting in early May through harvest in early October were 86.5, 93.3, 92.8, 90.4, and 88.8 degrees F with average minimum temperatures of 63.6, 69.6, 71.5, 71.4, and 67.3 degrees F, respectively. Rainfall accumulation for each month was 3.6, 7.3, 5.0, 9.5, and 1.7 inches with a total of 27 inches.

The drought continued in 2008 but was not as severe as in 2007. Thus, reniform nematode pressure was moderate. Reniform nematode numbers at planting averaged 47 vermiform life stages per 150 cm^3 of soil at planting, which is low, but the soil moisture was 6.0 percent. Plant stand was greater in Aeris + Temik 15 G (treatment four) and Abermectin + Temik 15 G (treatment five) as compared to Abermectin alone (treatment three) but not from the control (treatment one) and all stands were within the optimum of three plants per foot of row. Plant vigor was visually improved in these same seed treatments + Temik 15 G combinations as compared to the control (treatment one). Reniform numbers were similar between all treatments at 30 days after planting, although only 3.6 inches of rain had been recorded during this month. By July the seed treatment + Temik 15 G combination treatments (treatments four, five, six, and seven) supported 56 percent fewer reniform as compared to the untreated control; however, these reduced numbers were not significant. At mid-season, August 11, the combination seed treatment + Temik 15 G continued to support fewer reniform ($P \leq 0.10$) as compared to the control. By harvest reniform numbers had dropped in all treatments except for Abermectin + Temik 15 G SD (treatment seven). Seed cotton yields varied by 530 pounds per acre at harvest with an average of 2973 pounds per acre of seed cotton produced over all nematicide treatments.

EFFECT OF NEMATICIDE SEED TREATMENTS ON STAND, PLANT VIGOR, NEMATODE NUMBERS, AND SEED COTTON YIELD

Treatment	Rate	Stand/1-ft row[1] 6 Jun	Plant vigor[2] 4 Jun	—*Rotylenchulus reniformis*/150cm³ soil— 6 Jun	9 Jul	11 Aug	11 Oct	Seed cotton *lb/A*
1. Untreated		3.9 ab	3.3 b	283.3	3660.8	8819.4 a	4184.4 b	2994 ab
2. Aeris	0.75 mg ai/seed	4.1 ab	3.5 b	206.0	3575.0	6295.9 a	3643.6 b	2998 ab
3. Abermectin	500.4 mg ai/seed	3.2 b	3.4 b	154.5	3029.9	8175.6 a	4287.4 b	3180 a
4. Aeris	0.75 mg ai/seed	4.5 a	4.0 a	180.3	1763.9	6115.6 b	3695.1 b	2650 b
Temik 15G	5 lb/A							
5. Abermectin	500.4 mg ai/seed	4.2 a	3.8 a	399.1	1137.3	5832.4 b	3128.6 b	2912 ab
Temik 15G	5 lb/A							
6. Aeris	0.75 mg ai/seed	3.9 ab	3.7 a	218.9	1802.5	6759.4 a	3759.5 b	3101 a
Temik 15G SD[3]	5 lb/A							
7. Abermectin	500.4 mg ai/seed	3.8 ab	3.6 ab	218.9	1708.1	8252.9 a	8046.9 a	3135 a
Temik 15G SD	5 lb/A							
8. Temik 15G	5 lb/A	4.1 ab	3.3 b	141.6	2503.1	9707.8 a	3115.8 b	2817 ab
LSD (P≤ 0.10)		***0.9***	***0.3***	***NS[4]***	***NS***	***3564.6***	***2001.0***	***422***
SD		***9.0***	***0.4***	***228.9***	***2562.9***	***3638.2***	***2042.3***	***430***
CV		***22.5***	***10.2***	***101.6***	***106.9***	***48.5***	***48.3***	***14.49***

[1] Stand counted from 10 feet of row and averaged.
[2] Plant vigor ratings scale from 1 to 5 with 5 being the most vigorous and 1 the least.
[3] Sidedress application of the granule at pin head square growth stage.
[4] NS indicates that there was no significant difference (P≤ 0.10).
Means within columns followed by different letters are significantly different according to Fisher's LSD (P ≤ 0.10).

Evaluation of Experimental Biological Nematicide Seed Treatments for Reniform Nematode Management in Cotton in South Alabama, 2008

K. S. Lawrence, S. R. Moore, J. D. Castillo, N. S. Sekora, and J. R. Akridge

Experimental seed treatments were evaluated for the management of reniform nematodes in a naturally infested producer's field near Huxford, Alabama. The field has a history of reniform nematode infestation, and the soil type is a Ruston very fine sandy loam (59 percent sand, 33 percent silt, 8 percent clay). The seed treatments were applied to DPL555BG/RR cotton seed by Bayer Crop Science. Temik 15G (5 pounds per acre) was applied at planting on May 6 in the seed furrow with chemical granular applicators attached to the planter. Plots consisted of two rows, 25 feet long with 3-foot row spacing, and were arranged in a randomized complete block design with six replications. All plots were maintained throughout the season with standard herbicide, insecticide, and fertility production practices as recommended by the Alabama Cooperative Extension System. Population densities of the reniform nematode were determined at 30, 63, 96, and 155 days after planting. Ten soil cores, 1 inch in diameter and 6 inches deep, were collected from the two rows of each plot in a systematic sampling pattern. Nematodes were extracted using the gravity sieving and sucrose centrifugation technique. Plots were harvested on October 3. Data were statistically analyzed by GLM and means compared using Fisher's protected least significant difference test ($P \leq 0.10$). Monthly average maximum temperatures from planting in early May through harvest in early October were 86.5, 93.3, 92.8, 90.4, and 88.8 degrees F with average minimum temperatures of 63.6, 69.6, 71.5, 71.4, and 67.3 degrees F, respectively. Rainfall accumulation for each month was 3.6, 7.3, 5.0, 9.5, and 1.7 inches with a total of 27 inches.

The drought continued in 2008 but was not as severe as in 2007. Reniform nematode pressure was moderate and secondary to the lack of rainfall during bloom. Reniform nematode numbers at planting averaged 56 vermiform life stages per 150 cm^3 of soil at planting. Plant stand was similar between all experimental seed treatments with cotton plant stands in the optimum range of three plants per foot of row. The skip index, indicating stand uniformity, was higher in the Baytan 30 + Vortex FL + Allegiance FL + Aeris seed applied system (treatment four) as compared to the Baytan 30 + Vortex FL + Allegiance FL + Gaucho Grande (treatment one) industry standard. Reniform numbers were higher ($P \leq 0.10$) in the Baytan 30 + Vortex FL + Allegiance FL + Aeris (treatment three) combination as compared to the Baytan 30 + Vortex FL + Allegiance FL + Gaucho Grande (treatment one) industry standard control at 30 days after planting. However, by 63 days after planting, no differences in nematode numbers were observed between any treatments. At midseason, nematode numbers increased in the Baytan 30 + Vortex FL + Allegiance FL + Crusier 600FS +Avicta 500FS (treatment eight) as compared to Baytan 30 + Vortex FL + Allegiance FL + Aeris (treatment three) combination and the Baytan 30 + Vortex FL + Allegiance FL +Aeris + with *Bacillus firmus* (treatment four). By harvest, the seed treatment combination Baytan 30 + Vortex FL + Allegiance FL + test compound 1 (treatment six) held nematode numbers below that in the Baytan 30 + Vortex FL + Allegiance FL + Aeris treatment (treatment three). Seed cotton yields varied by 173 pounds per acre at harvest with an average of 2752 pounds per acre of seed cotton produced over all nematicide treatments. None of the experimental seed treatment nematicides increased yield ($P \leq 0.10$) as compared to the control. The lack of rainfall during the bloom period caused plant stress and probably reduced yield differences due to the nematode.

Seed Treatment Effects on Cotton Stand, Skip Index, Nematode Numbers, and Seed Cotton Yield

Treatment	Rate	Stand/ 1-ft row[1] 4 Jun	Skip index[2] 4 Jun	—*Rotylenchulus reniformis*/150cm³ soil— 4 Jun	7 Jul	11 Aug	6 Oct	Seed cotton *lb/A*
1. Baytan 30	32.5 ml/100 kg	3.4	0.2 b	154.5	1686.8	5716.7 ab	1648.0 b	2736
Vortex FL	2.5 g ai/100 kg							
Allegiance FL	15.6 g ai/100 kg							
Gaucho Grande	0.375 mg ai/seed							
2. Baytan 30	32.5 ml/100 kg	3.1	0.3 b	193.1	2343.3	6399.0 ab	2884.0 ab	2732
Vortex FL	2.5 g ai/100 kg							
Allegiance FL	15.6 g ai/100 kg							
Aeris	0.75 mg ai/seed							
3. Baytan 30	32.5 ml/100 kg	3.3	0.3 b	450.6	1802.8	4532.2 b	3437.6 a	2726
Vortex FL	2.5 g ai/100 kg							
Allegiance FL	15.6 g ai/100 kg							
Aeris	0.75 mg ai/seed							
Bacillus firmus tech	1.0 g/100 kg							
4. Baytan 30	32.5 ml/100 kg	2.9	2.0 a	154.5	1970.0	4673.7 b	2652.3 ab	2663
Vortex FL	2.5 g ai/100 kg							
Allegiance FL	15.6 g ai/100 kg							
Aeris	0.75 mg ai/seed							
Bacillus firmus tech	1.0 g/100 kg							
5. Baytan 30	32.5 ml/100 kg	2.8	1.0 ab	193.1	2111.7	5703.7 ab	2343.3 ab	2782
Vortex FL	2.5 g ai/100 kg							
Allegiance FL	15.6 g ai/100 kg							
Aeris	0.75 mg ai/seed							
Bacillus firmus tech	1.0 g/100 kg							
6. Baytan 30	32.5 ml/100 kg	3.0	1.5ab	218.9	2279.0	5111.7ab	1828.3b	2836
Vortex FL	2.5 g ai/100 kg							
Allegiance FL	15.6 g ai/100 kg							
Test compound 1	1.0 g/100 kg							
7. Baytan 30	32.5 ml/100 kg	3.0	0.8ab	257.5	1725.7	6025.7ab	2420.5ab	2735
Vortex FL	2.5 g ai/100 kg							
Allegiance FL	15.6 g ai/100 kg							
Gaucho Grande	0.375 mg ai/seed							
Bacillus firmus tech	1.0 g/100 kg							
8. Baytan 30	32.5 ml/100 kg	2.9	0.8 ab	244.6	2369.2	7081.2 a	2188.8 ab	2795
Vortex FL	2.5 g ai/100 kg							
Allegiance FL	15.6 g ai/100 kg							
Crusier 600FS	0.34 mg ai/seed							
Avicta 500FS	0.15 mg ai/seed							
LSD (P=0.10)		***NS[3]***	***1.5***	***NS***	***NS***	***2348.5***	***1382.3***	***NS***
Standard Deviation		***0.8***	***1.6***	***195.2***	***1540.1***	***2397.0***	***1410.8***	***239.3***
CV		***2.6***	***176.7***	***83.7***	***75.6***	***42.4***	***58.2***	***8.7***

[1] Stand counted from 10 feet of row and averaged.
[2] Skip index is a measure of uniformity of the stand across the row. The higher the number, the more space between plants with 1 = 1 foot of empty row and 25 = 25 feet of row.
[3] NS indicates that there was no significant difference (P≤ 0.10).
Means within columns followed by different letters are significantly different according to Fisher's LSD (P ≤ 0.10).

Evaluation of Cotton Seed Treatment and Granular Nematicides for Reniform Nematode Management in South Alabama, 2008

K. S. Lawrence, S. R. Moore, J. D. Castillo, N. S. Sekora, and J. R. Akridge

Experimental seed treatments were evaluated for the management of reniform nematodes in a naturally infested producer's field near Huxford, Alabama. The field has a history of reniform nematode infestation, and the soil type is a Ruston very fine sandy loam (59 percent sand, 33 percent silt, 8 percent clay). The seed treatments were applied to DPL555BG/RR cotton seed by Syngenta. Temik 15G (5 pounds per acre) was applied at planting on May 6 in the seed furrow with chemical granular applicators attached to the planter. Plots consisted of two rows, 25 feet long with a 3-foot row spacing ,and were arranged in a randomized complete block design with six replications. All plots were maintained throughout the season with standard herbicide, insecticide, and fertility production practices as recommended by the Alabama Cooperative Extension System. Population densities of the reniform nematode were determined at 30, 63, 96, and 155 days after planting. Ten soil cores, 1 inch in diameter and 6 inches deep, were collected from the two rows of each plot in a systematic sampling pattern. Nematodes were extracted using the gravity sieving and sucrose centrifugation technique. Plots were harvested on October 3. Data were statistically analyzed by GLM and means compared using Fisher's protected least significant difference test ($P \leq 0.10$). Monthly average maximum temperatures from planting in early May through harvest in early October were 86.5, 93.3, 92.8, 90.4, and 88.8 degrees F with average minimum temperatures of 63.6, 69.6, 71.5, 71.4, and 67.3 degrees F, respectively. Rainfall accumulation for each month was 3.6, 7.3, 5.0, 9.5, and 1.7 inches with a total of 27 inches.

The drought continued in 2008 but was not as severe as in 2007. Thus reniform nematode pressure was moderate. Reniform nematode numbers at planting averaged 52 vermiform life stages per 150 cm^3 of soil at planting. Plant stand was similar ($P \leq 0.10$) to the control A15436 + Cruiser 5 FS (treatment one) in all treatments except for A15436 + Temik 15G (treatment ten). The A15436 + Temik 15G (treatment ten) seed treatment plus granular nematicide produced a stand of less than the optimum three plants per foot of row. The skip index was greater in the A15436 + Temik 15G (treatment ten) and A15436, Allegiance FL, Bayan 30, Trilex F, STP 15273, and STP 17217 (treatment nine) as compared to the control A15436 + Cruiser 5 FS (treatment one). Reniform numbers were lower than expected at 30 days after planting on June 4 due to the dry weather. None of the nematicide combinations reduced nematode numbers as compared to the control A15436 + Cruiser 5 FS (treatment one). Reniform numbers increased in July with all nematicde treatments supporting lower populations ($P \leq 0.10$) than A15436 + Cruiser 5 FS (treatment one), the control. By mid-season on August 11 and at harvest on October 6, nematode numbers had increased in all treatments and no differences were found between any treatments. At harvest, reniform numbers had dropped in all treatments. Seed cotton yields varied by 723 pounds per acre at harvest with an average of 2626 pounds per acre of seed cotton produced over all nematicide treatments. All of the experimental seed treatment nematicides yielded similarly to the control A15436 + Cruiser 5 FS; however, the standard A15436 + Temik 15 G (treatment ten) produced lower yields ($P \leq 0.10$) than all other seed treatments.

Seed Treatment Effects on Cotton Stand, Skip Index, Nematode Numbers, and Seed Cotton Yield

Treatment	Rate	Stand/ 1-ft row[1] 4 Jun	Skip index[2] 4 Jun	—*Rotylenchulus reniformis*/150cm³ soil— 4 Jun	7 Jul	11 Aug	6 Oct	Seed cotton *lb/A*
1. A15436	31 g ai 100 kg seed	3.4 a	1.7 b	154.5 ab	2858.5 a	4828.2	2072.9	2400 a
Cruiser 5 FS	0.342 mg ai/seed							
2. A15436	31 g ai 100 kg seed	3.0 ab	2.5 ab	115.9 b	1261.8 b	4390.5	1673.8	2655 a
Cruiser 5 FS	0.342 mg ai/seed							
A9625	1.0 g ai 100 kg seed							
3. A15436	31 g ai 100 kg seed	3.2 a	3.0 ab	257.5 a	1326.5 b	3785.3	2111.5	2603 a
Dynasty CST 125 FS	0.034 mg ai/seed							
Cruiser 5 FS	0.342 mg ai/seed							
AVICTA 4.17 FS	0.145 mg ai/seed							
4. A15436	31 g ai 100 kg seed	3.4 a	2.5 ab	193.1 ab	1532.3 b	4570.8	1982.8	2682 a
Dynasty CST 125 FS	0.034 mg ai/seed							
Cruiser 5 FS	0.342 mg ai/seed							
AVICTA 4.17 FS	0.145 mg ai/seed							
A9625	1.0 g ai 100 kg seed							
5. A15436	31 g ai 100 kg seed	3.4 a	1.8 b	90.1 b	1030.2 b	4635.3	2034.3	2814 a
Cruiser 5 FS	0.342 mg ai/seed							
A9890	40 g ai 100 kg seed							
6. A15436	31 g ai 100 kg seed	3.1 a	2.5 ab	115.9 b	1313.3 b	4686.5	1326.1	2671 a
Dynasty CST 125 FS	0.034 mg ai/seed							
Cruiser 5 FS	0.342 mg ai/seed							
AVICTA 4.17 FS	0.145 mg ai/seed							
A9890	40 g ai 100 kg seed							
7. A15436	31 g ai 100 kg seed	3.2 a	2.0 b	283.3 a	1828.5 a	3605.0	2394.8	2658 a
Dynasty CST 125 FS	0.034 mg ai/seed							
Cruiser 5 FS	0.342 mg ai/seed							
AVICTA 4.17 FS	0.145 mg ai/seed							
A9890	40 g ai 100 kg seed							
A9625	1.0 g ai/100 kg seed							
8. Mertect 500 SC	20.0 g 100 kg seed	3.4 a	1.3 b	167.4 ab	927.2 b	4351.8	1841.1	2663 a
A15436	31 g ai 100 kg seed							
Dynasty CST 125 FS	0.034 mg ai/seed							
Cruiser 5 FS	0.342 mg ai/seed							
AVICTA 4.17 FS	0.145 mg ai/seed							
9. A15436	31 g ai 100 kg seed	3.3 a	3.2 a	154.5 ab	1879.8 b	4313.2	2678.0	2787 a
Allegiance –FL	15.0 g 100 kg seed							
Baytan 30	5.0 g 100 kg seed							
Trilex Flowable	10 g ai/100 kg seed							
STP15273	0.375 mg ai/seed							
STP17217	0.375 mg ai/seed							
10. A15436	31 g ai 100 kg seed	2.2 b	3.8 a	257.5 a	2008.8 a	3746.7	1532.1	2091 b
Temik 15 G	5 lb/A							
LSD ($P \leq 0.10$)		***0.9***	***1.7***	***135.3***	***1219.8***	***NS[3]***	***NS***	***443***
SD		***0.9***	***1.7***	***139.2***	***1254.6***	***1925.5***	***1402.6***	***455.9***
CV		***2.9***	***7.2***	***77.8***	***78.6***	***44.9***	***71.4***	***17.5***

[1] Stand counted from 10 feet of row and averaged.

[2] Skip index is a measure of uniformity of the stand across the row. The higher the number, the more space between planst with 1 = 1 foot of empty row and 25 = 25 feet of row.

[3] NS indicates that there was no significant difference ($P \leq 0.10$).

Means within columns followed by different letters are significantly different according to Fisher's LSD ($P \leq 0.10$).

EVALUATION OF EXPERIMENTAL NEMATICIDE SEED TREATMENTS FOR RENIFORM NEMATODE MANAGEMENT IN COTTON IN SOUTH ALABAMA, 2008

K. S. Lawrence, S. R. Moore, J. D. Castillo, N. S. Sekora, and J. R. Akridge

Experimental seed treatments were evaluated for the management of reniform nematodes in a naturally infested producer's field near Huxford, Alabama. The field has a history of reniform nematode infestation, and the soil type is a Ruston very fine sandy loam (59 percent sand, 33 percent silt, 8 percent clay). The seed treatments were applied to DPL555BG/RR seed by Syngenta. Temik 15G (5 pounds per acre) was applied at planting on May 6 in the seed furrow with chemical granular applicators attached to the planter. Plots consisted of two rows, 25 feet long with a 3-foot row spacing, and were arranged in a randomized complete block design with six replications. All plots were maintained throughout the season with standard herbicide, insecticide, and fertility production practices as recommended by the Alabama Cooperative Extension System. Population densities of the reniform nematode were determined at 30, 63, 96, and 155 days after planting. Ten soil cores, 1 inch in diameter and 6 inches deep, were collected from the two rows of each plot in a systematic sampling pattern. Nematodes were extracted using the gravity sieving and sucrose centrifugation technique. Plots were harvested on October 3. Data were statistically analyzed by GLM and means compared using Fisher's protected least significant difference test ($P \leq 0.10$). Monthly average maximum temperatures from planting in early May through harvest in early October were 86.5, 93.3, 92.8, 90.4, and 88.8 degrees F with average minimum temperatures of 63.6, 69.6, 71.5, 71.4, and 67.3 degrees F, respectively. Rainfall accumulation for each month was 3.6, 7.3, 5.0, 9.5, and 1.7 inches with a total of 27.1 inches.

The drought continued in 2008 but was not as severe as in 2007. Reniform nematode pressure was moderate and secondary to the lack of rainfall during bloom. Reniform nematode numbers at planting averaged 56 vermiform life stages per 150 cm^3 of soil at planting. Plant stand was similar between all experimental seed treatments and the control A15436 + Cruiser 5 FS (treatment one); however the industry standard A15436 + Temik 15 G (treatment two) did have a lower stand ($P \leq 0.10$) as compared to the control A15436 + Cruiser 5 FS (treatment one).

The skip index was also lower in the industry standard A15436 + Temik 15 G (treatment two) as compared to the control A15436 + Cruiser 5 FS (treatment one). Reniform numbers were uniform across all treatments at 30 days after planting on June 4. By July 9, however, the A15436 + Dynasty CST + A16115 (treatment five) supported fewer reniform ($P \leq 0.10$) than the control A15436 + Cruiser 5 FS (treatment one) although the numbers were not lower than the A15436 + Temik 15 G (treatment two) standard. No differences in nematode numbers were observed at mid-season or at harvest on August 11 and October 6, respectively. The total reniform numbers across the season were reduced by an average of 20 percent over all experimental seed treatments as compared to the control. Seed cotton yields varied by 323 pounds per acre at harvest with an average of 2942 pounds per acre of seed cotton produced over all nematicide treatments. None of the experimental seed treatment nematicides nor the standard A15436 + Temik 15 G (treatment two) increased yield ($P \leq 0.10$) as compared to the control A15436 + Cruiser 5 FS (treatment one). The lack of rainfall during the bloom period caused plant stress and probably reduced yield differences due to the nematode.

Seed Treatment Effects on Cotton Stand, Skip Index, Nematode Numbers, and Seed Cotton Yield

Treatment	Rate	Stand/1-ft row[1] 4 Jun	Skip index[2] 4 Jun	—*Rotylenchulus reniformis*/150cm³ soil— 4 Jun	7 Jul	11 Aug	6 Oct	Seed cotton *lb/A*
1. A15436	31.0 g ai/100 kg	4.0 ab	0.7 b	167.4	1945.8	4995.5	2987.0	2992
Cruiser 5 FS	0.342 mg ai/seed							
2. A15436	31.0 g ai/100 kg	2.9 c	2.8 a	321.9	1287.7	4030.0	3154.4	2829
Temik 15 G	5 lb/A							
3. A15436	31.0 g ai/100 kg	3.9 abc	1.3 b	296.1	1855.2	4686.8	2935.5	2961
Dynasty 100 FS	0.034 mg ai/seed							
Cruiser 5 FS	0.342 mg ai/seed							
AVICTA 4.17 FS	0.145 mg ai/seed							
4. A15436	31.0 g ai/100 kg	3.6 abc	1.7 ab	334.8	1879.8	3875.7	3102.9	3024
Dynasty 100 FS	0.034 mg ai/seed							
A16115	0.5 mg ai/seed							
5. A15436	31.0 g ai/100 kg	4.2 a	0.5 b	167.4	850.0	4377.7	3205.9	2958
Dynasty 100 FS	0.034 mg ai/seed							
A16115	0.5 mg ai/seed							
6. A15436	31.0 g ai/100 kg	3.5 abc	1.7 ab	141.6	1660.8	5047.2	2330.4	2918
Dynasty 100 FS	0.034 mg ai/seed							
A16115	0.5 mg ai/seed							
7. A15436	31.0 g ai/100 kg	3.2 abc	1.5 ab	334.8	2047.0	3862.5	2533.8	3011
A16115	0.5 mg ai/seed							
Dynasty 100 FS	0.034 mg ai/seed							
EXC3405	29.57 ml/100 kg							
8. A15436	31.0 g ai/100 kg	3.5 abc	0.8 b	206.0	1815.5	4583.3	3579.3	2701
Dynasty 100 FS	0.034 mg ai/seed							
A16115	0.5 mg ai/seed							
EXC3405	29.57 ml/100 kg							
9. A15436	31.0 g ai/100 kg	2.9 bc	1.7 ab	283.3	1120.3	3849.8	3296.0	3008
Allegaince-LS	15.0 g ai/100 kg							
Baytan 30	5.0 g ai/100 kg							
Trilex F	10.0 g ai/100 kg							
STP15273	0.375 mg ai/seed							
STP17217	0.375 mg ai/seed							
LSD (P ≤ 0.10)		***0.7***	***1.3***	***NS[3]***	***NS***	***NS***	***NS***	***NS***
SD		***0.7***	***1.3***	***209.2***	***964.6***	***1708.5***	***1518.0***	***347.5***
CV		***1.92***	***94.9***	***83.6***	***60.0***	***39.1***	***50.4***	***10.5***

[1] Stand counted from 10 feet of row and averaged.

[2] Skip index is a measure of uniformity of the stand across the row. The higher the number, the more space between planst with 1 = 1 foot of empty row and 25 = 25 feet of row.

[3] NS indicates that there was no significant difference (P≤ 0.10).

Means within columns followed by different letters are significantly different according to Fisher's LSD (P ≤ 0.10).

Cotton Cultivar Response to Root-Knot Nematodes in Two Tillage Regimes, 2008

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Six cotton cultivars were evaluated for yield response to the root-knot nematode in a naturally infested field at E. V. Smith Research and Extension Center, near Shorter, Alabama. The field had a long history of root-knot nematode infestation, and the soil type was classified as a sandy loam. Plots consisted of four rows, 50 feet long with 36-inch row spacing, and were planted in a factorial arrangement with five replications. Convention tillage and no tillage were the main factors and cotton cultivar was the sub factor with plots split with and without nematicide. Avicta amd Cruiser was applied to the seed by the manufacturer. Temik 15G (5 pounds per acre) was applied at planting on May 23 in the seed furrow with chemical granular applicators attached to the planter. All plots were maintained throughout the season with standard herbicide, insecticide, and fertility production practices as recommended by the Alabama Cooperative Extension System. Population densities of the root knot nematodes were determined at mid-seasons after a significant rainfall event. Ten soil cores, 1 inch in diameter and 6 inches deep, were collected from the two rows of each plot in a systematic sampling pattern. Nematodes were extracted using the gravity sieving and sucrose centrifugation technique. Plant height and nodes per plant were also recorded at this time. Plots were harvested on October 22. Data were statistically analyzed by GLM and means compared using Fisher's protected least significant difference test ($P \leq 0.10$). Monthly average maximum temperatures for May through September were 84.5, 93.6, 92.5, 89.7, and 86.7 degrees F with average minimum temperatures of 60.9, 68.2, 70.0, 71.1, and 66.0 degrees F, respectively. Rainfall accumulation for each month was 2.52, 1.98, 4.97, 9.92, and 0.73 inches with a total of 20.1 inches.

Rainfall was a limiting factor in the 2008 season; thus, root-knot nematode pressure was moderate under these conditions. Only 20 inches of rain were recorded for the entire growing season. At planting, root-knot nematode numbers averaged 51 J2's per 150 cm^3 of soil. Interactions between cultivar, tillage, and nematicide were observed for plant height and nodes per plant. Root-knot numbers of J2 from the soil varied between varieties with the lowest numbers observed in DPL 117, STM, and ST 5599. Over all cultivars, no tillage plots contained higher numbers of root-knot nematodes than conventionally tilled plots. Nematicide application did not consistently reduce root-knot numbers across cultivars. Seed cotton yields averaged 3708 pounds per acre across all cultivars with ST 5599 and STM producing a greater yield ($P \leq 0.01$) than DPL 555, DPL 515, DPL 117, and DPL 143. Nematicide and tillage did not affect seed cotton yields ($P \leq 0.01$).

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Variety	Tillage[1]	Nematicide	Plant height	Nodes/plant	*Meloidogyne incognita* J2 14 Aug	Seed cotton 16 Oct
			in	*no.*	N[2]	*lb/A*
DPL 117	Conv	Avicta+Temik	39.7	19.3	115.9	3535
DPL 117	Conv	Cruiser	42.3	17.8	115.9	3694
DPL 117	No-till	Avicta+Temik	40.4	18.3	579.4	3631
DPL 117	No-till	Cruiser	44.6	19.3	424.9	3631
DP143	Conv	Avicta+Temik	33.7	15.5	115.9	3502
DP143	Conv	Cruiser	37.7	16.5	231.8	3913
DP143	No-till	Avicta+Temik	38.1	17.8	1332.6	3643
DP143	No-till	Cruiser	44.2	19.5	927.0	3790
DP515	Conv	Avicta+Temik	40.5	18.8	193.1	3655
DP515	Conv	Cruiser	41.1	18.8	173.8	3603
DP515	No-till	Avicta+Temik	40.7	20.3	695.3	3433
DP515	No-till	Cruiser	46.2	21.0	598.7	3577
DP555	Conv	Avicta+Temik	43.0	20.0	193.1	3415
DP555	Conv	Cruiser	44.5	19.0	637.3	3522
DP555	No-till	Avicta+Temik	41.5	19.8	984.9	3548
DP555	No-till	Cruiser	46.6	21.3	1100.8	3662
ST5599	Conv	Avicta+Temik	39.3	16.8	193.1	3836
ST5599	Conv	Cruiser	39.3	18.0	212.4	3906
ST5599	No-till	Avicta+Temik	37.1	16.0	560.1	3981
ST5599	No-till	Cruiser	40.6	17.5	521.4	4075
STM	Conv	Avicta+Temik	35.7	18.0	173.8	3812
STM	Conv	Cruiser	37.0	18.0	115.9	3777
STM	No-till	Avicta+Temik	37.5	18.0	309.0	3935
STM	No-till	Cruiser	37.7	18.0	482.8	3935
LSD ($P \leq 0.10$)			***3.4***	***1.1***	***729.9***	***443***

[1] Conv is conventional tillage; No-till is for plots with reduced tillage.

[2] N is the application of the nematicides Avicta and Temik 15 G.

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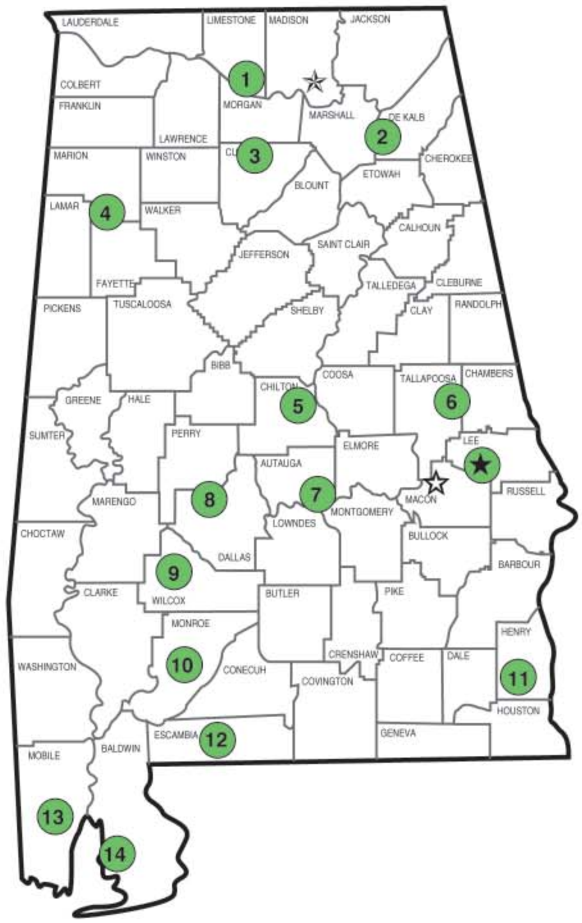

Research Unit Identification

★ Main Agricultural Experiment Station, Auburn.
☆ Alabama A&M University.
☆ E. V. Smith Research Center, Shorter.

1. Tennessee Valley Research and Extension Center, Belle Mina.
2. Sand Mountain Research and Extension Center, Crossville.
3. North Alabama Horticulture Research Center, Cullman.
4. Upper Coastal Plain Agricultural Research Center, Winfield.
5. Chilton Research and Extension Center, Clanton.
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