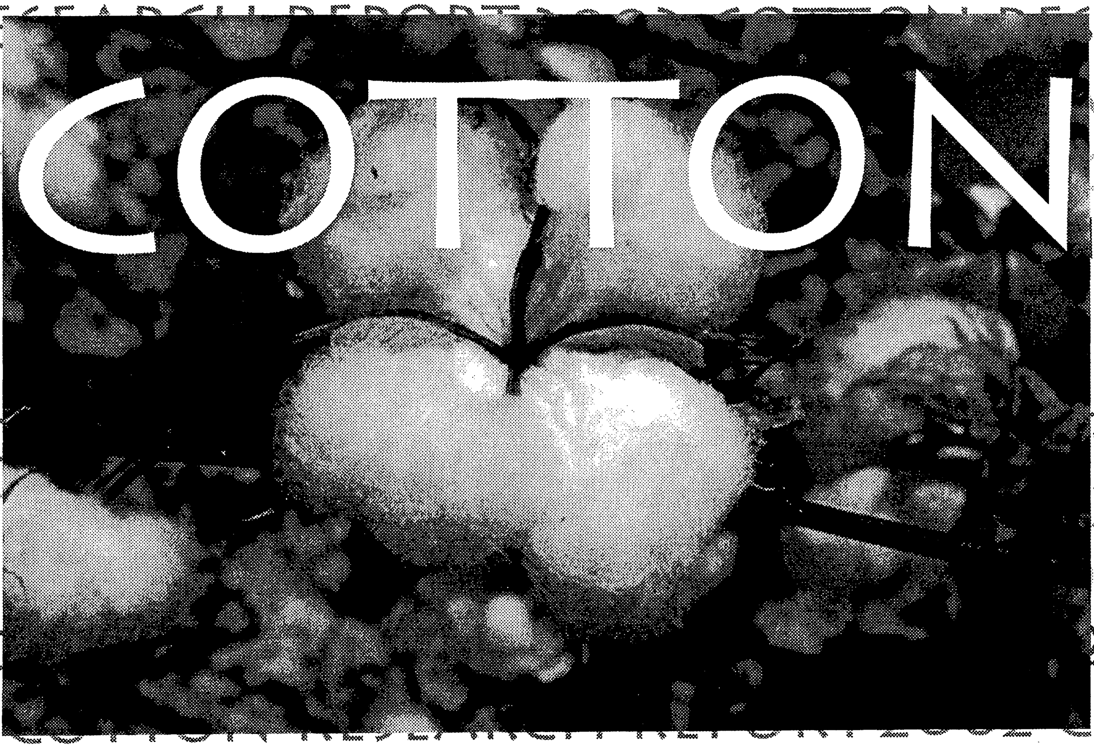
2002 COTTON RESEARCH REPORT

COTTON



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VARIETY TRIALS

CHEROKEE COUNTY COTTON VARIETY TRIAL

Charles Burmester and David Derrick

Each season a cotton variety trial is conducted in Cherokee County to supplement yield results from the Alabama Cotton Variety Trials. This large cotton growing area has unique soil types and farmers often use results of this test to evaluate new cotton varieties for northeast Alabama.

In 2002, the trial was conducted on the farm of Randall and Nick McMichen on a Holston fine sandy loam soil. Cotton was planted into a winter cover crop of wheat on April 26 and consisted of eight rows of each variety planted the length of the field.

A total of ten cotton varieties were planted in 2002. All varieties were genetically modified and contained the Roundup Ready gene that allows weed control applications with Roundup Ultra until the 4th leaf stage. The cotton variety FiberMax 989 BR was used as a check variety between each plot to detect soil variability. All varieties were spindle picked, and seed cotton weighed in a boll buggy. A seed cotton sample from each variety was ginned on a tabletop gin for lint percentage and quality.

Dry growing conditions in 2002 limited yields; however, this test site still produced over two bale yields (see table). Insect pressure was low and only minimal control measures were required. Yields of Deltapine DP 555 BG/RR and Paymaster PM 1218 BG/RR lead this test in 2002. Cotton quality was excellent with all varieties with no discounts for staple, micronaire, or strength. Deltapine DP 555 BG/RR had the highest lint percentage of all varieties tested.

YIELD AND QUALITY OF COTTON VARIETIES IN THE CHEROKEE COUNTY TRIAL

Variety[1]	Seed cotton yield *lbs/ac*	Lint[2] *%*	Lint yield *lbs/ac*	Mic.[3] *units*	Length *staple*	Unif.[4] *%*	Strength *g/tex*
Deltapine DP 555 BG/RR	3150	46.5	1460	4.6	34	81	28.6
Paymaster PM 1218 BG/RR	3390	42.8	1450	4.8	34	83	28.4
Deltapine DP 215 BG/RR	3190	41.3	1320	4.4	34	83	27.1
Deltapine DP 1199 BG/RR	2930	42.7	1250	4.6	35	83	30.1
Sure-Grow 521 R	2910	42.5	1240	4.6	34	83	27.9
FiberMax FM 989 BR	2890	41.8	1210	4.3	35	82	31.8
FiberMax FM 989 RR	2790	43.0	1200	3.9	34	83	30.9
Stoneville ST 4793 R	2760	42.8	1180	4.6	34	84	28.9
Deltapine DP 451 B/RR	2870	39.2	1130	4.7	35	83	27.3

[1] Stoneville 4892 BR yields are not reported due to a poor stand in part of the field. [2] Lint % determined on a small cotton gin without cleaners. This percentage is usually higher than normal turn-out at a cotton gin. [3] Mic.=micronaire. [4] Unif.=uniformity.

2002 MONROE COUNTY ROUNDUP READY COTTON VARIETY TRIAL

Dennis Delaney, C. Dale Monks, Anthony Wiggins, and Kathy Glass

One of the most critical decisions a cotton producer makes each year is which variety to plant. Many factors, such as yield potential and lint quality, are heavily influenced by seed selection. Area cotton producers often ask for more site-specific information on the unique soils and situations on their farms. On-farm field trials are important to verify university research and to show how different varieties perform under typical management practices in producers' fields.

A field was selected on the David Majors farm near Excel in Monroe County on a Malbis loam soil. Fertilization, weed, and insect control was maintained at optimum levels, per Alabama Cooperative Extension System recommendations. The same production practices were carried out across all varieties, regardless of technology or genetically engineered traits.

Twelve cotton varieties, all containing the Roundup Ready^R gene were planted on April 23, 2002, with three replications of each variety in a randomized complete block design. Each plot was eight field-length rows of a single variety, with plot size ranging from 0.5 to 0.7 acre each.

The plots were harvested on October 3 with a spindle picker. A weighing boll buggy was used to weigh each plot, and a grab sample taken. One-pound samples were ginned on a mini-gin, and analyzed with HVI equipment at the USDA-AMS Birmingham Classing Office.

The cotton industry has renewed emphasis on lint quality in recent years, and producers have asked to see "value per acre" data in addition to lint yield per acre. Results are presented in the following table, with varieties ranked by value in $/acre, with lint yield, turnout, and quality. Ratings for each variety also listed. Value per acre was determined from the USDA loan chart, assuming a base of $0.5275/lb of lint for SLM-41, leaf = 4, and adding or subtracting values taken from the chart for micronaire, length, and strength. No adjustments were made for seed costs or other cultural expenses. Producers can modify these numbers as needed for their particular situation.

Results showed that there was a range in total value of over $110 per acre from the lowest to highest valued variety, or 215 pounds per acre of lint. There were also significant differences in quality and other measurements.

Area cotton producers can use these results to compare the performance of these varieties, with the potential for significantly higher returns from their crop. Producers should not rely on any single source, however, to guide their choices, but should also use other information such as the multi-year data from the Alabama Agricultural Experiments Station Official Variety Trials, and other public and private sources.

Monroe County Cotton Variety Trial

Name	Lint yield *lb/ac*	Turnout *%*	Mic. *units*	Length *in*	Strength *g/tex*	Uniformity *%*	Lint value *cent/lb*	Value[1] *$/ac*
Deltapine DP 555 BG/RR	792	45	42.0	1.06	26.9	82	52.90	418.97
Deltapine DP 5415 RR	747	42	48.7	1.07	27.4	83	53.00	395.91
Sure-Grow 215 BG/RR	763	42	47.3	1.02	25.0	82	49.40	376.92
Deltapine DP 655 B/RR	693	40	44.3	1.07	28.8	81	52.75	365.56
Sure-Grow 501 BR	731	42	48.7	1.04	27.8	82	50.00	365.50
FiberMax FM 991 RR	674	41	44.0	1.09	29.2	83	54.20	365.31
Stoneville ST 4892 BR	773	44	50.3	1.03	26.8	82	46.05	355.97
Deltapine DP 451 B/RR	662	39	46.0	1.06	26.6	81	52.75	349.21
Deltapine DP 436 RR	661	38	47.4	1.07	26.0	82	52.75	348.68
FiberMax FM 989 RR	629	42	42.4	1.08	29.5	83	54.70	344.06
Stoneville ST 4793 RR	661	44	48.3	1.04	27.1	82	50.00	330.50
FiberMax FM 989 BR	577	42	43.7	1.05	29.1	81	52.75	304.37
LSD (P=.10)	**83**	**1.2**	**2.7**	**0.04**	**1.4**	**1**		

[1] Value = $0.5275 per pound of lint for SLM41, if =4, plus or minus loan premiums and discounts.

No Till Cotton Varieties at E.V. Smith

Dennis Delaney, Kathy Glass, C. Dale Monks, and Bobby Durbin

An increasing acreage of cotton in Alabama is planted using conservation tillage of some kind; consequently, growers have asked for information about performance of cotton varieties within the conservation tillage systems they use on their farms. The objective of this test was to compare the suitability of several commercially available cotton varieties in a strip till conservation tillage system.

Twenty-five selected varieties were planted on a Cowarts loamy sand at the E.V. Smith Field Crops Unit on April 26 into a rye cover crop, which had been killed a month earlier. After in-row subsoiling, four replications of two 40-inch rows, 20 feet long of each variety were planted with a no-till planter equipped with row cleaners and spoked closing wheels. Fertility and pesticide applications were according to Alabama Cooperative Extension System recommendations. Insect pressure was relatively heavy, and nine foliar insecticide applications were made. Hail and wind damage in June and late summer dry weather affected yields.

Plots were defoliated on September 9; the defoliant included a boll opener. Fifty-boll samples were taken from two replications, and then ginned on a mini-gin for lint quality and turnout. Plots were spindle-picked on September 19, and seed cotton weighed for yield.

Yield and turnout results are presented in the table. Lint yields ranged from 915 to nearly 1300 pounds per acre. Lint turnout ranged from 35 to 41%. Producers can use these results to compare the relative performance of these varieties in various management systems.

E.V. Smith No Till Cotton Variety Test, 2002

Variety	Lint yield *lb/ac*	Turnout *%*
PhytoGen PSC 355	1293	38
Sure-Grow 747	1288	40
Stoneville ST 4892 BR	1252	39
Deltapine DP 436 RR	1219	34
FiberMax FM 966	1190	39
Deltapine DP 555 BG/RR	1181	40
Sure-Grow 521 R	1150	37
Stoneville ST 4793 R	1132	39
Deltapine DP 5415 RR	1119	38
Stoneville ST 580	1092	36
Deltapine DP 458 B/R	1083	37
PhytoGen PSC GA 161	1074	35
Sure-Grow 215 BG/RR	1061	38
FiberMax FM 989 BR	1042	37
FiberMax FM 958	1041	39
Deltapine NuCotn 33B	1023	35
Sure-Grow 501 BR	988	37
Deltapine DP 565	969	36
Deltapine DP 655 B/RR	969	35
PhytoGen PSC HS-12	946	36
DP Delta Pearl	934	38
FiberMax FM 991 R	919	35
Paymaster PM 1218 BG/RR	915	39
FiberMax FM 989 R	895	38
Stoneville ST 5599 BR	866	41
LSD (P=.10)	**131**	**1**

VARIETY EVALUATION IN ULTRA NARROW ROW COTTON AT E.V. SMITH

Dennis Delaney, Kathy Glass, C. Dale Monks, and Bobby Durbin

The objective of this test was to compare the suitability of several picker type cotton varieties for use in an Ultra Narrow Row system. Variety selection is one of the most important decisions a cotton producer must make, and little information is available about how different cultivars perform in this production system.

Twenty selected varieties were planted at the E.V. Smith Field Crops Unit on April 6, 2002 using a small plot drill. Approximately 180,000 seed per acre were planted in 7-inch rows in plots 10.5 feet wide by 25 feet long. Conventional soil-applied herbicides were used to control weeds, and insects were controlled by foliar materials. A total of 100 pounds per acre of N was applied at planting, with other fertilizers according to soil test.

A total of 8 ounces per acre Pix Plus® was applied in two applications. The test was defoliated on August 27, and desiccated on September 3. The center 7 feet by 25 feet of each plot was harvested on September 6 with a stripper equipped with a broadcast header. Grab samples from the center two replications were cleaned, ginned on a mini-gin, and lint was analyzed by HVI.

Results are presented in the table. Approximately one-third of the test was affected by a poor stand, and these plots were not harvested or included in the results. Lint yields ranged from 875 to 1284 pounds per acre, while lint turnout from grab samples ranged from 31 to 37%. There were also several statistical differences in lint quality.

Yield and Quality of Cotton Varieties in Ultra Narrow Row Trial at E.V. Smith

Variety[1]	Lint yield *lbs/ac*	Turnout *%*	Mic. *units*	Length *in*	Strength *g/tex*
FiberMax FM 966	1284	37	37.0	1.11	32.9
Phytogen PSC 355	1185	35	39.0	1.10	29.5
Stoneville ST 5599 BR	1082	37	34.0	1.06	28.1
FiberMax FM 958	1056	36	32.0	1.09	31.3
Stoneville ST 580	1046	32	38.0	1.05	29.3
Paymaster PM 1218 BG/RR	1044	36	43.0	1.01	26.2
Deltapine DP 5415 RR	1039	32	34.0	1.06	28.5
Stoneville ST 4892 BR	1028	34	39.5	1.06	29.4
Deltapine NuCotn 33B	1016	32	37.0	1.14	28.5
Deltapine 458 B/R	1008	33	36.0	1.08	29.3
FiberMax FM 991 R	1004	32	34.0	1.08	32.3
Stoneville ST 4793 R	993	35	39.0	1.08	29.0
Sure-Grow 501 BR	992	31	41.0	1.01	28.7
Deltapine DP 555 BG/RR	988	37	37.5	1.09	27.6
Deltapine DP 436 RR	948	32	37.0	1.07	27.1
Deltapine DP 655 B/RR	875	32	32.5	1.02	29.3
FiberMax FM 989 BR	875	33	34.5	1.04	29.1
LSD (P=.10)	**111.1**	**1.8**	**4.5**	**0.03**	**1.4**

2002 FUSARIUM WILT/COMMERCIAL COTTON VARIETY TEST

Kathy Glass and William Gazaway

Fifteen commercial cotton varieties commonly grown in Alabama were evaluated for Fusarium wilt resistance at the E.V. Smith Research Center, Plant Breeding Unit, Tallassee, Alabama. Varieties were planted on a Wickham fine sandy loam in single 20-foot rows on 40-inch centers, separated by 5-foot alleys. Four replications of the test entries and the susceptible check variety Rowden were evaluated in a randomized complete block design.

Plots were planted on May 22, 2002, with Ridomil at 8 pounds per acre applied in the seed furrow at planting. Initial plant counts were made on June 20. Wilted plants were counted and removed on July 10, July 31, August 20, and September 3. The remaining live plants were counted and recorded on September 3. Total percent wilted plants were determined by the ratio of removed to wilted plants and mean wilting for a given variety was calculated.

AVERAGE PERCENT OF WILTED PLANTS

Variety	Average wilt %
Rowden[1]	**76**
FiberMax FM 958	32
Stoneville ST 4793 R	20
Stoneville ST 4892 BR	20
Stoneville ST 580	18
Paymaster PM 1218 BG/RR	17
Deltapine DP 555 BG/RR	15
Deltapine DP 491	12
Sure-Grow SG 215 BG/RR	12
PhytoGen PSC 355	11
FiberMax FM 991 RR	10
FiberMax FM 989 BR	10
Deltapine DP 458 B/R	8
Deltapine DP 5690 RR	7
PhytoGen PSC GA 161	7
Sure-Grow SG 501 BG/RR	7

[1]Rowden is extremely susceptible to Fusarium wilt.

EVALUATION OF EARLY SEASON COTTON VARIETIES FOR RESPONSE TO BOLL ROT DISEASE IN ALABAMA

A. J. Palmateer, K. S. McLean, G. W. Lawrence, J. L. Hutchinson, J. R. Jones, K. Glass, and M. D. Pegues

A cotton variety trial was planted on May 9 at the Auburn University, Gulf Coast Research and Extension Center, Fairhope, Alabama. Plots consisted of two rows, 25 feet long, with a between-row spacing of 40 inches. Plots were arranged in a randomized complete-block design with four replications. A 20-foot alley separated blocks. Cotton boll rot was evaluated by recording the number of healthy bolls and diseased bolls from a one thousandth of an acre section within each plot. Percent diseased bolls ([number of diseased bolls divided by total number counted] × 100) were calculated for each variety.

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 harvested on November 25. Data were statistically analyzed using PROC GLM and means compared with Fisher's protected least significant difference test ($P \leq 0.05$).

Cotton boll rot disease incidence was high in 2002 due to tropical storms and hurricane conditions late in the season. The disease index for boll rot ranged from 30.4% for Texas 295 to a low rating of 7% for Deltapine DP 555BG/RR. Lint cotton yields varied by 784 pounds per acre between the Sure-Grow 105 and Deltapine NuCotton 33B varieties.

EVALUATION OF EARLY SEASON COTTON VARIETIES FOR RESPONSE TO BOLL ROT DISEASE IN ALABAMA, 2002

Variety	Healthy bolls[1] *no.*	Diseased bolls[1] *no.*	Disease index[2]	Seed cotton yield *lb/ac*
Deltapine NuCotton 33B	73.8 ab[3]	11.5 abc	17.0 abc	898.5 e
Deltapine DP 451B/RR	53.3 bcd	11.8a bc	30.0 a	1357.0 a-d
Sure-Grow 747	67.8 bc	9.3 abc	14.6 abc	1471.8 a-d
Sure-Grow 105	55.8 bcd	11.5a bc	28.8 ab	1682.0 a
Deltapine DP 436RR	45.0 d	10.5 abc	24.3 abc	1333.3 a-d
PhytoGen PSC 355	64.3 bcd	16.3 ab	30.2 a	1089.8 de
Stoneville ST 4892BR	69.5 bc	8.5 bc	12.9 abc	1333.5 a-d
Sure-Grow 501BR	63.3 bcd	12.3 abc	18.4 abc	1228.5 b-e
Paymaster PM 1218BG/RR	67.0 bc	7.3 c	10.7 abc	1295.0 a-d
FiberMax FM 966	64.0 bcd	9.0 abc	14.2 abc	1586.3 ab
Sure-Grow 521R	61.8 bcd	8.8 bc	14.1 abc	1127.8 cde
Sure-Grow 215BR	73.0 ab	8.0 bc	11.5 abc	1123.3 cde
Paymaster PM 1199 RR	63.5 bcd	6.0 c	9.2 bc	1237.5 b-e
Stoneville ST 4793R	55.0 bcd	9.5 abc	19.4 abc	1491.3 abc
Deltapine DP 555BG/RR	92.8 a	6.5 c	7.0 c	1500.5 abc
Deltapine DP 99X35	58.8 bcd	13.5 abc	24.9 abc	1414.3 a-d
PhytoGen PH98M-2983	50.0 cd	13.3 abc	27.7 ab	1376.3 a-d
FiberMax 958	51.0 cd	8.8 bc	17.2 abc	1151.8 cde
Stoneville ST 457	57.5 bcd	10.0 abc	17.8 abc	1438.5 a-d
Texas 28R	57.3 bcd	13.8 abc	23.8 abc	1428.8 a-d
Texas 30R	70.5 bc	17.3 a	24.6 abc	1457.5 a-d
Texas 295	52.0 bcd	16.0 ab	30.4 a	1132.5 cde
LSD ($P \leq 0.05$)	**21.8**	**8.4**	**20.2**	**393.5**

[1] Number of bolls per 50 ft of row.

[2] Disease index = (number of diseased bolls / number of total bolls) x 100.

[3] Means within columns followed by the same letter are not significantly different according to Fisher's protected least significant difference test ($P = 0.05$).

EVALUATION OF FULL SEASON COTTON VARIETIES FOR RESPONSE TO BOLL ROT DISEASE IN ALABAMA

A. J. Palmateer, K. S. McLean, G. W. Lawrence, J. L. Hutchinson, J. R. Jones, K. Glass, and M. D. Pegues

A cotton variety trial was planted on May 9 at the Gulf Coast Research and Extension Center, Fairhope, Alabama. The soil type was a Malbis fine sandy loam. Plots consisted of two rows, 25 feet long, with a between-row spacing of 40 inches. Plots were arranged in a randomized complete block design with four replications. A 20-foot alley separated blocks. Cotton boll rot was evaluated by recording the number of healthy bolls and diseased bolls from a thousandth acre section within each plot. Disease index ([number of diseased bolls divided by the total number counted] × 100) was calculated for each variety.

Plots were maintained throughout the season with standard herbicide, insecticide, and fertility production practices as recommended by the Alabama Cooperative Extension System. Plots were harvested on November 25. Data were statistically analyzed using PROC GLM, and means were compared with Fisher's protected least significant difference test ($P \leq 0.05$).

Cotton boll rot disease incidence was high for early-planted cotton in 2002 due to tropical storms and hurricane conditions. Disease index for boll rot ranged from 69% for PhytoGen Phy 78 Acala to a low rating of 5% for Stoneville ST 4892BR. Lint cotton yields between GC-271and DP Delta Pearl varied by 755 pounds per acre.

EVALUATION OF FULL SEASON COTTON VARIETIES FOR RESPONSE TO BOLL ROT DISEASE IN ALABAMA, 2002

Variety	Healthy bolls[1] *no.*	Diseased bolls[1] *no.*	Disease index[2]	Seed cotton yield *lb/ac*
Deltapine DP 5415	67.8 a-d[3]	13.8 bcd	15.8 bcd	1424.3 a-d
Deltapine DP 35B	68.0 abc	16.0 bc	18.9 bcd	1343 a-d
Deltapine DP 5415 RR	56.0 a-d	17.8 b	23.4 bc	1314.3 a-d
Deltapine DP 5690 RR	77.5 a	10.5 b-e	12.5 cd	1515.0 a-d
Deltapine DP 448B	52.3 bcd	16.5 bc	23.8 bc	1118.5 bcd
PytoGen PSC 161	45.8 d	13.0 bcd	22.6 bc	1343.0 a-d
FiberMax FM 989	46.8 cd	14.8 bc	23.3 bc	1596.0 ab
AP 7126	62.5 a-d	10.5 b-e	14.7 bcd	1280.5 a-d
Deltapine DP 458B RR	60.3 a-d	12.0 b-e	17.2 bcd	1065.8 cd
Deltapine DP655 BRR	61.5 a-d	7.0 cde	10.0 cd	1581.5 abc
PytoGen PSC 12	51.5 bcd	12.3 c-e	19.9 bcd	1366.5 a-d
DP Delta Pearl	59.8 a-d	12.5 c-e	17.1 bcd	1027.5 d
Deltapine DP 565	51.5 bcd	14.8 bc	22.5 bc	1400.3 a-d
Deltapine DP 491	49.5 bcd	13.3 bcd	24.7 bc	1558.0 abc
GC-271	56.5 a-d	9.3 c-e	14.1 cd	1782.5 a
Stoneville ST 580	58.5 a-d	13.3 bcd	18.6 bcd	1443.5 a-d
Stoneville ST 5599 BR	61.0 a-d	13.5 bcd	18.4 bcd	1232.8 bcd
FiberMax FM 989 BR	64.8 a-d	12.5 c-e	16.2 bcd	1295.0 a-d
FiberMax FM 989 RR	56.3 a-d	10.5 c-e	18.1 bcd	1538.8 a-d
FiberMax FM 99 1R	49.8 bcd	9.3 c-e	18.4 bcd	1290.3 a-d
Stoneville ST 0003	63.5 a-d	4.3 de	6.1 d	1438.5 a-d
Texas 24R	67.8 a-d	13.5 bcd	17.8 bcd	1319.0 a-d
Texas 245	47.3 bcd	17.5 b	29.7 b	1319.0 a-d
PhytoGen Phy 78 Acala	20.0 e	45.8 a	69.9 a	1257.0 bcd
Deltapine NuCotton 33B	64.8 a-d	14.0 bc	17.8 bcd	1180.5 bcd
Deltapine 555 BGBR	57.0 a-d	11.0 b-e	16.8 bcd	1491.0 a-d
Sure-Grow 747	62.0 a-d	7.8 cde	11.1 cd	1510.0 a-d
Stoneville ST 4892 BR	69.0 ab	3.3 e	5.1 d	1323.8 a-d
LSD ($P \leq 0.05$)	**22.1**	**9.5**	**15.2**	**523.2**

[1] Number of bolls per 6 ft of row.

[2] Disease index = (number of diseased bolls / number of total bolls) x 100.

[3] Means within columns followed by the same letter are not significantly different according to Fisher's protected least significant difference test ($P = 0.05$).

TRANSGENIC COTTON VARIETY RESPONSE TO *ROTYLENCHULUS RENIFORMIS* ON COTTON FOLLOWING CORN IN NORTH ALABAMA

S. R. Usery Jr., K. S. McLean, C. H. Burmester, B. A. Meyer, and E. van Santen

Cruiser-treated transgenic cotton varieties were examined with and without Temik 15G for their response to the reniform nematode (*Rotylenchulus reniformis*) following corn in north Alabama. The test was planted on April 22 in a producer's field naturally infested with the reniform nematode after a year of corn production. The soil was a Decatur silt loam. Temik 15G at 3.5 pounds per acre was applied at planting in the seed furrow with chemical granular applicators attached to the planter. Plots consisted of one row, 200 feet long with 36-inch row spacing.

All plots were maintained with standard production practices recommended by the Alabama Cooperative Extension System commonly used in the area. Plots were not irrigated. Population densities of reniform nematode were determined at planting, peak bloom, and harvest. Each row was sampled individually in a systematic sampling pattern. Nematodes were extracted using gravity sieving and sucrose centrifugation technique. Plots were harvested on November 11. Mixed models analysis of variance with nearest neighbor adjustment (NNA) was conducted using the average residual of adjacent plots as a covariate. Least squares means are reported with standard errors.

Reniform nematode numbers increased in all of the plots. Reproductive factors (rf) varied from lowest in DP 5415 no Temik treatment to highest in the ST 4892 BR no Temik treatment. All varieties and treatments produced an rf value of greater than 1, which indicated reniform nematodes were increasing. Cotton seed yield varied 629 pounds per acre for Stoneville ST 4793 R plus Temik and Sure-Grow 521 R with no Temik, respectively. Temik 15 G application had no effect on seed cotton yield, except for Deltapine DP 436 RR, Sure-Grow 521R, and Sure-Grow 501 BR, where Temik-treated plots yielded significantly less (average of 192 pounds per acre). The phenotypic correlation between rf and cotton seed yield was non-significant. The absence of a treatment effect is likely the result of the extremely low reniform populations in this field at planting following the previous year in corn production.

TRANSGENIC COTTON VARIETY RESPONSE TO *ROTYLENCHULUS RENIFORMIS* ON COTTON FOLLOWING CORN IN NORTH ALABAMA, 2002

Treatment	Reniform at planting	Reniform ——at harvest[1]——		Reniform reproduction ——factor[1]——		Yield seed cotton[2] ——*lb/ac*——	
		Temik	no Temik	Temik	no Temik	Temik	no Temik
Deltapine DP 5415 RR	33.4	924	747	27.7	22.4	2241	2369
Stoneville ST 4793 R	33.4	1008	2285	30.2	68.4	2097	2107
Deltapine DP 436 RR	33.4	1226	916	36.7	27.4	2215	2474
Sure-Grow 521 R	33.4	1100	1021	32.9	30.6	2572	2726
Paymaster PM 1199 R	33.4	1091	1959	32.7	58.6	2433	2561
Stoneville ST 4892 BR	33.4	1766	2210	52.9	66.2	2494	2465
Sure-Grow 501 BR	33.4	1940	1650	58.1	49.4	2555	2717
Sure-Grow 215 BR	33.4	782	1650	23.4	49.4	2415	2482
Paymaster PM 1218 BG/RR	33.4	1206	2036	36.1	61.0	2206	2326
Deltapine DP 451 B/RR	33.4	1110	1804	33.2	54.0	2136	2247
Standard Error		**——278——**		**——9.4——**		**——55.4——**	

[1] Variety x treatment interaction was significant with a calculated $P < 0.01$.
[2] Variety x treatment interaction was non-significant ($P = 0.18$). The variety effect was significant with $P = 0.001$.

TRANSGENIC COTTON VARIETY RESPONSE TO *ROTYLENCHULUS RENIFORMIS* ON MONOCULTURED COTTON IN NORTH ALABAMA

S. R. Usery Jr., K. S. McLean C. H. Burmester, B. A. Meyer, and E. van Santen

Transgenic cotton varieties were examined with and without Temik 15G for their response to the reniform nematode (*Rotylenchulus reniformis)* in north Alabama. The test was planted on April 18 in a producer's field naturally infested with the reniform nematode and monocultured in cotton. The soil was a Decatur silt loam. Temik 15G at 5.0 pounds per acre or Di-Syston 15 G at 6.0 pounds per acre were applied at planting in the seed furrow with chemical granular applicators attached to the planter. Plots consisted of two rows, 25feet long with a 40-inch row spacing.

All plots were maintained with standard production practices recommended by the Alabama Cooperative Extension System and commonly used in the area. The plots were irrigated. Population densities of the reniform nematode were determined at planting, peak bloom, and harvest. Soil cores, 1-inch diameter and 8-inches deep, were collected from the rows in each two-row plot in a systematic sampling pattern. Nematodes were extracted using gravity sieving and sucrose centrifugation technique. Plots were harvested on September 30. Mixed models analysis of variance with nearest neighbor adjustment (NNA) was conducted using the average residual of adjacent plots as a covariate. Least squares means are reported with standard errors.

Reniform nematode numbers increased from planting to harvest in 83% of the plots as indicated by reproductive factors (rf) exceeding 1. Rfs varied from 0.83 for Paymaster PM 1218 BG/RR with Temik to 3.17 for FiberMax FM989 RR also with Temik. No variety exhibited an rf below 1 with Temik and

Di-Syston. Cotton seed yield varied 829 pounds per acre for Deltapine DPL 458 B/RR and Sure-Grow 215 BG/RR, both with Temik. There was no correlation between yield and rf for either Temik or Di-Syston treated plots. Of particular interest are the two varieties PM 1218 BG/RR and SG 215 BG/RR for which the Di-Syston treatment significantly (P = 0.10) out yielded the Temik treatment. These two varieties may have some tolerance to *R. reniformis*.

TRANSGENIC COTTON VARIETY RESPONSE TO *ROTYLENCHULUS RENIFORMIS* ON MONOCULTURED COTTON IN NORTH ALABAMA, 2002

Treatment	Reniform at planting	Reniform —at harvest[1]—		Reniform reproduction —factor[1]—		Yield seed cotton[2] —*lb/ac*—	
		Temik	Di-Syston	Temik	Di-Syston	Temik	Di-Syston
Deltapine DP 5415 RR	5112	5613	4241	1.10	0.85	2830	2833
Stoneville ST 4892 BR	4414	6481	4741	1.47	1.07	2894	2678
Deltapine DP 451 B/RR	3960	6151	5005	1.55	1.26	2976	3071
Deltapine DP 436 RR	5064	4460	6143	0.88	1.21	2974	3060
Deltapine DPL 458 B/RR	3580	8586	8014	2.40	2.24	2725	2532
FiberMax FM 989 RR	2441	7744	5375	3.17	2.20	3022	3011
Paymaster PM 1218 BG/RR	3675	3116	3917	0.83	1.07	3169	3308
Sure-Grow 215 BG/RR	4667	5884	4412	1.26	0.95	3129	3361
Paymaster PM 1199 RR	3675	6205	6546	1.69	1.78	3010	2838
Stoneville ST 4793 R	4010	4906	5411	1.22	1.35	2874	2832
Deltapine DP 555 BG/RR	4301	4378	5785	1.02	1.35	2619	2644
FiberMax FM 989 BR	3462	6294	6412	1.82	1.85	3030	2771
Standard Error	**465**	**—790—**				**—55—**	

[1] Variety x treatment interaction was non-significant (*P* = 0.24). The variety effect was significant with *P* =0.001.

[2] Variety x treatment interaction was significant with a calculated *P* = 0.0002.

CROP PRODUCTION

WEED POPULATION DYNAMICS UNDER GLYPHOSATE-RESISTANT COTTON CROPPING SYSTEMS

Wilson H. Faircloth and Michael G. Patterson

Concerns about the effect of intense glyphosate applications on continuous cotton cropping systems have increased as glyphosate-resistant cotton varieties have exceeded 90% of the cotton acreage planted in Alabama. Consequently, there is the potential for this intense usage to shift weed populations toward more tolerant species and, ultimately, resistance.

Field studies were implemented in 2000 at the Tennessee Valley Research and Extension Center, Belle Mina, and at the E.V. Smith Research Center, Field Crops Unit, Shorter, to study the effect of intense glyphosate usage on sicklepod (*Senna obtusifolia*) and pitted morningglory (*Ipomoea lacunosa*) populations. Experimental units consisted of glyphosate-resistant cotton varieties (Sure-Grow 125 BR, Belle Mina; Sure-Grow 501 BR, Shorter) planted in four 40 inch rows, 25 feet long at each location. Cotton was planted and maintained with conventional tillage practices and the Alabama Cooperative Extension System's recommendations for fertility and non-weed pests.

SICKLEPOD AND PITTED MORNINGGLORY RESPONSE TO INTENSE GLYPHOSATE USAGE[1,2]

Herbicide	Rate	Application timing	Plant density		
			Sicklepod	Pitted morningglory	
				With pendimethalin	Without pendimethalin
	lb ai/ac		*no. plants/plot*		
1 glyphosate[3]	0.5	POT-1[4]	7	20	66
glyphosate	0.5	POT-4			
glyphosate	0.5	PDS-12			
2 glyphosate	0.5	POT-4	8	19	58
glyphosate	0.5	PDS-8			
glyphosate	0.5	PDS-12			
3 glyphosate	1.0	POT-1	3	13	50
glyphosate	1.0	POT-4			
glyphosate	1.0	PDS-12			
4 glyphosate	0.5	POT-1	3	18	40
+pyrithiobac	+0.04				
glyphosate	0.75	PDS-8			
glyphosate	0.5	PDS-12			
5 glyphosate	0.5	POT-4	5	18	57
+pyrithiobac	+0.04				
glyphosate	0.75	PDS-8			
prometryn	0.75	PDS-12			
+MSMA	+1.5				
6 fluometuron	1.5	PRE	4	5	22
glyphosate	0.5	POT-4			
glyphosate	0.5	PDS-12			
7 fluometuron	1.5	PRE	4	6	8
glyphosate	0.5	POT-4			
+pyrithiobac	+0.04				
glyphosate	0.5	PDS-12			
8 weed-free	—	—	5	25	75
LSD ($P \leq 0.05$)			**NS**	**25**	

[1] Plant density (August 2001) at the conclusion of a 2-year study.

[2] Sicklepod data pooled over pendimethalin usage.

[3] Glyphosate product used: Roundup , 4 lb ai/gal (3 lb ae/gal).

[4] Abbreviations: POT-1, postemergence over-the-top 1 leaf; POT-4, postemergence over-the-top 4 leaf; PDS-8, postemergence directed spray 8 leaf; PDS-12, postemergence directed spray 12 leaf; PRE, preemergence; NS, not statistically significant.

Treatments consisted of three applications of glyphosate at either one-half time or one time (one time equals one pound active ingredient per acre) rates applied at various times including postemergence over-the-top one leaf (POT-1), POT-4, postemergence directed spray eight leaf (PDS-8), and PDS-12. Variations on this basic pattern included pyrithiobac (0.04 pound active ingredient per acre) added to the POT-1 or POT-4 applications, prometryn (0.75 pound active ingredient per acre) plus MSMA (1.5 pounds active ingredient per acre) substituted for the PDS-12 application, and fluometuron applied as a preemergence (PRE) treatment (see table). A hand-weeded check plot was also maintained. These treatments were applied with and without pendimethalin (0.8 pound active ingredient per acre) preplant incorporated (PPI), yielding a total of 16 treatments per site.

Experimental design was a randomized complete block with four replications. Plot integrity was maintained over years at each location. The glyphosate product used was Roundup Ultra, 4 pounds active ingredient per gallon (3 pounds acid equivalent [ae] per gallon). Response variables measured included the following: weed density early (June), mid (July), and late season (August); visual control and crop injury ratings (not presented); and crop yield. Baseline weed densities in a measurement plot (250 square feet) were recorded at the onset of the studies: Belle Mina, pitted morningglory, 97 plants per plot; Shorter, sicklepod, 138 plants per plot.

Pendimethalin showed no interaction for the plant density counts in the sicklepod study at Shorter (see table); therefore, treatments were combined in analysis. Treatments utilizing glyphosate alone at both the one-half time and one time rates had more sicklepod plants per plot than those where other herbicides were used in combination with glyphosate at the end of the 2000 growing season. The treatment that exhibited the fewest number of plants at the end of year one (five plants per plot) included both pyrithiobac and fluometuron.

At the beginning of year two, all plots showed a greater number of emerged sicklepod seedlings (76 to 267 plants per plot), with no significant differences between treatments. This increase in density is likely due to a relatively wet spring as compared to 2000, which stimulated the large seedbank. At the conclusion of the 2001 growing season, sicklepod densities ranged from three to eight plants per plot with no significant differences between treatments. Seed cotton yield data exhibited a pendimethalin by year interaction; therefore, data were pooled accordingly due to absence of treatment effects. Pendimethalin resulted in higher yields in both 2000 and 2001, likely due to early-season annual grass suppression. Seed cotton yields ranged from 1423 to 3274 pounds per acre.

The effect of pendimethalin was significant in the pitted morninglory study at Belle Mina (see table). Early season plant counts in 2000 revealed an increase in density when no pendimethalin was applied, being significantly higher for the glyphosate one-half time rate treatments and one treatment that included pyrithiobac in the POT (four leaf) application. When pendimethalin was not applied, those treatments utilizing the one time rate of glyphosate and/or the one-half time rate plus pyrithiobac and/or fluometuron PRE showed a decrease in plant densities. Mid-season evaluations for 2000 continued to exhibit the trend of glyphosate alone at the one-half time rate without pendimethalin treatments having significantly higher numbers of plants per plot. At the end of 2000, pitted morningglory counts ranged from zero to six plants per plot, with pendimethalin plots having significantly fewer plants per plot; however, these low numbers may be of no practical significance.

No differences were detected between plots at the beginning of 2001. However, early evaluations again showed an increase in plant populations where pendimethalin was not applied, except for the fluometuron treatments, which showed no difference. When pendimethalin was not applied, the addition of fluometuron to the treatment reduced the number of plants/plot significantly compared to other treatments. At the conclusion of the 2001 growing season, those treatments with glyphosate alone at the one-half time rate without pendimenthalin showed the highest numbers of plants per plot, with all other plots being equal. Seed cotton yields at Belle Mina showed only a year main effect with 2001 yielding 61% higher than 2000, due to the much more favorable moisture conditions.

In summary, at the conclusion of two years of repeated glyphosate and glyphosate-mixed treatments, no differences in sicklepod plant numbers were detected. Pitted morningglory occurrence in glyphosate-only systems was higher, especially if the one-half time rate was utilized. Long-term management strategies for pitted morningglory in glyphosate-resistant cotton might include the use of pendimethalin. Further studies into the effectiveness of pendimethalin applied PRE for pitted morningglory management would be critical for conservation tillage systems.

EVALUATION OF SUBSURFACE IRRIGATION IN THE WIREGRASS

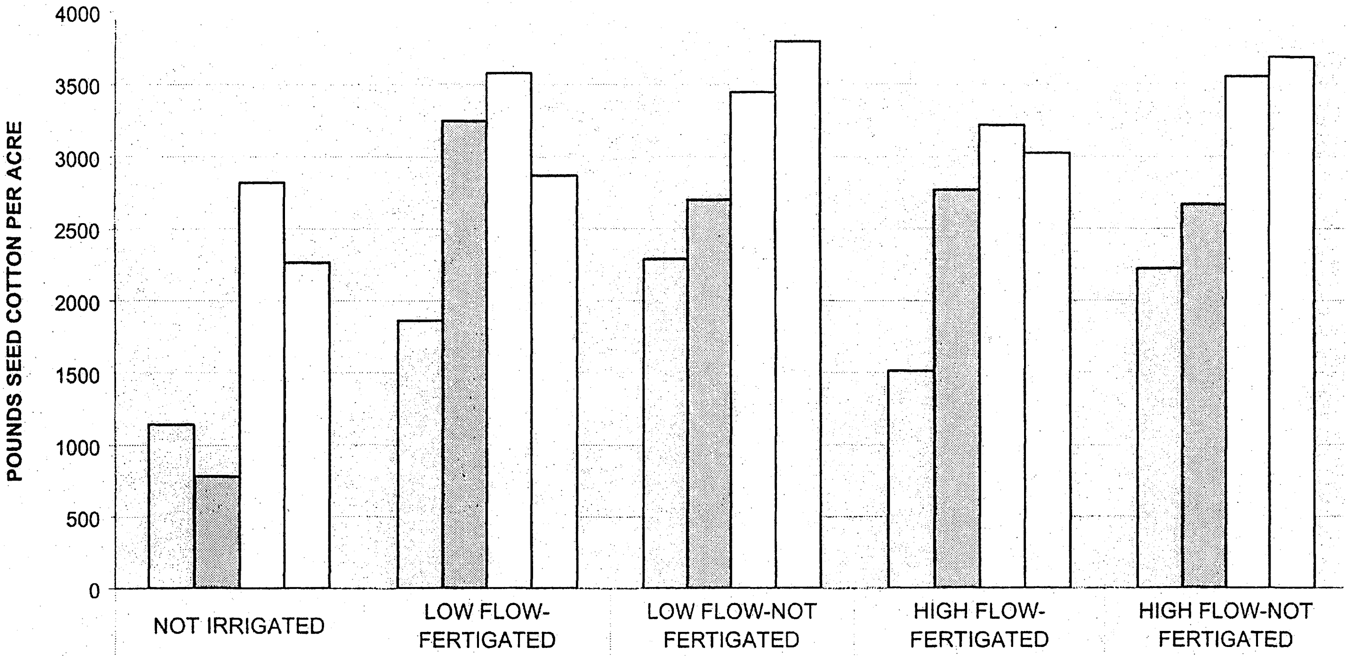
Larry M. Curtis, William C. Birdsong, and Ted W. Tyson

This project evaluating subsurface drip irrigation was initiated at the Wiregrass Research and Extension Center in the spring of 1999. Start up problems delayed planting the first year resulting in relatively poor yields relative to 2000, 2001 and 2002.

The objectives of this project were (1) to evaluate subsurface drip irrigation for cotton production in an application similar to typical field conditions in the Wiregrass; (2) to compare fertigation through drip irrigation versus conventional application of fertilizer; (3) to evaluate the effectiveness of subsurface drip irrigation using conventional tillage vs strip till; (4) to evaluate subsurface drip irrigation placed at 15 inches deep and at two flow rates (flow rates = 0.4 gallon per hour per emitter and 0.23 gallon per hour per emitter at 24-inch spacing); (5) to evaluate the reliability of subsurface drip irrigation in terms of longevity and plugging using traditional filtration and maintenance procedures; and (6) to compare yields for the fertigated and non-fertigated treatments, tillage treatments, flow rate treatments, and dry plot treatments in each of the above tests.

Subsurface drip irrigation was plowed in between rows at a depth of approximately 14 to 16 inches. This product is being utilized to evaluate injection of liquid fertilizer through the system versus application in the traditional manner. Conventional tillage and strip-till practices are being compared. Two tape flow rates were evaluated with the quantity of water flowing through the system being monitored since installation. The system is maintained with filtration, chlorine injection, and other maintenance procedures to keep the system open and flowing at the design flow rate. The tape is evaluated periodically through the season and at the end of each season to determine if deterioration of flow is occurring. To date initial flows through the tape have been maintained. Yield determinations have been taken for each treatment and for non irrigated plots for the 4 years of the project. Yield results for 1999-2002 are illustrated in figures 1 and 2. Average yields for the 4 years are combined in figure 3.

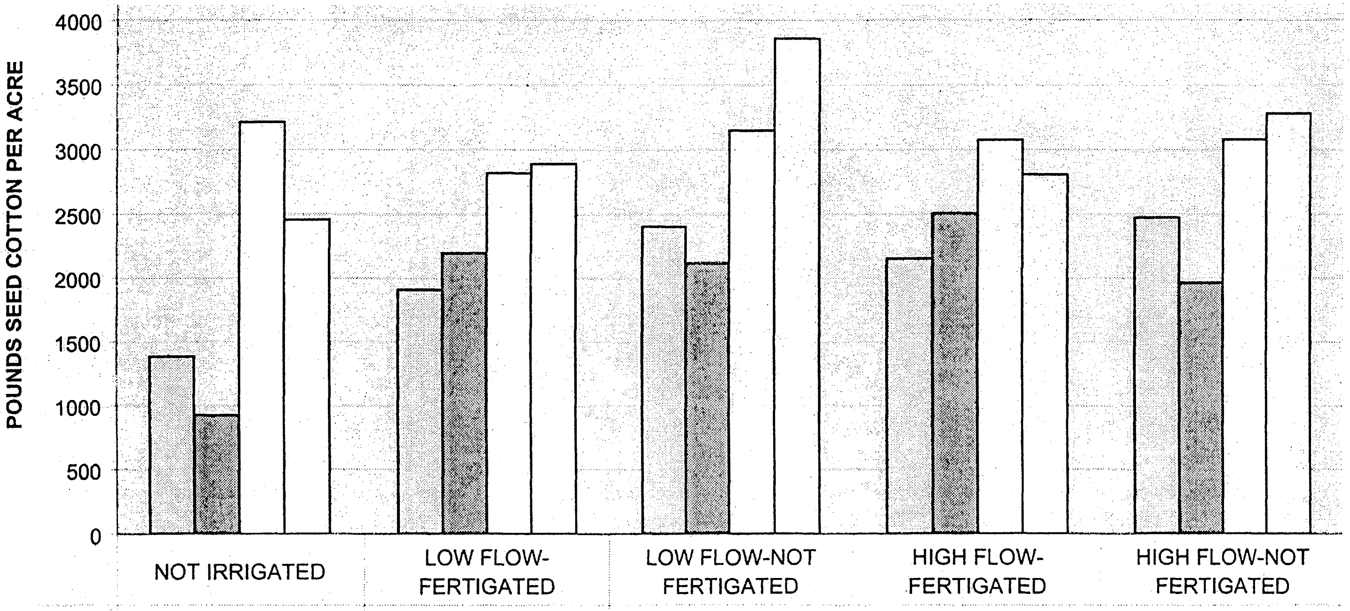
Figure 1. Subsurface drip irrigation conventional till treatments, Headland.



	NOT IRRIGATED	LOW FLOW-FERTIGATED	LOW FLOW-NOT FERTIGATED	HIGH FLOW-FERTIGATED	HIGH FLOW-NOT FERTIGATED
□ 1999	1145	1861	2291	1511	2222
▨ 2000	786	3250	2703	2770	2667
□ 2001	2822	3580	3445	3217	3553
□ 2002	2266	2871	3798	3025	3687

TREATMENT AND YIELD EACH YEAR

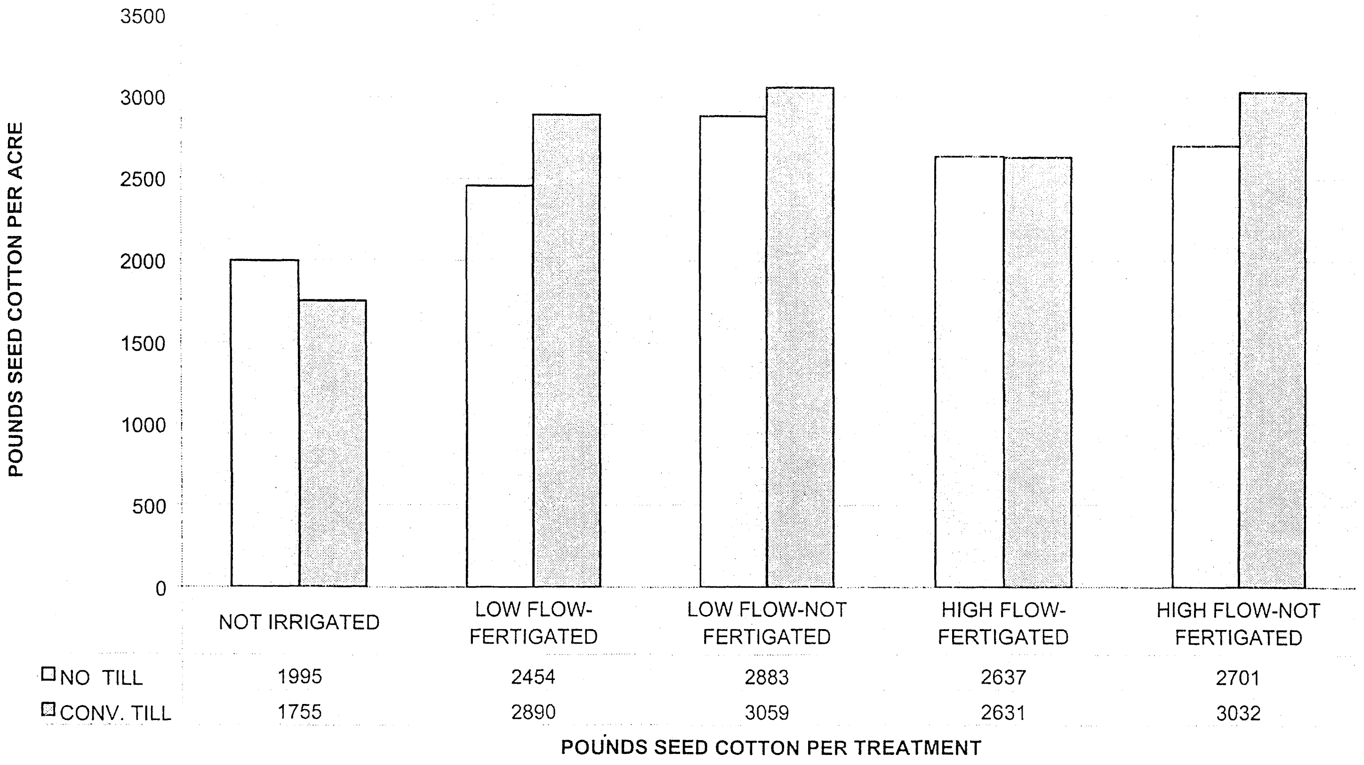
Figure 2. Subsurface drip irrigation no till treatments, Headland.



	NOT IRRIGATED	LOW FLOW-FERTIGATED	LOW FLOW-NOT FERTIGATED	HIGH FLOW-FERTIGATED	HIGH FLOW-NOT FERTIGATED
□ 1999	1385	1906	2406	2155	2475
▨ 2000	926	2198	2120	2508	1967
□ 2001	3214	2820	3148	3077	3081
□ 2002	2457	2891	3857	2809	3282

TREATMENT AND YIELD EACH YEAR

Figure 3. Subsurface drip irrigation 4-year average, Headland.



SPRINKLER AND SUBSURFACE DRIP IRRIGATION AT THE TENNESSEE VALLEY RESEARCH AND EXTENSION CENTER

Larry M. Curtis, Charles H. Burmester, David H. Harkins, B. E. Norris, and James W. Baier

Three experiments involving application and use of sprinkler and subsurface drip irrigation continued in 2002 at the Tennessee Valley Research and Extension Center, Belle Mina, Alabama. The variety selections for each experiment are indicated in Table 1. The experiments were as follows.

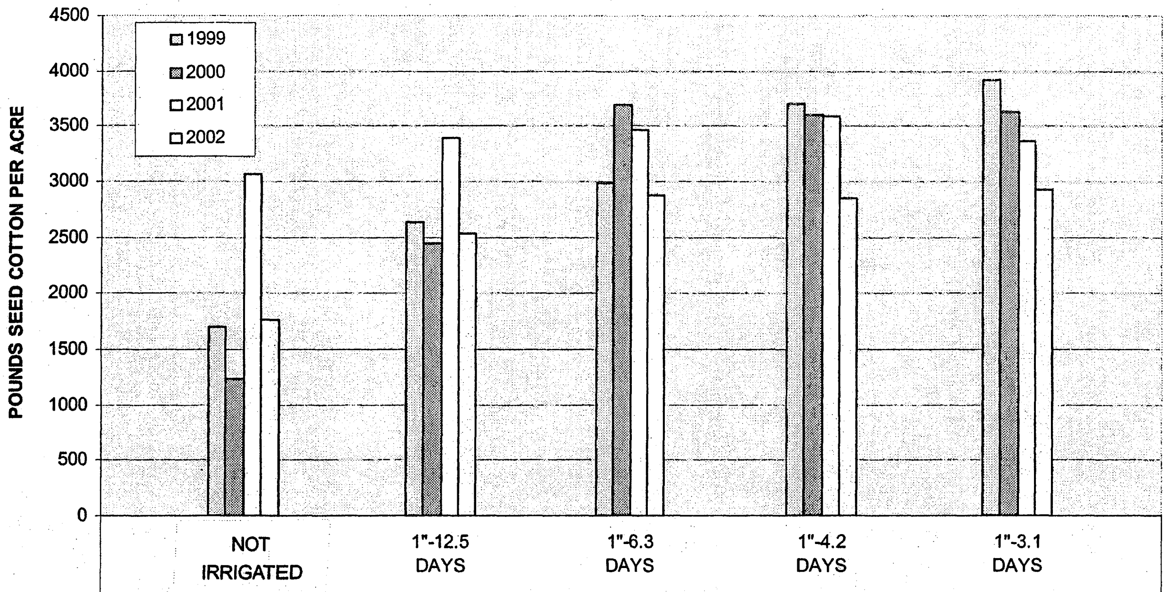
Sprinkler irrigation water requirements and irrigation scheduling. This experiment was established in 1999 to evaluate a range of irrigation application capabilities to identify the minimum design flow rate that will produce optimum yields. Treatments included four sprinkler irrigation capabilities and a non-irrigated treatment. Irrigation was managed using soil moisture sensors and Moiscot (a spreadsheet-based scheduling method). The irrigation capabilities were (1) 1 inch every 12.5 days, (2) 1 inch every 6.3 days, (3) 1 inch every 4.2 days, and (4) 1 inch every 3.1 days. This 1 inch represents the maximum amount of irrigation that could be applied in the time indicated.

The results for 1999, 2000, 2001, and 2002 are presented in Figure 1. Irrigated yields in 2002 were significantly higher than non-irrigated yields but the highest yields were less than in previous years for most treatments. The reason for this is unclear but may be related to shutdown of irrigation prior to sufficient boll maturity. Only very small yield differences were noted in 2001 while significant differences were measured in 1999 and

TABLE 1. VARIETY SELECTION

	Sprinkler study	SDI Placement and water management	SDI tape-fertigation study
1998		Deltapine NuCotn 33B	Deltapine NuCotn 33B
1999	Deltapine NuCotn 33B	Deltapine NuCotn 33B	Deltapine NuCotn 33B
2000	Deltapine DP 428 B	Deltapine NuCotn 33B	Deltapine DP 428 B
2001	Deltapine DP 428 B	Deltapine NuCotn 33B	Deltapine DP 428 B
2002	Deltapine DP 451B/RR	Deltapine DP 451B/RR	Deltapine DP 451B/RR

Figure 1. Sprinkler irrigation cotton yield results.



	NOT IRRIGATED	1"-12.5 DAYS	1"-6.3 DAYS	1"-4.2 DAYS	1"-3.1 DAYS
□1999	1700	2637	2984	3708	3920
▨2000	1236	2444	3688	3603	3627
□2001	3061	3387	3466	3595	3371
□2002	1759	2530	2871	2853	2925

IRRIGATION SYSTEM CAPACITY

2000. Rainfall variability and treatment effects accounted for the wide range of yield responses for each of these years.

Subsurface drip irrigation (SDI) placement and irrigation water requirements. This experiment was initiated in 1998 to evaluate placement of SDI relative to crop row direction and to evaluate water requirements for cotton production using SDI. Drip tubing was buried 15 inches deep with emitters at 2-foot intervals along the tubing. Tubing placement treatments were (1) between every other row—80 inch spacing between drip lines and (2) perpendicular to rows—80 inch spacing between drip lines.

Irrigation treatments were based on daily applications equal to 30%, 60%, and 90% of pan evaporation after full crop canopy with adjustments based on percent canopy prior to full canopy cover. Yield results for 5 years (1998 through 2002) are presented in Figure 2.

TABLE 2. AVERAGE YIELD OF SEED COTTON OVER FIVE YEARS

Treatment	Seed cotton lb/ac
Non-irrigated	2291
30 perpendicular	3218
60 perpendicular	3491
90 perpendicular	3698
30 between row	3414
60 between row	3731
90 between row	3656

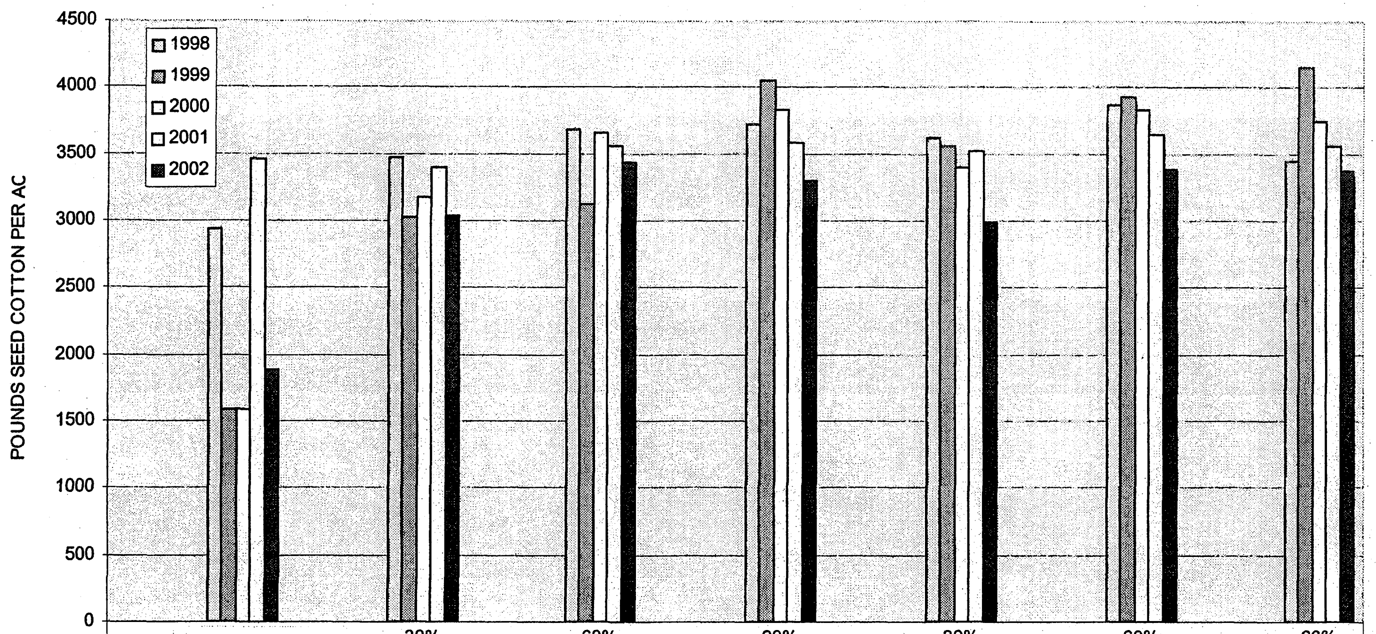
Significant yield increases were achieved for 3 out of the 5 years of this study with average yields over these 5 years as shown in Table 2.

The average over all irrigation treatments for the 5 years was 1244 pounds of seed cotton per acre greater than the non-irrigated treatment.

Subsurface drip irrigation (SDI) tape products and fertigation. A subsurface drip irrigation study initiated in 1998 was designed to compare five different drip irrigation tape products with a fertigation component included. This study was installed in an area where continuous crops have been produced for many years. Emitters were located 2 feet along the tape with tape buried 15 inches between every other row. Rows 340 feet in length were used to better simulate field conditions. Fertilizer management for each tape product was evaluated using a single (conventional) surface applied sidedress versus multiple sidedress applications injected through the subsurface drip irrigation system. A tape product was also used on the surface using a conventional fertilizer treatment. Fertility treatments are indicated in Table 3.

In 1998 little difference between fertility treatments was observed. Sufficient rainfall occurred late in the growing season so that fertilizer in the upper layers of the soil was readily available. In 1999, extremely dry conditions in the upper layers of the soil profile made conventional applied fertilizer less available, resulting in yield reduction compared to fertilizer applied through the irrigation system. In 2001, initiation of fertigation through the tape was inadvertently delayed more than 2 weeks. Even though the fertigation schedule was modified to insure that all scheduled fertilizer was applied, the delay reduced fertigated yields. Yields in

Figure 2. Drip placement and irrigation scheduling.



	NOT IRRIGATED	30% PERPENDI-CULAR	60% PERPENDI-CULAR	90% PERPENDI-CULAR	30% BETWEEN ROW	60% BETWEEN ROW	90% BETWEEN ROW
▢ 1998	2938.9	3469.09	3680.61	3722.5	3614.64	3868.04	3446.06
▨ 1999	1589.52	3024.07	3123.2	4053.38	3556	3929.82	4154.95
▢ 2000	1583.24	3170.67	3660.72	3834.54	3391.61	3830.35	3747.63
▢ 2001	3464.56	3393.7	3560.19	3580.09	3522.5	3647.1	3557.05
■ 2002	1879.22	3034.54	3429.30	3298.41	2986.37	3382.18	3373.81

PERPENDICULAR (T) vs BETWEEN ROWS (II)

TABLE 3. FERTILITY TREATMENTS

	Irrigated			Non-irrigated
	Fertigated	Conventional	Drip tape on surface[2]	
Preplant	75#N + 60#K	75#N + 60#K	75#N + 60#K	75# + 60#K
Sidedress[1]	60#N + 60#K	60#N + 60#K	60#N + 60#K	60#N

[1]All sidedress was applied at early to mid square for conventional and drip tape treatments; the sidedress treatment was divided into eight equal applications for the fertigated treatments beginning at early to mid square. [2]The surface tape treatment was discontinued after 2000 because of damage and leaks caused by insects and other animals.

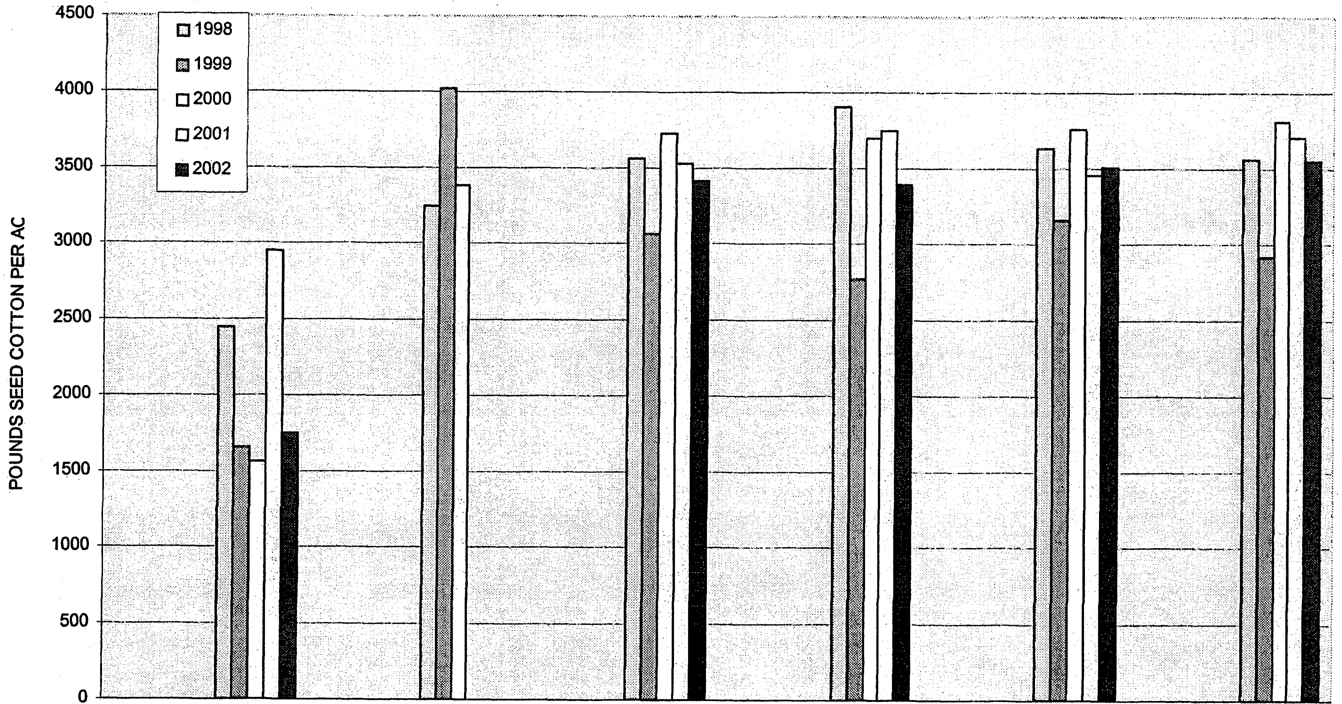
2002 were similar to previous years with little difference between fertilizer treatments but significant yield improvement over the non-irrigated treatment.

Significant yield differences were observed each year between non-irrigated plots and tape plots with fertility treatments. Figures 3 and 4 illustrate yield results for 1998 through 2002 for conventional and fertigated treatments. To date only minimal differences have been observed between the different drip irrigation tape products. Average yields for the 5 years are shown in Table 4.

TABLE 4. FIVE YEAR AVERAGE YIELD OF SEED COTTON

	Seed cotton (lb/ac)	
	Conventional	Fertigated
Not Irrigated	2073	
Surface T-Tape[2]	3545	
T-Tape	3457	3511
Raintape	3499	3645
Netafilm	3501	3617
Eurotape	3510	3668

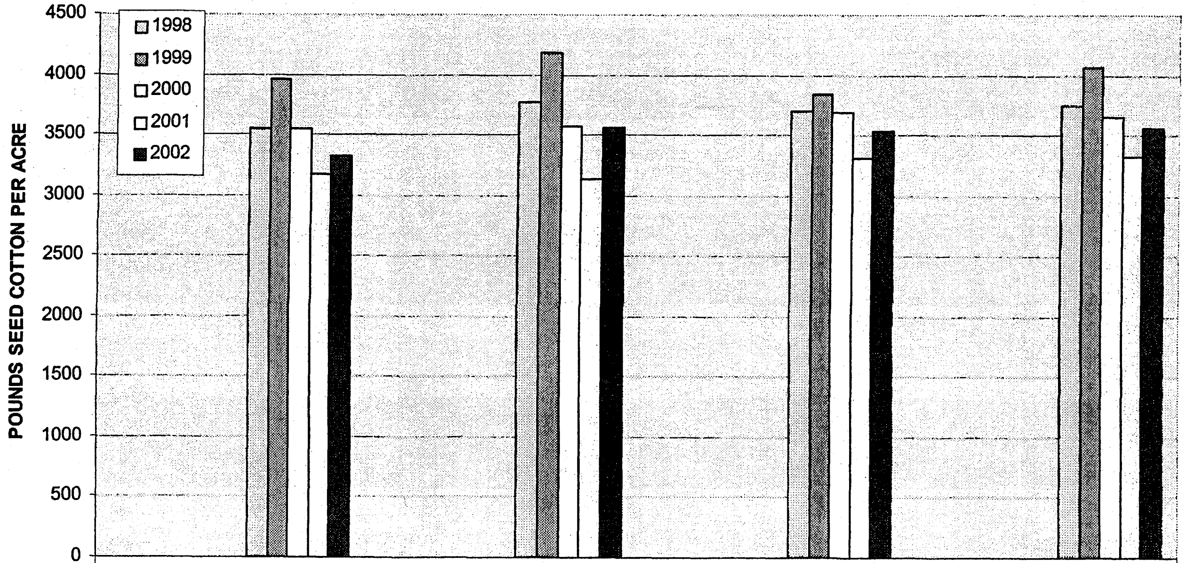
Figure 3. Drip tape comparison with conventional fertility program.



	NOT IRRIGATED	SURFACE T-TAPE	T-TAPE	RAINTAPE	NETAFILM	EUROTAPE
▨ 1998	2448.33	3244.66	3561.51	3904.79	3633.58	3563.19
▩ 1999	1658.72	4013.85	3064.73	2770.22	3158.18	2921.56
☐ 2000	1561.43	3377.5	3723.42	3689.79	3752.25	3810.2
☐ 2001	2949.91		3521.63	3742.64	3454.37	3704.8
■ 2002	1748.81		3411.37	3386.63	3505.78	3548.52

TAPE PRODUCT

Figure 4. Drip tape comparison: fertigation program.



	T-TAPE	RAINTAPE	NETAFILM	EUROTAPE
▨ 1998	3543.25	3770.02	3699.4	3743.84
▩ 1999	3956.67	4182.96	3844.01	4061.65
☐ 2000	3550.46	3569.68	3684.98	3651.35
☐ 2001	3175.72	3137.28	3315.04	3329.46
■ 2002	3329.70	3563.67	3542.29	3555.75

TAPE PRODUCT

CONSERVATION TILLAGE AND POULTRY LITTER EFFECTS ON COTTON

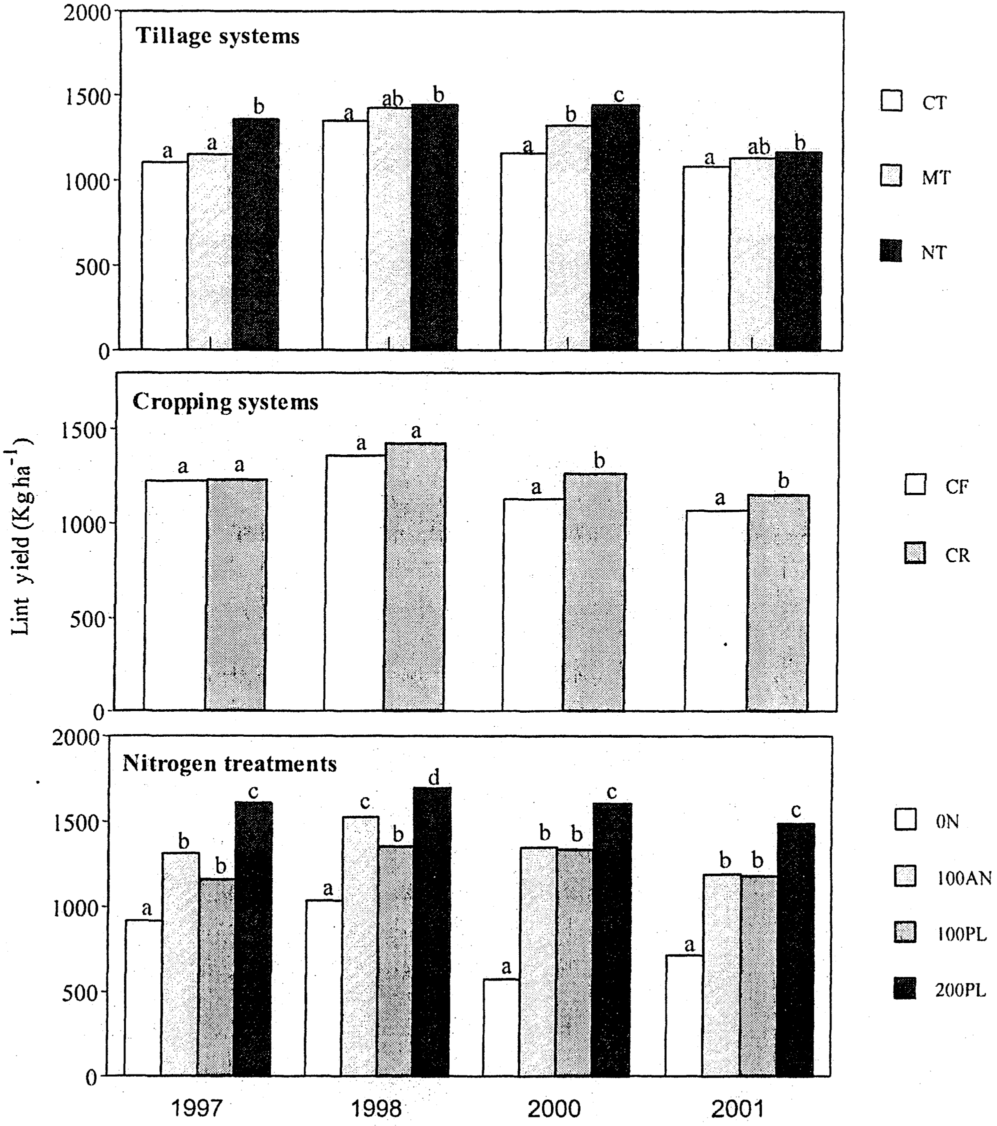
K. C. Reddy and E. Z. Nyakatawa

The adoption of conservation tillage for cotton (*Gossypium hirsutum* L.) production in some counties of north Alabama has lagged behind that of other parts of the state. Poor emergence, reduced seedling growth, delayed maturity, and reduced yield are some of the problems which have been attributed to the slow adoption of conservation tillage systems. A field experiment to study the effects of tillage (no till, mulch till, and conventional till), cropping system (cotton winter fallow without cover crop and cotton with winter rye (*[Secale cereale* L.] cover crop), and nitrogen source (poultry litter and ammonium nitrate) on growth and yield of cotton was initiated at the Tennessee Valley Research and Extension Center, Belle Mina, Alabama on a Decatur silt loam soil in 1996. The experimental design was a randomized complete block design with four replications.

The winter rye cover crop, variety Oklon, was planted in fall and killed by Roundup herbicide (glyphosate) about 7days after flowering in spring. A no-till grain drill was used to plant the rye cover crop at 60 kg ha^{-1} (See note at end of article for conversion factor to use for converting from metric to English measurement). Cotton variety Deltapine NuCotn 33B was planted in all plots at 16 kg ha^{-1}, using a no-till planter. During the season, a cultivator was used for controlling weeds in the conventional till system while spot applications of Roundup using a knapsack sprayer were used to control weeds in the no-till and mulch-till systems. Cotton lint yield under no till was 24, 7, 24, and 8% greater than that under conventional till in 1997, 1998, 2000, and 2001, respectively (see figure). Improved soil moisture conservation in no till plots was largely responsible for improved lint yields in this system. Cover cropping increased cotton lint yields by 6 to 12% compared to cotton winter fallow cropping in 2000 and 2001 (see figure). Poultry litter containing 100 kg N ha^{-1} generally gave similar cotton lint yield to ammonium nitrate at the same rate whereas at 200 kg N ha^{-1}, lint yields were 25 to 38% significantly greater than those at 100 kg N ha^{-1} in the form of ammonium nitrate or poultry litter. Soil moisture measurements in the top 7 cm of the soil taken during cotton seedling emergence showed a greater volumetric soil moisture content in no till plots compared to conventional till plots with or without poultry litter. Poultry litter improved soil water holding capacity which resulted in higher soil moisture content in no till and poultry litter plots during dry spells. Residues left at the surface and the mulch provided by poultry litter under no till reduced loss of soil moisture by evaporation which resulted in higher yields in no till and poultry litter plots. In practical terms, no till, cover cropping, and surface application of poultry litter at 200 kg N ha^{-1} into crop residues will be useful for soil moisture conservation in cotton production systems in the southeastern United States where erosion is a problem and abundant poultry litter is available.

Note: To convert from metric to English measurement, multiply kg/ha times 0.893 to get pounds per acre.

Lint yield of cotton as influenced by conventional till (CT), mulch till (MT), and no till (NT) tillage systems; cotton winter fallow (CF) and cotton winter rye (CR) cropping systems; and ammonium nitrate (AN) and poultry litter (PL) sources of nitrogen at Belle Mina, Alabama, 1997 to 2001. (Letters show mean separation at 0.05 level of significance.)



IRRIGATED COTTON MANAGEMENT WITH CONSERVATION TILLAGE

D. W. Reeves, J. N. Shaw, L. Curtis, and C. Burmester

Historically, dry weather during the critical fruiting period in the Tennessee Valley Region is common. During the critical fruiting period, from the last week of June to the second week of August, a minimum of one third of the days will be drought days (plant-available soil water is reduced to zero) in 50% of the years. In 3 years out of 10 a minimum of 65% percent of the days during this period will be drought days. For these soils, deep tillage under-the-row in fall, to reduce soil compaction and increase the volume of soil available for rooting and water storage, coupled with a cover crop to produce adequate residue for moisture conservation, can reduce the risks of drought-induced yield reductions. Irrigation technologies offer producers reduced risks and increased profitability; however, management of irrigation in conservation tillage systems has not been researched.

This project was conducted in 2002 to evaluate irrigation management and tillage system interactions related to cotton yield and water relations. Tillage by irrigation regimes was imposed at the Tennessee Valley Extension and Research Center in Belle Mina, Alabama. Treatments consisted of four tillage systems and four irrigation regimes in all possible combinations. Tillage systems included the following: (1) conventional tillage (fall chisel/disk, spring disk/level) without paratilling; (2) conventional tillage (fall chisel/disk, spring disk/level) with fall paratilling; (3) no tillage with rye cover crop without paratilling; and (4) no tillage with rye cover crop with fall paratilling. Overhead sprinkler irrigation regimes included the following: (1) 0 gallons per minute (no irrigation); (2) 2 gallons per minute (1 inch every 9.4 days); (3) 4 gallons per minute (1 inch every 4.7 days); and (4) 6 gallons per minute (1 inch every 2.35 days).

Cotton growth started slowly due to a wet spring with some unusually cold weather. Only irrigation affected lint yields, ginning percentage, and total cotton dry matter production (see table). There were no differences due to tillage, nor were there any tillage X irrigation interactions on these variables. Ginning percentage decreased with irrigation, averaging 40.1% with no irrigation and 37.1% when irrigated. Within irrigated treatments, there were no differences among rates. Lint yields and post-harvest total cotton dry matter (plant size) increased with irrigation rate to the 4 gallons per minute irrigation rate regime, averaged over all tillage treatments. Lint yields averaged 680, 932, 1024, and 994 pounds per acre for the 0, 2, 4, and 6 gallons per minute irrigation regimes, respectively. Although lint yields were not found to be affected by tillage or by the interaction of tillage and irrigation regimes, these types of studies need to be conducted for a number of seasons in order to make valid conclusions and recommendations. Preliminary data indicate that tillage did impact soil water and plant water stress, but further statistical analysis is needed to evaluate these data. This study will continue through the 2003 season.

COTTON LINT YIELD[1] FOR 2002

Tillage trreatments	0 gpm	2 gpm	4 gpm	6 gpm	**Tillage means**
Conventional tillage without paratill	609	1011	1084	1053	**939**
Conventional tillage with paratill	577	968	1017	936	**875**
No-tillage/cover crop without paratill	758	856	991	1010	**903**
No-tillage/cover crop with paratill	776	894	1006	976	**913**
Irrigation means[2]	**680**	**932**	**1024**	**994**	

[1] Yield is measured in pounds per acre.

[2] LSD (0.10) for irrigation means = 81 pounds per acre.

NUTRIENT MOVEMENT UNDER LONG-TERM BROILER LITTER FERTILIZATION

C. C. Mitchell and W. C. Birdsong

Alabama produces almost three times more poultry broiler litter (by weight) as commercial fertilizers used. In regions of intensive poultry production, most broiler litter is over applied to pastures and hayfields creating potential nutrient enrichment of surface and ground waters. Row crop farmers have concerns about using broiler litter on their crops, especially cotton.

In 1990 and 1991, experiments were begun to address some of these concerns. Experiments began in 1990 at the Tennessee Valley Research and Extension Center, Belle Mina, Alabama, and in 1991 at the E.V. Smith Research Center, Shorter, Alabama, with 11 treatments replicated four times in a randomized block design (see table). Soil at theTennessee Valley site is a Decatur silt loam. The experiment at this site was discontinued after 3 years. Soil at the E.V. Smith site is a Norfolk fine sandy loam. This site has been continued from 1991 through 2002. Today, it is one of the oldest, continuous experiments in the United States with poultry manure on crops.

Plot size at both sites was 25 feet long and 24 feet wide, which accommodated eight, 36-inch rows of cotton or corn. All broiler litter was broadcast just prior to planting at a rate based upon the total N concentration in the litter. Ammonium nitrate rate was split with half applied at planting and half applied as a sidedress.

All treatments except the broiler litter treatments received 27 pounds per acre of P and 50 pounds per acre of K as concentrated superphosphate and muriate of potash, respectively, at planting.

The sites were in conventionally tilled cotton through 1993 (moldboard plow, disk, field cultivate, and cultivate to control weeds; winter fallow). Nutrients were incorporated just prior to planting under conventional tillage. In 1994, treatments at the E.V. Smith site were slightly modified to include residual broiler litter treatments. The experiment was planted to conservation-tilled corn from 1994 to 1997 (winter rye planted as a cover crop; nutrients surface applied just prior to planting into rye residue after spraying with glyphosate; in-row subsoiled to 14 inches every spring just prior to planting; no cultivation). From 1998 through 2002, the experiment has been in conservation tilled cotton (see table).

Three years of broiler litter application in the Tennessee Valley and 11 years application in a Coastal Plain soil dramatically increased extractable P, K, Ca, Mg, Zn, and Cu in surface soils in proportion to that applied in the broiler litter (Figure 1). There was also a slight but significant accumulation of surface soil organic C and N after 11 years in Central Alabama at the highest broiler litter rate (240 pounds N per acre as broiler litter or approximately 4 tons of broiler litter per acre every 2 years) (Figure 2). When broiler litter is used as a source of N, soil pH is maintained or slightly increased depending upon the rate used (data not shown). Rapid nitrate leaching in these soils results in generally low measurable levels of soil nitrate-N. The preside dress soil nitrate test does not predict crop response to sidedress N regardless of N source at planting.

TREATMENTS USED IN EXPERIMENTS WITH BROILER LITTER ON COTTON AND CORN AT TWO LOCATIONS

———Both locations[1]———			———Central Alabama location only[2]———		
Source of N	N rate *lb/ac*	Growth regulator[3]	Source of N	N rate *lb/ac*	Other factors
None	0	no	None	0	
Am. nitrate	60	no	Am. nitrate	60	
Am. nitrate	60	yes	Am. nitrate	120	
Am. nitrate	120	no	Am. nitrate	180	
Am. nitrate	120	yes	Am. nitrate	240	
Broiler litter	120	no	Broiler litter	120	
Broiler litter	120	yes	Broiler litter	120	Residual[4]
Broiler litter	180	no	Broiler litter	180	
Broiler litter	180	yes	Broiler litter	180	Residual[4]
Broiler litter	240	no	Broiler litter	240	
Broiler litter	240	yes	Broiler litter	240	Residual[4]

[1] Cotton–conventional tillage, 1990-1993.

[2] Corn–conservation tillage, 1994-1997; Cotton–conservation tillage, 1998-2002.

[3] Pix (mepiquat chloride) applied at rate of 8 oz/ac in multiple applications.

[4] Broiler litter and residual plots were alternated each year so that each year there was a residual treatment which did not receive an N source.

Figure 1. Mehlich-1 extractable K with depth at the E.V. Smith location in central Alabama.

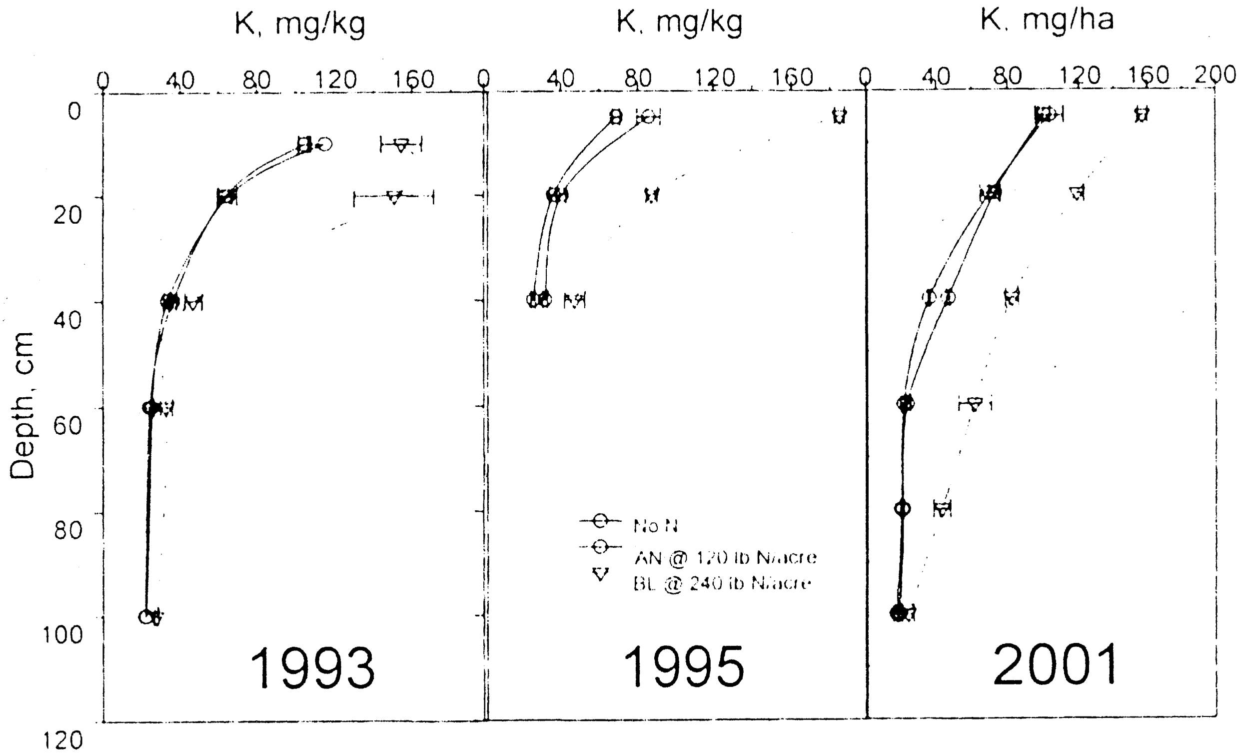
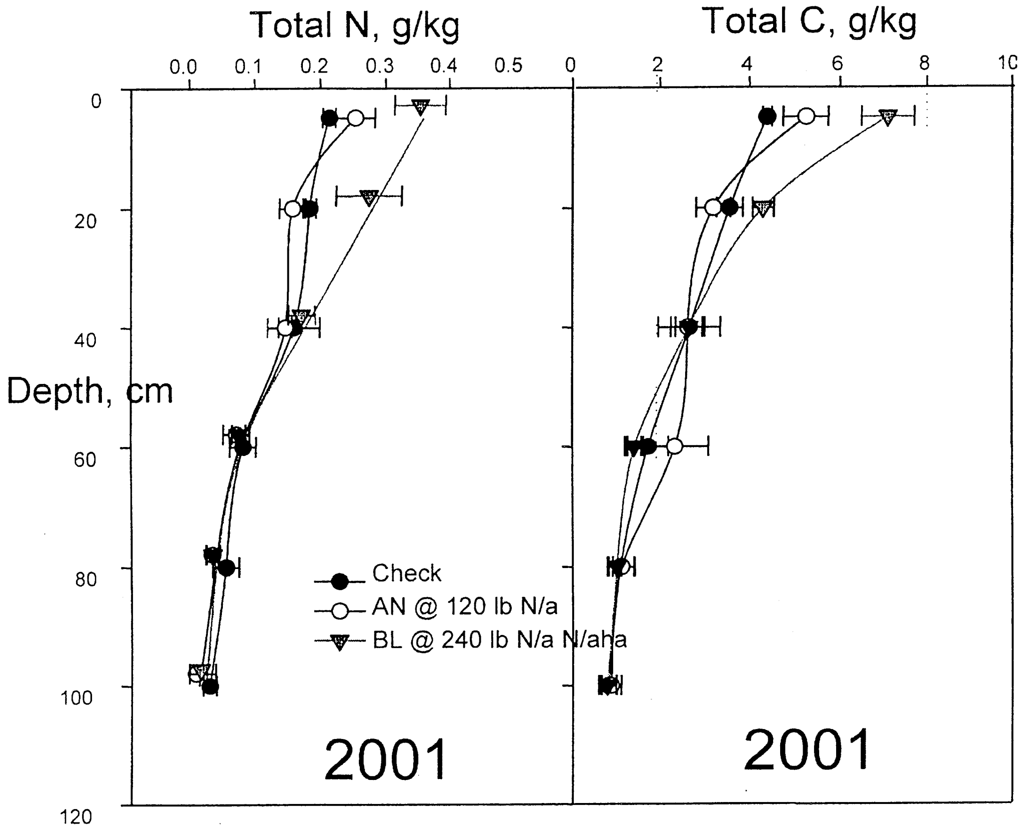


Figure 2. After 11 years at E.V. Smith with 32 tons per acre of broiler litter applied, significant increases in both total N and C were found in the upper 20 cm of the soil.



NEW CHANGES PRODUCE RECORD YIELDS ON OLD ROTATION

C. C. Mitchell, D. Delaney, and D. W. Reeves

The Old Rotation experiment (circa 1896) on the campus of Auburn University is the oldest, continuous cotton experiment in the world.

Since the centennial cropping year of the Old Rotation (1995), major technological modifications have been implemented in managing this experiment. These include switching to genetically modified crops, almost complete elimination of insecticide use, drastically reducing herbicide use, and switching to conservation tillage instead of conventional moldboard plowing and cultivation. In 2002, another dramatic change is being monitored in the old experiment. Irrigation has been installed so that half of each plot can now be irrigated. This report will highlight yields and observations made during these transition years.

The site is at the junction of the Piedmont Plateau and Gulf Coastal Plain soil physiographic regions. The soil is identified as a Pacolet sandy loam. There are 13 plots on 1acre of land. Each plot is 136 feet long by 21.5 feet wide with a 3-foot alley between each plot and comprise seven cropping systems (Table 1).

All plots were managed with conventional tillage (moldboard plow, flatbed disk or chisel, field cultivate or harrow, and cultivation for weed control) from 1896 through 1996. In 1997, all plots were switched to conservation tillage (spring paratill under the row and plant using no till planter; no mechanical cultivation). A goal was to establish reseeding crimson clover in those plots planted to winter legumes.

Since switching to genetically modified crops in 1996 and conservation tillage in 1997, record yields of all crops have been produced on the Old Rotation (Table 1). A record three bales cotton per acre (1600 pounds lint) was produced in 2001 on a plot which has never received anything but legume N (plot 8). In 1999, a record corn grain yield of 236 bushels per acre was produced on the 3-year rotation with only legume N.

In 1997, just prior to conversion to conservation tillage, additional soil physical and chemical measurements were taken to serve as a benchmark for future comparisons (Table 2). As crop rotation increased and more biomass was returned to the soil in the form of crop residue, soil water holding capacity, hydraulic conductivity (Ksat), respiration, total C, total N, cation exchange capacity (CEC), and water-stable aggregates have increased. All these indicate improvements in soil quality.

For more information about the Old Rotation and long-term yield records, visit the Web site at http://www.ag.auburn.edu/dept/ay/cotton.htm.

TABLE 1. RECORD NONIRRIGATED YIELDS ON THE OLD ROTATION

Crop	Rank	Year	Plot	Record yield
Cotton	1	2001*[1]	8	1600 lb lint/acre
	2	1994	3	1490
	3	1993	9	1270
Corn	1	1999*	11	236 bu/acre
	2	2001*	5	193
	3	1997*	5	148
Wheat (1961-present)	1	2001*	10	94 bu/acre
	2	2000*	11	81
	3	1999*	12	79
Oat (before1960)	1	1958	—	109
	2	1937	—	97
	3	1956	—	87
Rye (1978-present)	1	1981	—	55
	2	1988	—	48
	3	1979	—	40
Soybean (1957-present)	1	1996	12	67 bu/acre
	2	1992	—	61
	3	1983	—	55
Winter legume	1	1981	11	7250 lb dry matter/acre
	2	2000*	8	6480
	3	1999*	3	6410

[1] * indicates conservation tillage since 1997.

TABLE 2. SELECTED SOIL PHYSICAL AND CHEMICAL MEASUREMENTS MADE ON TREATMENTS FROM THE OLD ROTATION IN 1997 BEFORE CONVERSION TO CONSERVATION TILLAGE

Treatments	Bulk density *g/cm^3*	Soil water *%*	K_{sat} *in/min*	Soil respiration *lb/C/ac/day*	Total C *%*	Total N *%*	C.E.C. *cmol$_c$/kg*	Water stable aggregates *%*
Continuous cotton:								
No N/no legumes	1.66	7.69 c	0.37	22 b	0.50 d	0.02 c	3.1 c	49.8 b
+ winter legumes	1.66	7.47 b	0.43	44 ab	0.84 c	0.04 ab	4.3 b	52.2 b
+120 lb N/acre	1.73	9.40 bc	0.04	36 ab	0.87 c	0.04 abc	5.6 a	34.7 c
Two-yr rotation:								
+ winter legumes	1.68	10.11 ab	0.57	60 a	0.85 c	0.05 ab	4.6 b	53.2 b
+legumes/+120 lb N/acre	1.62	11.67 a	0.33	45 ab	1.09 b	0.06 a	5.4 a	48.9 b
Three-yr rotation	1.65	11.47 a	1.22	60 a	1.27 a	0.05 ab	5.5 a	64.1 a

INSECTICIDES

EFFECTS OF A WIDE RANGE OF INSECTICIDES ON TARNISHED PLANT BUGS IN COTTON

Barry L. Freeman

This trial was conducted on the Tennessee Valley Research and Extension Center in Belle Mina, Alabama, to test the effectiveness of a variety of insecticides on tarnished plant bugs. The test was conducted as a nonreplicated large strip trial to minimize the effects of migration. Plots were 100 feet long by eight rows wide and were under irrigation.

Treatments were applied on July 10, 2002. Post-treatment 6-foot drop-cloth samples were conducted on July 15, July 18, and July 22 to estimate plant bug populations. Five samples per plot on each sample date were desired, but inclement weather forced this number to be abbreviated to three in all treatments on July 22.

Pinhead square retention was determined on the above dates by examining 50 pinhead squares in each plot for plant bug damage.

Seed cotton yields were determined by harvesting and weighing the four center rows from each plot on October 2.

Pinhead square retention remained above 80% and plant bug populations were low or moderate during the latter half of June. On July 1 the pinhead square retention in the test area was 80%, approximately 33 plant bug nymphs per 100 row feet were present, and adult plant bugs were common. On July 8 the pinhead square retention was down to 74% and the nymphal plant bug population averaged 108 per 100 row feet. Though the tarnished plant bug was predominant, some adult and nymphal garden fleahoppers were also present during this trial.

Average plant bug populations for the entire post-treatment period are shown in Table 1. Eight of the insecticide treatments (Karate Z, Intruder plus MSO, Intruder plus COC, F1785, Bidrin, Centric 0.0635, Orthene, and Centric 0.0475) reduced the overall post-treatment plant bug population by 65% or more (Table 1). The Intruder treatment without additives reduced the overall population by only 53.42%, but the average ending population on July 22 was acceptable (Table 1).

In addition to the above list of treatments, Vydate plus Asana, Intruder, Asana, and V-10112 0.088 all provided an average pinhead square retention level above 80% during the post-treatment period (Table 2). The only treatments at the end of the sample period with an average square retention level of 85% or above were Karate Z, F 0570, Orthene, Intruder plus COC, and Centric 0.0635. Pinhead square retention becomes unreliable as a predictor of plant bug activity as terminal growth slows. This usually occurs during mid to late July, which coincides with the period of this trial. Nevertheless, the pinhead square retention data from this test generally reflect anticipated product performance.

Cotton yields are reported in Table 3, but this test was run as a large strip trial and is unreplicated. All but three treat-

TABLE 1. NUMBERS OF PLANT BUGS PER 100 FEET OF ROW

Treatment	Plant bugs July 15	July 18	July 22	Average	% change from control
Karate Z (0.025 lb a.i./ac)	23	33	22	26	-88
Intruder + MSO (0.05 lb a.i./ac + 1 pt/ac)	30	43	78	50	-78
Intruder + COC (0.05 lb a.i./ac + 1 pt/ac)	37	57	61	52	-77
F1785 (0.053 lb a.i./ac)	67	78	17	54	-76
Bidrin (0.33 lb a.i./ac)	37	107	22	55	-75
Centric (0.0635 lb a.i./ac)	63	87	39	63	-72
Orthene (0.5 lb a.i./ac)	60	100	50	70	-69
Centric (0.0475 lb a.i./ac)	80	107	44	77	-66
F 0570 (0.018 lb a.i./ac)	50	130	94	91	-59
Steward (0.11 lb a.i./ac)	88	128	89	102	-55
Intruder (0.05 lb a.i./ac)	137	133	44	105	-53
Vydate (0.33 lb a.i./ac)	93	143	122	119	-47
V-10112 (0.088 lb a.i./ac)	83	150	139	124	-45
Asana (0.04 lb a.i./ac)	183	128	128	146	-35
Vydate + Asana (0.25 + 0.036 lb a.i./ac)	73	280	94	149	-34
Trimax (0.047 lb a.i./ac)	143	200	122	155	-31
V-10112 (0.044 lb a.i./ac)	196	183	128	169	-25
Control	258	278	139	225	—

TABLE 2. PERCENT PINHEAD SQUARE RETENTION

Treatment	Pinhead square retention July 15	July 18	July 22	Average	% change from control
Orthene (0.5 lb a.i./ac)	96.0	92	92	93.33	+41.05
F 0570 (0.018 lb a.i./ac)	88.0	92	94	91.33	+38.02
Bidrin (0.33 lb a.i./ac)	92.0	98	84	91.33	+38.02
Centric (0.0635 lb a.i./ac)	92.0	94	86	90.67	+37.03
Karate Z (0.025 lb a.i./ac)	80.0	90	96	88.67	+34.00
Intruder + MSO (0.05 lb a.i./ac+ 1 pt/ac)	94.0	82	84	86.67	+30.98
Vydate + Asana (0.25 + 0.036 lb a.i./ac)	92.0	84	80	85.33	+28.96
Intruder + COC (0.05 lb a.i./ac + 1 pt/ac)	84.0	80	90	84.67	+27.96
Centric (0.0475 lb a.i./ac)	76.0	88	78	80.67	+21.91
Intruder (0.05 lb a.i./ac)	88.0	84	70	80.67	+21.91
V-10112 (0.088 lb a.i./ac)	97.5	74	70	80.50	+21.66
Asana (0.04 lb a.i./ac)	88.0	72	80	80.00	+20.90
Trimax (0.047 lb a.i./ac)	84.0	76	76	78.67	+18.89
Vydate (0.33 lb a.i./ac)	86.0	86	64	78.67	+18.89
F 1785 (0.053 lb a.i./ac)	80.0	72	76	76.00	+14.86
V-10112 (0.044 lb a.i./ac)	87.5	58	66	70.50	+ 6.54
Steward (0.11 lb a.i./ac)	78.0	72	60	70.00	+ 5.79
Control	72.5	70	56	66.17	—

ments, the V-10112 product and one of the Centric treatments, outyielded the untreated control (Table 3). The highest yielding treatments were two of the Intruder treatments, Karate Z, Trimax, F 1785, and a Centric treatment, and they out performed the control by 7.44 to 13.8% (Table 3).

This trial demonstrates the difficulty of controlling an imbedded population of plant bugs on a large plant. Only one product, Karate Z, provided above 80% control (Table 1). Nevertheless, the old standards, Bidrin and Orthene, performed decently as did Centric, Intruder, and F 1785. The V-10112 compound was a disappointment.

TABLE 3. COTTON YIELDS AS POUNDS OF SEED COTTON PER ACRE

Treatment	Seed cotton per acre	% change from control
Intruder + COC (0.05 lb a.i./ac + 1 pt/ac)	3504	+13.80
Karate Z (0.025 lb a.i./ac)	3472	+12.76
Trimax (0.047 lb a.i./ac)	3440	+11.72
Intruder (0.05 lb a.i./ac)	3341	+8.51
F1785 (0.053 lb a.i./ac)	3341	+8.51
Centric (0.0475 lb a.i./ac)	3308	+7.44
F0570 (0.018 lb a.i./ac)	3242	+5.29
Orthene (0.5 lb a.i./ac)	3242	+5.29
Steward (0.11 lb a.i./ac)	3242	+5.29
Bidrin (0.33 lb a.i./ac)	3210	+4.25
Intruder + MSO (0.05 lb a.i./ac + 1 pt/ac)	3177	+3.18
Vydate + Asana (0.25 +0.036 lb a.i./ac)	3177	+3.18
Vydate (0.33 lb a.i./ac)	3177	+3.18
Asana (0.04 lb a.i./ac)	3144	+2.11
Control	3079	—
Centric (0.0635 lb a.i./ac)	3013	-2.14
V-10112 (0.044 lb a.i./ac)	2882	-6.40
V-10112 (0.088 lb a.i./ac)	2817	-8.51

Control of Thrips on Seedling Cotton

Barry L. Freeman

This test was designed to compare seed and in-furrow treatments with and without foliar insecticides for thrips control. It was located on the Tennessee Valley Research and Extension Center in Belle Mina, Alabama, and was planted on April 23, 2002. Plots were four rows wide by 25 feet long and were replicated four times each. Foliar applications were made on May 15.

Thrips were sampled on May 7, May 15, May 22, May 29, and June 4 by rinsing five plants from each plot in ethyl alcohol. Each sample was then filtered and the resulting thrips counted under a dissecting microscope. Adult and immature thrips were tallied separately.

An earliness evaluation was made on July 9 and July 11 by counting all white blooms in the center two rows of each plot. Seed cotton yields were determined by harvesting the center two rows of each plot on September 24.

All treatments except the control kept thrips populations at acceptable levels through May 22 (Table 1). Thrips reproduction was becoming evident in the Gaucho and Cruiser treatments on May 29 and by June 4 all treatments except the Temik plus Orthene contained more than one thrips larva per plant (Table 1). The Orthene overspray reduced the thrips population for all three at-planting insecticides (Table 1).

The control plots contained fewer white blooms than the insecticide treatments on July 9 and July 11 (Table 2). The insecticide treatments with the fewest numbers of blooms were the low rate of Temik and Gaucho treatments (Table 2).

The neonicitinoid treatments outyielded other treatments and the addition of Orthene improved both the Gaucho and Cruiser yields (Table 3). Rainfall totaling 2.68 inches fell on May 3 and May 4 and may have had some impact on the performance of Temik, but the thrips control in these plots does not bear that out. These data support past experiences, which indicate that the neonicitinoid seed treatments often yield above expectations based on thrips populations.

Table 1, Part A. Average Number of Thrips per Five Plants, 2002

	May 7		May 15		May 22		May 29	
Treatments	Adult	Larva	Adult	Larva	Adult	Larva	Adult	Larva
Temik 0.53 lb a.i./ac + Orthene 0.2 lb a.i./ac	0.75	0.00	0.00	0.75	0.25	0.50	0.50	1.25
Cruiser 4.8 oz a.i./cwt. seed + Orthene 0.2 lb a.i./ac	0.00	0.00	1.00	0.25	0.25	0.00	0.75	1.00
Gaucho 5 oz a.i./cwt. seed + Orthene 0.2 lb a.i./ac	0.50	0.00	0.50	1.50	0.00	0.25	1.50	0.25
Temik 0.75 lb a.i./ac	0.50	0.00	0.50	0.75	1.00	0.75	1.50	1.25
Cruiser 4.8 oz a.i./cwt. seed	0.00	0.00	0.50	0.25	1.50	0.25	3.00	3.25
Temik 0.53 lb a.i./ac	0.50	0.00	0.50	1.75	2.00	1.00	1.00	1.75
Gaucho 5.0 oz a.i./cwt. seed	2.25	0.00	0.50	0.00	3.25	1.50	2.25	3.75
Untreated control	7.75	0.00	0.25	8.20	1.00	15.00	2.50	13.75

Table 1, Part B. Average Number of Thrips per Five Plants, 2002

	June 6		Seasonal average			% change
Treatments	Adult	Larva	Adult	Larva	Total	from control
Temik 0.53 lb a.i./ac + Orthene 0.2 lb a.i./ac	6.25	3.00	1.55	1.10	2.65	-81.77
Cruiser 4.8 oz a.i./cwt. seed + Orthene 0.2 lb a.i./ac	9.25	5.00	2.25	1.25	3.50	-75.93
Gaucho 5 oz a.i./cwt. seed + Orthene 0.2 lb a.i./ac	6.00	7.75	1.70	1.95	3.65	-74.90
Temik 0.75 lb a.i./ac	7.00	10.75	2.10	2.70	4.80	-66.99
Cruiser 4.8 oz a.i./cwt. seed	5.50	14.25	2.10	3.60	5.70	-60.80
Temik 0.53 lb a.i./ac	5.00	17.00	1.80	4.30	6.10	-58.05
Gaucho 5.0 oz a.i./cwt. seed	6.00	15.75	2.85	4.20	7.05	-51.51
Untreated control	8.00	16.25	3.90	10.64	14.54	—

TABLE 2. AVERAGE NUMBER OF WHITE BLOOMS PER 100 ROW FEET, 2002

Treatment	July 9	July 11	July 9 and Nov. 2	% change from control
Gaucho 5 oz a.i./cwt. seed + Orthene 0.2 lb a.i./ac	2.75	20.63	26.13	+81.71
Cruiser 4.8 oz a.i./cwt. seed	2.38	22.38	24.76	+72.18
Cruiser 4.8 oz a.i./cwt. seed + Orthene 0.2 lb a.i./ac	3.38	20.88	24.26	+68.71
Temik 0.53 lb a.i./ac + Orthene 0.2 lb a.i./ac	3.13	17.75	20.88	+45.20
Temik 0.75 lb a.i./ac	2.50	18.13	20.63	+43.46
Gaucho 5.0 oz a.i./cwt. seed	2.75	16.13	18.88	+31.29
Temik 0.53 lb a.i./ac	1.89	14.13	16.02	+11.40
Untreated control	1.13	13.25	14.38	—

TABLE 3. COTTON YIELDS IN POUNDS OF SEED COTTON PER ACRE

Treatment	Yield	% change from control
Gaucho 5 oz a.i./cwt. seed + Orthene 0.2 lb a.i./ac	3300	+16.77
Cruiser 4.8 oz a.i./cwt. seed + Orthene 0.2 lb a.i./ac	3189	+12.85
Cruiser 4.8 oz a.i./cwt. seed	3136	+10.97
Gaucho 5.0 oz a.i./cwt. seed	3019	+6.83
Temik 0.53 lb a.i./ac	2957	+4.64
Temik 0.53 lb a.i./ac + Orthene 0.2 lb a.i./ac	2940	+4.03
Untreated control	2826	—
Temik 0.75 lb a.i./ac	2800	-0.92

EVALUATION OF SEED TREATMENTS FOR THRIPS CONTROL IN THE WIREGRASS AREA

James R. Weeks and William Birdsong

This study, which compared seed and in-furrow treatments for thrips control in Bt and non-Bt cotton, was conducted at the Wiregrass Research and Extension Center in Headland, Alabama. The soil type is a Dothan sandy loam. Fertility, weed management, and irrigation for the study area were according to Alabama Cooperative Extension System (ACES) recommendations. Cotton cultivars FiberMax 989 RR and FiberMax 989 BR were planted on April 22, 2002 with a four-row John Deere vacuum planter. Seed treatments of Gaucho or Cruiser were treated from a common bag of each cultivar. Temik 15G or Thimet 20G were applied in-furrow at planting with the planter applicator. Foliar sprays of Karate Z or Orthene 97AG were applied on May 3, 2002. Treatments were arranged in a randomized complete block design with four replications. Each plot consisted of four 36-inch rows, 30 feet long. A treatment list with materials and rates is listed in Table 1.

Stand counts (emerged seedlings) in one row of each plot were made on May 3, 2002. Whole plot subjective thrips damage ratings were made on May 14 and May 30. All plots were treated for stink bugs on August 8, 2002 with Karate at the rate of 0.02 pound active ingredient per acre. Plots were scouted weekly for insect pests according to ACES guidelines and thresholds for treatment decisions were followed. The two middle rows of each plot were harvested with a one-row mechanized picker on September 18, 2002.

Although a few *Heliothine* eggs and larvae were found on several occasions, thresholds for treatment were never exceeded in the Bt(BR) or non-Bt(RR) treatments. Because of defoliation problems and poor boll opening, a second picking was planned. Rainy weather in October and subsequent boll rot prevented a second harvest. Late season weather conditions created problems with boll rot and regrowth which appear to have affected treatment yields. Much of the earliness that good thrips control promoted was lost due to the boll rot of the early-set fruit. Yields from the first harvest indicate that treatments of the FiberMax BR out yielded the FiberMax RR cultivar by 231 pounds of lint cotton (Table 2). The seed treatments of Cruiser and Cruiser plus foliar sprays had comparable yields to that of Temik 15G in-furrow treatments. However, early season thrips damage ratings indicated that Temik 15G treatments had less seedling cotton damage than did the Gaucho or Cruiser seed treatments.

Cruiser and Gaucho brand insecticides applied to cotton seed afford moderate to good early season thrips control under southeast Alabama conditions. For consistency comparable to Temik 15G in-furrow treatments, a cotton grower should be prepared to make an additional foliar application in the 2- to 4-leaf stage when thrips populations are especially heavy and/or growing conditions are unfavorable for cotton.

Even though the cotton in the study never exceeded threshold for bollworms, the treatments with the cultivar including the BollGard gene (BR) had higher yields than the treatments with the cultivar without the BollGard gene (RR). Low level infestations of bollworms, tobacco budworms, and late season fall armyworms apparently were causing enough damage season long to account for the yield increase due to BollGard.

TABLE 1. AVERAGES OF TREATMENTS FOR THRIPS CONTROL[1]

Treatment [2]	Cultivar	Stand *no/30 ft*	TDR 1 [3] May 14	TDR 2 *May 30*	Lint yield *lbs/ac*
Untreated control	FM 989 RR	77.75 ab	8.62 a	9.15 a	985 abcd
Untreated control	FM 989 BR	63.75 cdef	8.78 a	8.88 a	1169 ab
Cruiser seed treatment	FM 989 RR	61.50 defg	5.05 de	5.95 cd	1137 ab
Cruiser seed treatment	FM 989 BR	53.25 ghi	5.18 cde	5.33 def	1123 abc
Cruiser seed treatment + Karate 1 oz/ac (FSP at 1-2 TL)	FM 989 RR	71.75 bc	4.07 i	4.18 gh	1038 abcd
Cruiser seed treatment +Karate 1 oz/ac (FSP at 1-2 TL)	FM 989 BR	47.75 i	4.65 efgh	4.75 fgh	1113 abc
Temik 15g 3.5 lb/a (InF)	FM 989 RR	77.50 ab	4.15 hi	3.98 h	1169 ab
Temik 15g 3.5 lb/a (InF)	FM 989 BR	55.50 fghi	4.22 ghi	4.38 gh	953 cd
Temik 15g 5 lb/ac (InF)	FM 989 RR	81.75 a	2.75 j	2.80 i	1062 abc
Temik 15g 5 lb/ac (InF)	FM 989 BR	70.00 bcd	2.55 j	2.78 i	1116 abc
Gaucho seed treatment	FM 989 RR	56.25 fghi	5.68 c	6.05 bcd	818 d
Gaucho seed treatment	FM 989 BR	51.00 hi	5.33 cd	5.88 cde	1096 abc
Gaucho seed treatment +Karate 1 oz/ac (FSP at 1-2 TL)	FM 989 RR	63.00 cdef	4.78 ef	4.58 fgh	1043 abcd
Gaucho seed treatment +Karate 1 oz/ac (FSP at 1-2 TL)	FM 989 BR	58.25 efghi	4.83 def	4.98 efg	1084 abc
Cruiser seed treatment) +Orthene 97AG 4 oz/ac (FSP at 1-2 TL)	FM 989 RR	66.50 cde	4.43 fghi	4.53 fgh	1002 abcd
Cruiser seed treatment) +Orthene 97AG 4 oz/ac (FSP at 1-2 TL)	FM 989 BR	50.50 hi	4.78 ef	5.35 def	1062 abc
Gaucho seed treatment +Orthene 97AG 4 oz/ac (FSP at 1-2 TL)	FM 989 RR	56.00 fghi	4.70 efg	4.53 fgh	1014 abcd
Gaucho seed treatment) +Orthene 97AG 4 oz/ac (FSP at 1-2 TL)	FM 989 BR	59.75 efghi	4.65 efgh	4.13 gh	1164 ab
Thimet 20g 5 lb/ac (InF)	FM 989 RR	70.00 bcd	7.00 b	6.35 bc	897 cd
Thimet 20g 5 lb/ac (InF)	FM 989 BR	64.00 cdef	6.78 b	6.90 b	1212 a

[1] Data subjected to ANOVA. Mean separation within columns was according to Fisher's protected LSD test at 0.05 level.
[2] FSP = foliar spray; TL = true leaf; InF = in furrow application.
[3] TDR = thrips damage rating. Based on a 0-10 visual damage of each plot where 0 = no damage and 10 = dead plants.

TABLE 2. CULTIVAR FIBERMAX 989 RR VERSUS FIBERMAX 989 BR

Cultivar	Stand	TDR 1[1]	TDR 2	Lint yield	Yield *lbs/ac*
FiberMax 989 RR	68.20 a	5.12 a	5.21 a	1016.64 b	2541.61 b
FiberMax 989 BR	57.38 b	5.17 a	5.33 a	1109.33 a	2773.32 a

[1] TDR = thrips damage rating. Based on a 0-10 visual damage of each plot where 0 = no damage and 10 = dead plants.

EVALUATION OF NEW INSECTICIDE CHEMISTRY AND BIOTECHNOLOGY

Ron H. Smith

A test was conducted for tarnished plant bug/stink bug control and beneficial insect selectivity in 2002 comparing the newer labeled chemistry to existing standard insecticides. Evaluations were made at 1, 4, and 7 days post treatment (DAT).

Twenty-five treatments were made with single insecticides, tank mixtures, or additives (Table 1). Most treatments gave fair to good suppression of plant bugs. Karate Z, Orthene, and Vydate were the best three treatments in the test. The least effective treatments were Novaluron, Intruder plus MSO or Decis, and Trimax plus Bidrin (0.03 + 0.25 pound active ingredient per acre). Some treatments showed good initial knockdown at 1 DAT but a lack of residual control at 7 DAT. Other products showed less knockdown but good residual control. Centric and Trimax showed better activity at higher rates. The performance of Intruder for plant bugs was aided by the addition of a crop oil concentrate (COC) but not by a silicon surfactant (MSO). Steward and Denim did not give acceptable control when used alone.

The most effective treatments for stink bugs (southern green) were Trimax plus Bidrin (0.03 + 0.33 pound active ingredient), Centric, Orthene, Bidrin, Intruder plus MSO, Karate Z, Vydate, and Assail (Table 2). The least effective treatments were Denim, Steward, Novaluron, Trimax, Intruder, and Intruder plus COC. Centric (0.063 pound active ingredient) outperformed the other newer chemistries—Intruder, Assail, or Trimax—when each was used alone. All pyrethroids in this test were near the middle of the 25 treatments in effectiveness against the stink bug.

The selectivity of all treatments towards the beneficial species (big-eyed bugs, pirate bugs, and lady beetles) was measured. Of the newer chemistry, Intruder (Assail) is somewhat selective on the big-eyed bug species but quite harsh on pirate bugs and lady beetles. Trimax, alone or in combination,

TABLE 1. NUMBER OF TARNISHED PLANT BUGS PER 100 ROW FEET

	———July 12———			———July 15———			———July 18———			———Average———		
Treatment (lb ai/ac)	Nymphs	Adults	Total	Nymphs	Adults	Total	Nymphs	Adults	Total	Nymphs	Adults	Total
Karate Z (0.034)	8.3	0.0	8.3	0.0	0.0	0.0	5.0	0.0	5.0	4.4	0.0	4.4
Orthene (0.5)	8.3	0.0	8.3	0.0	0.0	0.0	8.3	0.0	8.3	5.6	0.0	5.6
Vydate (0.33)	16.7	0.0	16.7	0.0	0.0	0.0	0.0	0.0	0.0	5.6	0.0	5.6
Intruder + COC (0.05)	16.7	0.0	16.7	0.0	0.0	0.0	8.3	0.0	8.3	8.3	0.0	8.3
Leverage (0.077)	8.3	0.0	8.3	8.3	0.0	8.3	8.3	0.0	8.3	8.3	0.0	8.3
Vydate + Asana (0.25 + 0.36)	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	25.0	8.3	0.0	8.3
Centric + Karate Z (0.023 + 0.02)	16.7	0.0	16.7	0.0	0.0	0.0	5.0	5.0	10.0	7.2	1.7	8.9
Bidrin (0.4)	8.3	0.0	8.3	0.0	0.0	0.0	13.3	5.0	18.3	7.2	1.7	8.9
Centric (0.063)	0.0	0.0	0.0	8.3	0.0	8.3	21.7	0.0	21.7	10.0	0.0	10.0
Steward + Vydate (0.09 + 0.25)	0.0	0.0	0.0	0.0	0.0	0.0	21.7	8.3	30.0	7.2	2.8	10.0
Trimax (0.047)	16.7	0.0	16.7	0.0	0.0	0.0	13.3	0.0	13.3	10.0	0.0	10.0
Assail (0.075)	0.0	8.3	8.3	0.0	8.3	8.3	21.7	0.0	21.7	7.2	5.6	12.8
Trimax + Bidrin (0.03 + 0.33)	8.3	16.7	25.0	0.0	8.3	8.3	5.0	0.0	5.0	4.4	8.3	12.8
F 0570 (0.018)	16.7	0.0	16.7	0.0	8.3	8.3	13.3	5.0	18.3	10.0	4.4	14.4
Intruder (0.05)	16.7	8.3	25.0	16.7	0.0	16.7	5.0	0.0	5.0	12.8	2.8	15.6
Trimax (0.03)	25.0	0.0	25.0	8.3	8.3	16.7	5.0	0.0	5.0	12.8	2.8	15.6
Novaluron (0.045)	25.0	0.0	25.0	0.0	0.0	0.0	21.7	0.0	21.7	15.6	0.0	15.6
Centric (0.047)	33.3	0.0	33.3	0.0	0.0	0.0	16.7	0.0	16.7	16.7	0.0	16.7
Steward (0.11)	8.3	0.0	8.3	0.0	0.0	0.0	41.7	5.0	46.7	16.7	1.7	18.3
Denim (0.01)	8.3	0.0	8.3	16.7	0.0	16.7	38.3	0.0	38.3	21.1	0.0	21.1
Intruder + Decis (0.036 + 0.023)	16.7	0.0	16.7	16.7	0.0	16.7	33.3	13.3	46.7	22.2	4.4	26.7
Novaluron (0.068)	33.3	16.7	50.0	0.0	0.0	0.0	25.0	5.0	30.0	19.4	7.2	26.7
Trimax + Bidrin (0.03 + 0.25)	25.0	0.0	25.0	41.7	8.3	50.0	13.3	0.0	13.3	26.7	2.8	29.4
Novaluron (0.094)	50.0	16.7	66.7	16.7	8.3	25.0	8.3	0.0	8.3	25.0	8.3	33.3
Untreated	25.0	8.3	33.3	25.0	0.0	25.0	41.7	8.3	50.0	30.6	5.6	36.1
Intruder + MSO (0.05)	16.7	0.0	16.7	8.3	16.7	25.0	66.7	16.7	83.3	30.6	11.1	41.7
Untreated	66.7	16.7	83.3	25.0	0.0	25.0	33.3	5.0	38.3	41.7	7.2	48.9
Untreated	25.0	16.7	41.7	16.7	0.0	16.7	100.0	8.3	108.3	47.2	8.3	55.6

was not very selective on big-eyed bugs or pirate bugs but showed moderate selectivity against lady beetles. Centric showed some selectivity towards big-eyed bugs, pirate bugs, and lady beetles. Vydate was selective against big-eyed bugs, pirate bugs, and lady beetles. Novaluron showed good selectivity against big-eyed bugs with no rate response. However, the toxicity of Novaluron towards pirate bugs was very rate responsive. Novaluron was very easy on the lady beetle population. Steward at 0.11 pound active ingredient showed limited selectivity towards big-eyed bugs, pirate bugs, and lady beetles in this trial, generally being in the bottom one-half of all treatments. Denim was initially quite hard on big-eyed bugs and pirate bugs but not lady beetles. However, it did exhibit short residual since populations of all three beneficial species were rebounding by the seven DAT evaluation date.

Heliothine populations, primarily bollworms, were the heaviest since 1995 at the Prattville test site where 21 treatments containing the newer lepidopteran compounds were compared to existing chemistry. A total of five applications were made between July 16 and August 16. All treatments had significantly fewer larvae and less damage than the untreated plots on the peak observation dates of August 5 and August 12. When the seasonal averages were examined, all treatments had fewer larvae and less damage than the untreated. Treatments that maintained a seasonal average at or below the Alabama economic threshold of five larvae per 100 plants were Steward plus Asana, Tracer, Steward (0.09 and 0.11 pound active ingredient per acre), Baythroid, S-1812 plus Asana, Denim plus Karate Z, and Novaluron (0.068 pound active ingredient per acre). The top two treatments in reducing fruit damage were Steward plus Asana and Tracer. Most treatments held the seasonal average of fruit damage to less than 10% while the untreated was 26%. For the second consecutive season, the damage in the Denim treatment at 0.01 pound active ingredient per acre was not in proportion to the number of escape larvae recorded. This may indicate that the larvae were not feeding as actively behind Denim as with other treatments. Steward at 0.09 pound active ingredient per acre performed as well as the 0.11 rate. Baythroid at 0.04 outperformed the other pyrethroids (Decis, Karate Z, XDE-225, and Asana) at the rates used in this test.

TABLE 2. NUMBER OF GREEN STINK BUGS PER 100 ROW FEET

	July 12			July 15			July 18			Average		
Treatment (lb ai/ac)	Nymphs	Adults	Total	Nymphs	Adults	Total	Nymphs	Adults	Total	Nymphs	Adults	Total
Trimax + Bidrin (0.03 + 0.33)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Centric (0.063)	0.0	0.0	0.0	8.3	0.0	8.3	0.0	0.0	0.0	2.8	0.0	2.8
Vydate + Asana (0.25 + 0.36)	0.0	0.0	0.0	0.0	8.3	8.3	0.0	0.0	0.0	0.0	2.8	2.8
Orthene (0.5)	0.0	0.0	0.0	0.0	0.0	0.0	8.3	5.0	13.3	2.8	1.7	4.4
Bidrin (0.4)	16.7	0.0	16.7	0.0	0.0	0.0	0.0	0.0	0.0	5.6	0.0	5.6
Centric (0.047)	0.0	0.0	0.0	0.0	8.3	8.3	5.0	5.0	10.0	1.7	4.4	6.1
Untreated	8.3	0.0	8.3	0.0	0.0	0.0	5.0	5.0	10.0	4.4	1.7	6.1
Trimax + Bidrin (0.03 + 0.25)	0.0	0.0	0.0	0.0	0.0	0.0	13.3	5.0	18.3	4.4	1.7	6.1
Intruder + MSO (0.05)	0.0	0.0	0.0	0.0	0.0	0.0	16.7	5.0	21.7	5.6	1.7	7.2
Karate Z (0.034)	0.0	0.0	0.0	0.0	0.0	0.0	13.3	8.3	21.7	4.4	2.8	7.2
Vydate (0.33)	8.3	0.0	8.3	0.0	8.3	8.3	5.0	0.0	5.0	4.4	2.8	7.2
Assail (0.075)	16.7	0.0	16.7	0.0	0.0	0.0	8.3	0.0	8.3	8.3	0.0	8.3
F 0570 (0.018)	8.3	0.0	8.3	0.0	0.0	0.0	21.7	0.0	21.7	10.0	0.0	10.0
Intruder + Decis (0.036 + 0.023)	16.7	0.0	16.7	0.0	0.0	0.0	13.3	0.0	13.3	10.0	0.0	10.0
Centric + Karate Z (0.023 + 0.02)	8.3	0.0	8.3	16.7	0.0	16.7	8.3	0.0	8.3	11.1	0.0	11.1
Denim (0.01)	8.3	0.0	8.3	0.0	0.0	0.0	16.7	13.3	30.0	8.3	4.4	12.8
Leverage (0.077)	16.7	8.3	25.0	8.3	0.0	8.3	5.0	0.0	5.0	10.0	2.8	12.8
Trimax (0.03)	8.3	0.0	8.3	16.7	0.0	16.7	8.3	5.0	13.3	11.1	1.7	12.8
Trimax (0.047)	16.7	0.0	16.7	8.3	0.0	8.3	16.7	5.0	21.7	13.9	1.7	15.6
Intruder (0.05)	33.3	0.0	33.3	0.0	0.0	0.0	13.3	5.0	18.3	15.6	1.7	17.2
Steward + Vydate (0.09 + 0.25)	0.0	8.3	8.3	16.7	8.3	25.0	13.3	5.0	18.3	10.0	7.2	17.2
Novaluron (0.094)	8.3	8.3	16.7	25.0	8.3	33.3	25.0	0.0	25.0	19.4	5.6	25.0
Novaluron (0.045)	33.3	33.3	66.7	0.0	0.0	0.0	13.3	0.0	13.3	15.6	11.1	26.7
Untreated	8.3	8.3	16.7	25.0	0.0	25.0	41.7	5.0	46.7	25.0	4.4	29.4
Intruder + COC (0.05)	25.0	16.7	41.7	33.3	8.3	41.7	8.3	0.0	8.3	22.2	8.3	30.6
Untreated	0.0	8.3	8.3	8.3	0.0	8.3	75.0	5.0	80.0	27.8	4.4	32.2
Novaluron (0.068)	25.0	25.0	50.0	25.0	0.0	25.0	30.0	5.0	35.0	26.7	10.0	36.7
Steward (0.11)	91.7	0.0	91.7	8.3	0.0	8.3	16.7	16.7	33.3	38.9	5.6	44.4

Denim at 0.01 pound active ingredient per acre left the greatest number of escape larvae, other than the untreated plots. S-1812 performed better than Denim and Intrepid but not as well as Steward or Tracer. Intrepid and Larvin were two of the least effective treatments in both escape larvae and fruit damage. The three highest yielding treatments were Denim plus Karate Z, S-1812 plus Asana, and Baythroid. All treatments out yielded the untreated plots by 405 to 669 pounds of seed cotton per acre.

Bollgard II was compared to Bollgard and conventional varieties at two sites in Alabama in 2002. Moderate to heavy bollworm/tobacco budworm pressure occurred at both locations. A subeconomic level of both fall armyworms and soybean loopers occurred at one test site. All plots were treated as needed with insecticides. The conventional varieties required three applications, at a cost of $28.00 per acre at one site, while the other site received four applications at a cost of $40.00 per acre. Application costs were not included at either site. The Bollgard II with no oversprays yielded the same as, or higher, than the conventional or Bollgard. Measurable fruit damage was present in the conventional plots (due to poor timing of sprays in inclement weather) and the untreated Bollgard plots. No damage from any caterpillar species was detected in the Bollgard II plots.

NEMATICIDES

IN-SEASON CONTROL OF RENIFORM NEMATODES IN NORTHERN ALABAMA

Charles Burmester, Curtis Grissom, and K. S. McLean

Severe cotton stunting due to high levels of reniform nematodes has been observed in northern Alabama fields the last two seasons. In each season the stunting has become apparent in early June in random areas across the fields. Information on control measures to reduce reniform nematode damage at this time of the season is limited.

In 2002, three fields with very high reniform levels and stunted cotton were located in early June. The fields are identified as Bridgeforth, Anderson, and Murphy. All fields were located in Limestone County and the soil type was a Decatur silt loam at each test site. Side dress treatments of Temik 15G were applied in a two-replication test on the Bridgeforth farm and a three-replication test on the Anderson farm. Temik was sidedressed at 7 pounds per acre at both sites. The four-replications test on the Murphy farm received no side dress Temik applications. Foliar applications of Vydate were applied at 8.5 and 17.0 ounces per acre in the Anderson and Murphy tests while 8.5, 17.0, and 25.5 ounces per acre were applied in the Bridgeforth field. Soil samples were taken approximately 3 weeks after application to determine nematode control. Yields were determined by hand picking at the Bridgeforth and Murphy sites, but yields were not determined in the Anderson field.

In the Bridgeforth field, both Temik and Vydate treatments greatly reduced reniform nematode numbers 4 weeks after application (see table). Increasing Vydate rates steadily reduced the reniform levels from over 2500 to only slightly over 400 per 150cc of soil. Cotton growth was visually improved by the Temik and Vydate applications. A late season drought greatly reduced yields in this field. The cotton plants delayed by the reniform nematodes were especially affected by the drought. The Temik and Vydate treatments still increased seed cotton yields by between 150 and 250 pounds per acre compared to no treatment.

In the Anderson and Murphy fields, Temik and Vydate treatments did not reduce reniform nematode numbers (see table). In fact, reniform numbers were sometimes higher in the Vydate-treated plots than in the non-treated areas. No visual growth differences between nematicide treatments and the check areas were noted in either test. In the Murphy test, seed cotton yields were actually slightly lower in the nematicide treated plots compared to the check areas.

Although the Bridgeforth field produced very encouraging results relating to in-season control of reniform nematodes, the lack of response to the same treatments in the Anderson and Murphy fields is quite confusing. Tests to evaluate possible soil differences between the sites are being conducted.

CONTROL OF RENIFORM NEMATODES IN NORTHERN ALABAMA

	——Bridgeforth farm——		——Murphy farm——		Anderson farm[1]
Treatments	Reniform[2] *no/150cc*	Seedcotton *lbs/ac*	Reniform[2] *no/150cc*	Seedcotton *lbs/ac*	Reniform[2] *no/150cc*
Check	2588	1263	1198	2033	1674
Temik 7.0 lbs/ac	1120	1410	—	—	1931
Vydate 8.5 oz/ac	1159	1518	1004	1760	4377
Vydate 17.0 oz/ac	708	1472	1370	1800	3295
Vydate 25.5 oz/ac	425	1518	—	—	—

[1] Seed cotton yields were not measured in the Anderson field.

[2] Reniform nematodes were sampled approximately three weeks after application.

EVALUATION OF MESSENGER WITH TEMIK 15G FOR CONTROL OF *ROTYLENCHULUS RENIFORMIS* ON COTTON IN CENTRAL ALABAMA

K. S. McLean, G. W. Lawrence, A. J. Palmateer, J. Hutchinson, J. Jones, and D. Moore

This cotton nematicide test evaluated Messenger with Temik 15G for control of the reniform nematode *(Rotylenchulus reniformis)* on cotton. The test was planted on May 9 at the Prattville Agricultural Research Unit, Prattville, Alabama. The field has a history of reniform nematode infestation and the soil type was a sandy loam. Messenger was applied as a broadcast spray with a backpack CO$_2$ charged six foot wide boom with flat fan tip 8002E nozzles calibrated to deliver 10 gallons per acre at 20 pounds per square inch. Messenger was applied at the two leaf stage (2LF), pinhead square stage (PHS), full bloom (FB), and/or three weeks after full bloom (FB+3). The nematicide Temik 15G was applied at 3.5 pounds per acre in-furrow at planting. Plots consisted of two rows, 30 feet long with a 36-inch wide row spacing and were arranged in a randomized complete block design with five replications. Blocks were separated by a 20-foot alley.

All plots were maintained throughout the season with standard production practices as recommended by the Alabama Cooperative Extension System. Reniform nematode populations were monitored monthly throughout the season. Plots were harvested on November 14. Data were statistically analyzed by ANOVA and means compared using Fisher's protected least significant difference test ($P \leq 0.05$).

Reniform nematode disease pressure was moderate in 2002 due to the dry weather. Significant differences in reniform nematode populations were observed in the June, August, and October sampling dates. Forty days after planting, no significant differences were observed between the Messenger plus Temik 15 G combination treatments and the control Temik 15 G treatment. At eighty-three days after planting, Messenger plus Temik 15G FB+3 treatment had fewer reniform than the Messenger plus Temik 15G 2-L, FB and Messenger plus Temik 15G FB, FB+3 treatments. By 160 days after planting, no differences in reniform populations were observed among the treatments. The average reniform population across the season varied from a low in the Messenger plus Temik 15 G FB+ 3 treatment to a high in the Temik 15 G alone treatment. Seed cotton yields varied over 395 pounds per acre for the Messenger plus Temik 15 G FB+ 3 treatment and Messenger plus Temik 15 G PHS, FB+3 treatment. Averaging all the Messenger treatment yields together produced an increase of 59 pounds of seed cotton per acre greater than the Temik 15 G alone treatment.

EFFECT OF MESSENGER COMBINED WITH TEMIK 15G AT VARIOUS APPLICATION TIMINGS ON RENIFORM NEMATODE POPULATIONS AND SEED COTTON YIELD

Treatment-product-rate/ac	Applications of Messenger	Reniform/150 cc^3 of soil[1]				Seed cotton
		40 DAP	83 DAP	160 DAP	Average	*lb/ac*
Temik 15G 3.5 lb/ac	no application	2101	8189 ab	5840	4429 a	2166 ab
Messenger 2.25 oz/ac + Temik 15G 3.5 lb/ac	PHS, FB, FB+3	1684	5562 ab	4666	3374 ab	2158 ab
Messenger 2.25 oz/ac + Temik 15G 3.5 lb/ac	2-L, FB	1684	9517 a	6335	4780 ab	2287 ab
Messenger 2.25 oz/ac + Temik 15G 3.5 lb/ac	PHS, FB+3	2472	7292 ab	5670	4255 ab	2097 b
Messenger 2.25 oz/ac + Temik 15G 3.5 lb/ac	FB, FB+3	1452	9085 a	4063	4046 ab	2302 ab
Messenger 2.25 oz/ac + Temik 15G 3.5 lb/ac	2-L	1931	7107 ab	5933	4139 ab	2204 ab
Messenger 2.25 oz/ac + Temik 15G 3.5 lb/ac	PHS	2348	6010 ab	5516	3865 ab	2173 ab
Messenger 2.25 oz/ac + Temik 15G 3.5 lb/ac	PH +2	1184	6412 ab	6767	3987 ab	2097 b
Messenger 2.25 oz/ac + Temik 15G 3.5 lb/ac	FB	2018	5655 ab	4573	3458 ab	2219 ab
Messenger 2.25 oz/ac + Temik 15G 3.5 lb/ac	FB+3	983	4882 b	3646	2774 b	2492 a
FP LSD ($P \leq 0.05$)		1487	4332	4001	1734	356

[1] At planting, population of *R. reniformis* was 1586/150 cm^3 of soil.

IMPACT OF FUMIGATION WITH TELONE AND APPLICATIONS OF TEMIK ON COTTON IN RENIFORM NEMATODE INFESTED FIELDS NEAR PRATTVILLE

William S. Gazaway and Don Moore

Reniform nematodes continue to be a major impediment to successful cotton production in Alabama. Losses in cotton fields heavily infested with reniform nematodes (*Rotylenchulus reniformis*) can range from 20% to as high as 60% depending on growing conditions. Historically, Telone II and Temik 15 G have been used to moderate these losses and allow growers to successfully produce a profit in these fields. Currently cotton producers inject Telone II in the spring approximately 18 inches deep into well-pulverized, raised soil beds 7 days before planting. Temik 15G, applied at 5 to 7 pounds per acre in the seed furrow, is the most frequently used nematicide to control reniform nematodes. Past trials have shown that both nematicides can be effective against reniform nematodes when applied when conditions are favorable. Trials in north Alabama had shown a substantial yield increase with a side dress application of Temik 15G (7 pounds per acre) applied at pinhead square. This test was set up to determine if similar results could be obtained with side dress applications of Temik applied at pinhead square used in combination with either Telone II applied pre-plant or Temik 15G applied in the furrow at planting.

The Avant cotton field near Prattville, Alabama, was selected because it has historically lost substantial cotton yields as a result of a heavy infestation of reniform nematodes. The field, a sandy loam (66% sand, 29% silt, and 5% clay), was disced thoroughly and bedded up on April 3 2002. Treatments were arranged in a randomized complete block design with six replicates. Plots were four 36 inch rows, 25 feet long. Data were taken from the center two rows. Ammonium nitrate (90 units per acre) was applied broadcast on April 8. Telone II was injected 18 inches beneath the top of the raised bed surface at 3 gallons per acre or 5 gallons per acre to designated plots on April 18. All plots not receiving Telone were sub-soiled at the same 18 inch depth. On May 8, all plots were planted with Sure-Grow 501 BR seed treated with the insecticide Cruiser. Temik 15 G was applied in the seed furrow at 5 pounds per acre to designated plots on the same date. Roundup (at a rate of 1 pound of active ingredient per acre) was applied for weed control on June 5. Temik 15G was later applied as a side dress treatment on June 13 to designated plots. Cotton plots were defoliated on September 12 with 6 ounces per acre Ginstar plus Prep (1.5 pints per acre).

Reniform populations were found to average more than 200 per 100cc in the spring prior to planting. A 6-week nematode sampling after crop emergence was not taken because the field was too dry. Excessive rainfall during September and October delayed cotton harvest until November 14. During that period, cotton had to be defoliated a second time due to regrow. Though no statistical difference could be discerned among treatment yields (Table 1), all nematicide-treated plots appeared to yield better than the untreated plots with the exception of the plots in the fifth replication (the fifth tier) (see Table 2). For some unknown reason, cotton yield was unusually high in the untreated control plots in the fifth tier. Table 2, in which tier 5 is excluded, is included for your information.

TABLE 1. YIELD RESPONSE TO TELONE AND TEMIK APPLICATIONS

	Treatment	Rate/acre	Time of application	Seed cotton *lb/ac*
1	Telone II	3 gal	fumigation	1810 a
2	Telone II + Temik 15G	3 gal + 5 lb	fumigation + pinhead square	1718 a
3	Telone II	5 gal	fumigation	1781 a
4	Temik 15G	5 lb	at planting	1665 a
5	Temik 15G + Temik 15G	5 lb + 5 lb	at planting + pinhead square	1709 a
6	Cruiser		treated seed	1476 a
LSD (P= .05)				***285.6***

TABLE 2. COTTON YIELD EXCLUDING FIFTH REPLICATION

	Treatment	Rate/acre	Time of application	Seed cotton *lb/ac*
1	Telone II	3 gal	fumigation	1749
2	Telone II + Temik 15G	3 gal + 5 lb	fumigation + pinhead square	1646
3	Telone II	5 gal	fumigation	1706
4	Temik 15G	5 lb	at planting	1688
5	Temik 15G + Temik 15G	5 lb + 5 lb	at planting + pinhead square	1664
6	Cruiser		treated seed	1319

IMPACT OF SIDE DRESS TEMIK APPLICATIONS ON COTTON PRODUCTION IN RENIFORM NEMATODE INFESTED FIELDS NEAR HUXFORD

W. S. Gazaway and J. R. Akridge

Reniform nematode is a major limiting factor to successful cotton production in Alabama. Losses in cotton fields heavily infested with reniform nematodes (*Rotylenchulus reniformis*) can range from 20% to as high as 60% depending on growing conditions. Telone II and Temik 15 G have been used successfully to moderate these losses and allow growers to produce a profit in these fields. Temik 15G, applied at 5 to 7 pounds per acre in the seed furrow at planting, is preferred by most Alabama cotton producers and can be quite effective against reniform nematodes. Moreover, earlier trials in north Alabama had shown a substantial increase in yield with an application of Temik 15G (7 pounds per acre) or Vydate (2 pints per acre) at pinhead square. Trials were conducted to determine if side dress applications of Temik would produce similar results in central and south Alabama.

The test was placed in the Ward Brothers cotton field near Huxford, Alabama. This is fourth year that the side dress Temik test has been in this field. The field, a loam (49% sand, 34% silt, and 17% clay), was disced thoroughly and bedded up on April 9 2002. Treatments were arranged in a complete randomized block design with six replicates (Table 1). Plots were four 36 inch rows, 25 feet long. Nematode soil samples and yield data were taken from the center two rows. Telone II was injected 18 inches beneath the top of the raised bed surface at the rate of 3 gallons per acre to designated plots on April 9. Raised beds in all plots not receiving Telone were sub-soiled at the same 18-inch depth. On May 2, all plots were planted with DP 458 B/RR seed, and treated with the insecticide Cruiser. Temik 15 G was applied in the seed furrow at 5 pounds per acre or 7 pounds per acre to designated plots. Temik 15G was later applied as a side dress treatment on June 28 to designated plots. All other cultural practices, weed control, and insect control were according to Auburn University recommendations. Nematode samples were taken on April 9 and June 12.

Due to excessive rainfall (more than 30 inches) from September through November, cotton could not be picked. Cotton either fell to the ground or rotted in the bolls. Cotton losses in the area exceeded 80%. Although no yield data are available, some visual observations of cotton growth and boll production were made in the late summer before the onset of the rains. Cotton in plots treated with Telone alone and the two Temik dress treatments with either Telone or Temik at planting had the most vigorous growth and the best boll set (Table 2).

TABLE 1. SUMMARY OF TREATMENTS FOR THE 2002 TEMIK SIDE DRESS TEST

	Treatment	Rate/acre	Application method
1	Cruiser		Seed treatment for insect control
2	Temik 15G	3.5 lb	In seed furrow at planting
3	Temik 15G	5.0 lb	In seed furrow at planting
4	Temik 15G	7.0 lb	In seed furrow at planting
5	Temik 15 G + Temik 15G	5.0 lb + 7.0 lb	In seed furrow at planting. Followed by side dress application at pinhead square.
6	Telone II	3 gal	Injected 18 inches deep in raised beds prior to planting.
7	Telone II + Temik 15G	3 gal + 7.0 lb	Injected 18 inches deep in raised beds prior to planting. Side dress application at pinhead square.

TABLE 2. RENIFORM POPULATION RESPONSE TO TEMIK SIDE DRESS APPLICATIONS

	Treatment	Rate/acre	Application	Reniform/100cc soil April 9	Reniform/100cc soil June 12
1	Cruiser		Seed treatment	152 a	1108 a
2	Temik 15G	3.5 lb	At plant	50 b	737 ab
3	Temik 15G	5.0 lb	At plant	55 b	794 ab
4	Temik 15G	7.0	At plant	59 b	553 ab
5	Temik 15G + Temik 15G	5.0 lb + 7.0 lb	At plant Side dress	64 b	931 ab
6	Telone II	3.0 gal	Pre-plant	83 b	271 b
7	Telone II + Temik 15G	3.0 gal + 7.0 lb	Pre-plant Side dress	104 b	492 ab
LSD (P= .05)				**43.8**	**492.3**

Fall Fumigation Versus Spring Fumigation for Reniform Control in Heavily Infested Cotton Fields

W. S. Gazaway and J. R. Akridge

Telone II has been shown to be an effective nematicide when applied under proper soil conditions. Telone II, unlike other fumigants, is most effective when applied to drier soil at warmer temperatures. In Alabama, such conditions often occur in the fall after cotton has been picked. Conversely, Telone does not perform well when applied to overly wet and cooler soils—conditions that are often present in the spring. Coupled with the fact that Telone requires a 7- to 10- day waiting period prior to planting, a fall application would be more practical than a spring application. The purpose of this experiment was to compare a Telone fall application to a Telone spring application and to the conventional Temik in-furrow application in the spring.

Treatments were arranged in a randomized complete block design and replicated five times. Plots contained four rows and were 25 feet long. The entire test area of the field was disked and subsoiled on December 4 2001. At that time two rates of Telone II (3 and 5 gallons per acre) were injected 18 in deep in raised seed beds to assigned plots. The following spring, Telone application was made on April 9, 2002. Temik was applied in-furrow when cotton (DP 655 B/RR) was planted on May 2. Nematode samples were pulled on December 4, April 9, June 29, and November 31. The plots were not picked due to excessive boll rot caused by more than 30 inches of rain from September through November 2002.

Fall and Spring Fumigation Impact on Reniform Populations

Nematicide	Rate/acre	Application	Reniform/100cc soil	
			April 9	June 12
Telone II	3 gal	Fall	27 a	478 b
Telone II	5 gal	Fall	30 a	395 b
Telone II	3 gal	Spring	34 a	218 b
Temik 15G	7 lb	At-planting	28 a	871 a
Di-Syston 15G	7 lb	At-planting	33 a	392 b
LSD (0.05)			**19.2**	**313.6**

Due to the excessive rainfall, it was impossible to pick cotton from any of the tests in Huxford. More than 30 inches of rain fell from September through November, 2002. Most of the cotton, which was open during this exceedingly wet period, fell to the ground and rotted in the field. Only soil samples for nematode analyses are available for this test. Visual ratings on general cotton growth and boll production were made in the late summer prior to the rains, however. All treatments receiving Telone II appeared to have more vigorous growth and more boll production than the Temik at-planting treatment or the no nematicide treatment (see table). Cotton receiving fall application of 5 gallons per acre had the most vigorous growth followed by Telone treatments at 3 gallons per acre applied in the spring and in the fall, respectively. Based on the performance of Telone II fall applications in this test and previous tests conducted the past three years, Telone II applied the fall appears to be the superior application method.

Effect of Summer Crops and Winter Cover Crops Rotation on Reniform Nematode Populations in Cotton

W. S. Gazaway and J. R. Akridge

A rotation study was begun in 1997 to determine the impact of winter cover crops and summer non-host crops rotated alternate years with cotton on cotton production in fields heavily infested with reniform nematodes. The tests were initiated with winter cover crops or a fallow in the fall of 1997 followed by summer non-host crops planted to designated plots in the spring of 1998. Since that time winter cover crops or a fallow have continued to be planted each fall to the same designated plots, while in the summer cotton has been rotated with non-host crops in alternate years. For example, cotton was planted to all test plots in the spring of 1999. Non-host crops were planted in spring of 2000. Cotton was planted to all plots again in the spring of 2001 and nonhost crops were planted in the spring of 2002. However, two treatments, designated as continuous cotton, have been planted every season in cotton. One of the treatments received a nematicide; the other treatment received only an insecticide. The nonhost summer crops used in this study were corn, rye, a reniform resistant soybean variety, and peanut.

The field (49% sand, 34% silt, and 17% clay) has had a high infestation of reniform nematodes for more than 12 years and, as a result, has experienced substantial cotton yield losses over that period. The experimental design was a split plot, randomized design with five replications. Plots consisted of eight rows 36 inches wide and 25 feet long. Main plots were the winter cover crops that include vetch (Cahaba White), rye (Wren's Abruzzi), and fallow. Subplots are summer crops that include cotton (DP 655 B/RR), corn (Garst AP-8251), soybean (AgriPro 5588-RR), and peanut (Southern Runner). In 2002, plots were planted with non-host summer crops. Cotton was planted in the continuous cotton plots. One of the continuous cotton treatments was treated with Temik 15G at a rate of 7 pounds per acre in the seed furrow at planting. The tillage system was a strip till system. Soil samples were pulled for nematode analyses from the two inner rows of each plot in the spring prior to planting and in the fall after crops had been harvested. All other cultural practices, weed control, and insect control were implemented according to Auburn University recommendations.

The 2002 season experienced extremely unfavorable growing conditions as a result of bad weather. The spring was so dry that cotton had to be replanted in the continuous cotton plots a second time on May 24. Dry weather persisted throughout most of the late spring and early summer. However, from late August through much of November, rain fell continuously, rotting most of the cotton and preventing its harvest. More than 40 inches of rain fell during this period. Consequently, it was impossible to obtain cotton yield data. Soil samples for nematode analyses were taken in late April and again in late October. Reniform nematode fall populations were lower than in most years, because the field was extremely wet when the soil samples were taken (Table 1). Soil samples are generally taken in the field from 6 to 10 inches deep. Under these extremely wet conditions, reniform nematodes may have moved deeper into the soil, beneath the sampling zone. The population response to summer crops appears to be relative because peanut and corn reduced reniform populations in 2002 in a similar manner as they had done in previous years (Table 1). The nematicide Temik 15G also reduced reniform populations but to a lesser degree than either peanut or corn (Table 1). Winter cover crops as in previous years had no effect on reniform populations (Table 2). Surprisingly, vetch, which increases reniform nematode populations in greenhouse tests, did not increase reniform populations in the field during the winter months.

TABLE 1. IMPACT OF SUMMER CROPS ON RENIFORM NEMATODE POPULATIONS

Summer crop	Reniform nematodes/100 cc soil	
	April 15	Oct. 29
Cotton	4020	1130
Cotton + Temik	3115	649
Corn	2458	325
Soybean	2774	738
Peanut	2843	375
LSD (P=.05)	**840**	**240**

TABLE 2. IMPACT OF WINTER COVER ON RENIFORM NEMATODE POPULATIONS

Winter cover	Reniform nematodes/100 cc soil	
	April 15	Oct. 29
Fallow	3391	591
Vetch	2644	619
Rye	3092	719
LSD (P=.05)	**650**	**186**

FUNGICIDES

EVALUATION OF TERRA CONTROL SC 823 ON IRRIGATED AND NONIRRIGATED COTTON

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The soil conditioner Terra Control SC 823 is an ecologically compatible polymer dispersion for stabilizing topsoil layers. Terra Control forms a three-dimensional matrix in the subsoil that is permeable to water and oxygen but is stable against soil erosion due to wind or rain. Terra Control retains moisture longer in the soil and protects soil and plants from drying out, allowing for economical water management.

The objective of these studies was to determine if a single application of Terra Control SC 823 after planting would provide long-term water retention in the root zone that would benefit plants during extended periods of drought under nonirrigated and/or irrigated conditions.

Irrigated and nonirrigated trials were conducted at the Wiregrass Research and Extension Center and the Tennessee Valley Research and Extension Center. A nonirrigated trial was also established at the Prattville Agricultural Research Unit. Irrigated trials were conducted using overhead center-pivot irrigation. Each trial consisted of three treatments, replicated six times, in a randomized complete block design. Each treatment/replication consisted of a four-row plot, 30.0 feet long. Sure-Grow 125 BR was planted on June 4 at the Wiregrass Center, Sure-Grow 501 BR was planted on May 13 at the Prattville Agricultural Research Unit, and Sure-Grow 747 was planted on April 16 at the Tennessee Valley Center. Terra Control SC 823 treatments were applied as a broadcast spray at planting at 7.5 or 10 gallons per acre. Fertilizer applications were determined by soil test information. Insect and weed control required applying insecticide and herbicides as needed. Seed cotton yield was determined at harvest.

There were no significant differences in yield among treatments except at the Tennessee Valley Center-irrigated trial (see table). In that test, the 10-gallon rate of Terra Control increased cotton yield significantly more than the untreated control.

This was the second year of this study. A total of 12 field tests have been conducted in 2001 and 2002 evaluating Terra Control SC 823 on cotton in both irrigated and nonirrigated fields. In 11 of the 12 studies, no significant differences in cotton yield among treatments have been observed.

EFFECT OF TERRA CONTROL SC 823 ON COTTON YIELD ON IRRIGATED AND NONIRRIGATED COTTON AT THREE LOCATIONS IN ALABAMA

	———Nonirrigated———			——Irrigated——	
Variety	Prattville	Tn. valley	Wiregrass	Tn. valley	Wiregrass
	——————lb/ac cotton seed yield——————				
Control	2047 a [1]	1169 a	1228 a	2108 b	1064 a
Terra control 7.5 gal/ac	1955 a	1217 a	930 a	2191 ab	962 a
Terra control 10 gal/ac	2024 a	1200 a	1145 a	2274 a	913 a

[1] Numbers followed by the same letter are not significantly different.

EVALUATION OF PLANTING DATE FOR RESPONSE TO BOLL ROT DISEASE IN ALABAMA

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A planting date trial was conducted to evaluate cotton boll rot incidence in relation to the date of planting. The test was planted at the Gulf Coast Research and Extension Center, Fairhope, Alabama. The soil type was a Malbis fine sandy loam. Plots consisted of two rows, 25 feet long, with a between-row spacing of 40 inches. Plots were arranged in a randomized complete-block design with four replications. A 20-foot alley separated blocks. Two varieties—Sure-Grow 215 BG/RR (early season) and Deltapine DP 555 BG/RR (late season)—were planted on April 18 and every two weeks thereafter until June 1. Cotton boll rot was evaluated by recording the number of healthy bolls and diseased bolls from a 0.001 acre section within each plot. Disease index ([# diseased bolls / total # counted] × 100) was calculated for each variety on August 8, August 15, August 29, September 13, October 1, and October 18.

All plots were maintained throughout the season with standard herbicide, insecticide, and fertility production practices as recommended by the Alabama Cooperative Extension System. Data were statistically analyzed using PROC GLM, and means were compared with Fisher's protected least significant difference test ($P \leq 0.05$).

Cotton boll rot disease incidence was high in 2002 and yield data are not included due to tropical storms and hurricane conditions late in the season. The initial disease index taken on August 8 for Sure-Grow 215 BG/RR and Deltapine DP 555 BG/RR was lowest for the May 2 planting (see table). The May 16 and June 1 plantings were beginning to flower; therefore, the disease index is listed as zero. No significant differences were observed for disease index recorded on August 15. The mean disease index for Sure-Grow 215 BG/RR planted on May 2 was significantly less for both varieties on the June 1 planting and for Deltapine DP 555 BG/RR planted on May 2 and May 16.

DISEASE INDEX BY PLANTING DATE

Variety	Planting date	Disease index[1]						
		Aug. 1	Aug. 15	Aug. 29	Sept. 13	Oct. 1	Oct. 18	Mean
Sure-Grow 215 BG/RR	April 18	4.0 ab [2]	2.2 a	6.4 ab	6.1 a	harvested	harvested	3.1 de
Deltapine DP 555 BG/RR	April 18	5.8 a	5.0 a	6.6 ab	3.8 ab	harvested	harvested	3.5 cde
Sure-Grow 215 BG/RR	May 2	2.0 bc	1.6 a	5.6 abc	6.0 a	harvested	harvested	2.5 e
Deltapine DP 555 BG/RR	May 2	4.9 ab	4.1 a	9.5 a	2.7 b	7.0 b	10.9 a	6.5 ab
Sure-Grow 215 BG/RR	May 16	0.0 c	2.7a	3.3 bc	4.3 ab	7.8 b	8.6 a	4.4 b-e
Deltapine DP 555 BG/RR	May 16	0.0 c	1.4 a	3.1 bc	4.3 ab	8.2 b	11.9 a	4.9 a-d
Sure-Grow 215 BG/RR	June 1	0.0 c	0.8 a	2.6 bc	4.7 ab	15.1 a	16.9 a	6.7 a
Deltapine DP 555 BG/RR	June 1	0.0 c	5.5 a	1.7 c	4.9 ab	6.9 b	13.9 a	5.5 abc
LSD ($P \leq 0.05$)		**3.3**	**5.3**	**4.5**	**2.8**	**6.5**	**9.2**	**2.2**

[1] Disease index = (number of diseased bolls / number of total bolls) × 100.

[2] Means within columns followed by different letters are significantly different according to Fisher's LSD ($P \leq 0.05$).

Evaluation of Selected Fungicides for Control of Cotton Boll Rot Disease on Deltapine NuCotn 33B

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A cotton fungicide test was planted on May 9 on the Gulf Coast Research and Extension Center at Fairhope, Alabama. The test site was a Malbis fine sandy loam soil. All fungicides were applied as a foliar spray using TX-12 cone nozzles mounted on ground slides spraying upward with two nozzles per row calibrated to deliver 26 gallons per acre at 75 pounds per square inch. Plots consisted of two rows, 40 feet long with a 38 inch wide row spacing 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. Disease index ([number of diseased bolls / total number counted] × 100) was calculated for each variety. Boll rot ratings were conducted on October 18 and plots were harvested on November 25. Data were statistically analyzed using PROC GLM, and means were compared with Fisher's protected least significant difference test ($P \leq 0.05$).

The incidence of boll rot was high due to tropical storms and hurricane conditions. No fungicide significantly reduced the number of diseased cotton bolls as compared to the control (see table). Seed cotton yields varied by 224 pounds per acre for the Quadris 2SC first plus full bloom application and Rovral 4F first bloom applications. No treatments produced a significantly greater yield than the control. However, the average of the first bloom, first bloom plus full bloom, and full bloom applications increased cotton yield an average of 69, 95, and 32 pounds per acre, respectively. Quadris 2SC, Benlate 50WP, and Rovral 4F increased cotton yield an average of 170, 132, and 143 pounds per acre, respectively.

Evaluation Of Selected Fungicides For Control of Boll Rot Disease on Deltapine NuCotn 33B

Fungicide, application rate, schedule	Healthy bolls[1] *no.*	Diseased bolls[1] *no.*	Disease index[2]	Seed cotton yield *lb/ac*
Quadris 2SC, 12 fl oz/ac, First bloom	49.0 ab[3]	10.4 ab	24.3 ab	1592 ab
Quadris 2SC, 12 fl oz/ac, First + full bloom	61.8 a	7.0 b	11.7 b	1708 a
Quadris 2SC, 12 fl oz/ac, Full bloom	57.4 ab	15.0 ab	26.8 ab	1545 ab
Benlate 50WP, 3.3 dry oz/ac, First bloom	57.2 ab	11.0 ab	21.1 ab	1636 ab
Benlate 50WP, 3.3 dry oz/ac, First + full bloom	60.4 ab	11.0 ab	19.9 ab	1587 ab
Benlate 50WP, 3.3 dry oz/ac, Full bloom	57.4 ab	13.4 ab	35.2 ab	1507 ab
Folicur 3.6F, 7.2 fl oz/ac, First bloom	54.0 ab	13.6 ab	32.3 ab	1544 ab
Folicur 3.6F, 7.2 fl oz/ac, First + full bloom	62.0 a	8.0 ab	12.9 b	1347 ab
Folicur 3.6F, 7.2 fl oz/ac, Full bloom	44.2 b	10.0 ab	24.0 ab	1306 ab
Terraclor 4F, 16 fl oz/ac, First bloom	58.8 ab	9.2 ab	16.1 ab	1551 ab
Terraclor 4F, 16 fl oz/ac, First + full bloom	53.2 ab	13.4 ab	31.7 ab	1443 ab
Terraclor 4F, 16 fl oz/ac, Full bloom	55.6 ab	9.2 ab	17.2 ab	1371 ab
Rovral 4F, 4 fl oz/ac, First bloom	44.4 b	8.2 ab	19.2 ab	1483 b
Rovral 4F, 4 fl oz/ac, First + full bloom	44.0 b	16.0 a	48.1 a	1515 ab
Rovral 4F, 4 fl oz/ac, Full bloom	51.6 ab	9.4 ab	17.2 ab	1764 ab
Messenger, 2.25 dry oz/ac First bloom	57.6 ab	9.2 ab	17.6 ab	1267 ab
Messenger, 1.25+2.25 dry oz/ac, First + full bloom	57.0 ab	10.4 ab	18.1 ab	1639 ab
Messenger, 2.25 dry oz/ac, Full bloom	45.0 b	10.0 ab	28.8 ab	1369 ab
Untreated control	53.2	11.2 ab	42.6 ab	1445 ab
LSD($P \leq 0.05$)	**16.5**	**8.7**	**33.9**	**392**

[1] Number of bolls per 50 ft of row.

[2] Disease index = (# diseased bolls / # total bolls) × 100.

[3] Means within columns followed by different letters are significantly different according to Fisher's LSD ($P \leq 0.05$).

FOLIAR FUNGICIDES AND FERTILIZERS FOR BLACK BELT COTTON

Dennis Delaney, Kathy McLean, C. Dale Monks, Charles Mitchell, Ed Sikora, Rudy Yates, Kevan Tucker, and Bob Goodman

Cotton producers in the Black Belt area have experienced a severe production problem that has become more common in recent years. The syndrome has been described as "early leaf drop" and often involves fields that show very good yield potential with a heavy boll load set early in the season. Cotton leaves in the affected fields develop leaf spots, mainly attributed to *Cercospoa* spp. and *Alternaria* spp. fungi, during late bloom through early boll fill. These leaf spots spread and the affected leaves fall off prematurely, adversely affecting boll fill and yield, and sometimes are associated with early stalk death. Potassium deficiency has been speculated to be a contributing factor; however, field symptoms do not follow typical deficiency symptoms, and the problem often occurs where K fertilizer has been applied and soil test levels are high.

An experiment was established on a Kipling clay loam on Roy Etheridge's farm near Hugo in Marengo County, Alabama, to investigate whether foliar applications of fungicides and/or fertilizers might prevent symptoms long enough for normal boll fill to occur. Initial soil pH was 6.8, and soil test levels of all nutrients were rated high or above, with K levels rated very high (683 pounds per acre). The cotton variety planted was FiberMax 989 BR. Leaf samples taken at early bloom revealed that foliar K levels were rated deficient, with only 0.88% K versus recommended sufficiency levels of 1.5 to 3.0%. All other nutrients were rated sufficient.

Starting at early bloom, broadcast fungicide applications of Penncozeb 75DF at 1.4 pounds per acre or Quadris at 6 fluid ounces per acre, with and without foliar fertilizer, were made every 7 to 10 days, for a total of six applications. Foliar fertilizer treatments contained 5 pounds per acre each of N and K_2O, 0.1 pound per acre each of B, Zn, Fe, and Mg, 0.2 pounds per acre of S, and 20 grams per acre of Mo for each application. Growing conditions were generally very good, with little moisture stress.

Initial foliar fertilizer sprays caused some leaf burn due to high air temperatures. These symptoms were difficult to visually separate from diseased spots and are reflected in the ratings on August 16 (see table). Smaller droplet size and application earlier in the day helped avoid damage with later sprays. Ratings were made again a week later on fungicide and check plots, but not foliar-fertilized plots due to the still apparent damage. These ratings showed that both Penncozeb and Quadris decreased leaf spotting compared to check plots, but that foliar fertilizer sprays increased it.

Leaf drop or senescence ratings revealed that all treatments with foliar fertilizer had less leaf drop than the check. Green boll counts made at harvest showed that these plots also matured later, with more unopened bolls than check plots. Fungicides applied alone did not affect leaf drop or maturity.

Plots were hand harvested when more than 95% of the cotton was open. The only significant difference noted in seed cotton yields was between Quadris alone and Penncozeb plus foliar fertilizer, but neither was significantly different from the check. When estimated yields from green bolls not harvested were added to each plot's total weight, there were no significant differences in final yield between treatments (not shown).

These data indicate that in a year with relatively good weather, low stress, and low disease levels, applications of foliar fungicides decreased leaf damage from fungi, but did not affect yields. Foliar fertilizer applications also did not increase yields, but damaged some leaf tissue and delayed maturity. Further studies are needed under conditions of higher disease pressure to determine the value of these treatments. Producers should also be cautioned that some of the experimental treatments are not yet labeled for cotton.

FOLIAR FUNGICIDES AND FERTILIZERS FOR BLACK BELT COTTON, 2002

Treatment	Rate	Leaf spot Aug. 16 *%*	Leaf spot Aug 23 *%*	Leaf drop Aug. 27 *%*	Seed cotton yield *lb/ac*	Green bolls Sept. 23 *no/16 row-ft*
Penncozeb 75DF	1.4 lb/ac	5.0 d[1]	6.3 b	33.8 a	2396 ab	14.0 c
Foliar Fertilizer		24.5 b		18.8 bc	2410 ab	18.5 bc
Penncozeb 75DF + Foliar fertilizer	1.4 lb/ac	28.0 a		13.8 c	2314 b	28.0 ab
Quadris	6 oz/ac	3.0 d	5.8 b	30.0 ab	2668 a	11.8 c
Quadris + Foliar fertilizer	6 oz/ac	23.8 b		17.5 bc	2559 ab	31.5 a
Check		12.5 c	18.3 a	41.3 a	2614 ab	9.8 c
LSD (P=.10)		**2.8**	**5.7**	**14.6**	**342**	**12.7**

[1] Means followed by same letter do not significantly differ (P=.10, LSD)

EVALUATION OF SELECTED SEED TREATMENTS FOR MANAGEMENT OF COTTON SEEDLING DISEASE IN NORTH ALABAMA

K. S. McLean, A. J. Palmateer, J. L. Hutchinson, and B. E. Norris

This cotton fungicide test evaluated various seed treatments for control of cotton seedling disease. The test was planted on April 15 at the Tennessee Valley Research and Extension Center, Belle Mina, Alabama. The field had a history of cotton seedling disease and the soil type was a Decatur silty loam. Soil temperature was 65°F at a 4-inch depth at 10 a. m. with adequate moisture at planting. Fungicides were applied as a seed treatment by the manufacturer. Plots consisted of two rows, 25 feet long with a 40-inch wide row spacing and were arranged in a randomized complete block design with five replications. High disease incidence plots were infested with millet seed inoculated with *Pythium* spp. and *Rhizoctonia solani*. Blocks were separated by a 20-foot alley. The nematicide Temik 15G (5 pounds per acre) was applied in-furrow at planting.

All plots were maintained throughout the season with standard herbicide, insecticide, and fertility production practices as recommended by the Alabama Cooperative Extension System. Stand counts and skip index ratings were recorded at 2, 4, and 6 weeks after planting to determine the percent seedling loss and stand density due to cotton seedling disease. Plots were harvested on September 24. Data were statistically analyzed by ANOVA and means compared using Fisher's protected least significant difference test ($P=0.05$).

Cotton seedling disease incidence was high in 2002 due to cold wet weather. In the high disease incidence plots, differences ($P \leq 0.05$) in seedling stand were observed at 2, 4, and 6 weeks after planting (Table 1). At 2, 4, and 6 weeks after planting, nine seed treatments improved seedling survival compared to the control. A lower skip index ($P \leq 0.05$), indicating a more evenly spaced seedling stand, was observed at 6 weeks after planting in the nine seed treatments. No seed treatments increased yields over the control ($P \leq 0.05$); however, A13012 FS 125, A13012 FS 125 plus Systhane 40 WSP, and Apron XL 3 LS plus Maxim 4 FS plus Systhane 40 WSP increased yields compared to Allegiance-FL plus Baytan 30 plus Thiram 42-S plus Azoxystrobin plus Allegiance-FL plus Baytan 30. The average seed cotton yield from all fungicide-treated plots was 375 pounds per acre greater than the untreated control. Under low disease pressure, stand was not increased by any seed treatment compared to the control at 2, 4, or 6 weeks after planting (Table 2). Correspondingly, a lower skip index was improved compared to the control. However, no treatment increased yields over the control ($P \leq 0.05$). Yield was increased in three seed treatments under high disease pressure but not under low disease pressure.

TABLE 1. EFFECT OF SELECTED SEED TREATMENTS ON COTTON STAND, SKIP INDEX, AND SEED COTTON YIELD UNDER HIGH DISEASE PRESSURE IN NORTH ALABAMA

Treatment	Rate a.i./100 kg seed	——Stand 25 ft row——			Skip index	Seed cotton
		14 DAP	28 DAP	42 DAP		*lb/ac*
Control	——	13.6	5.4	2.0	22.8	2835
A13012 FS 125	25.0 g	35.2	21.2	18.6	13.8	3397
A13012 FS 125	25.0 g	32.8	20.2	19.6	16.8	3313
A13012 FS 125	25.0 g	25.4	17.0	14.8	19.0	3520
A13012 FS 125 + Systhane 40 WSP	25.0 + 21.0 g	37.4	32.4	32.4	8.4	3415
A13012 FS 125 + Systhane 40 WSP	25.0 + 21.0 g	44.8	33.6	34.4	11.4	2984
A13012 FS 125 + Systhane 40 WSP	25.0 + 21.0 g	35.6	30.8	28.6	14.8	3528
Apron XL 3 LS + Maxim 4 FS + Systhane 40 WSP	7.5 + 2.5 + 21.0g	36.4	27.0	26.8	11.8	3781
Allegiance-FL + Baytan 30 +Thiram 42-S	15.0 + 10.0 + 31.0g	12.8	9.0	7.4	17.8	2733
Allegiance-FL + Baytan 30 +Thiram 42-S + Delta Coat AD 3.24 FS	15.0 + 10.0 + 31.0 + 300.0 g	42.2	25.0	23.6	15.6	3196
Allegiance-FL + Baytan 30 + Thiram 42-S + Azoxystrobin + Allegiance-FL + Baytan 30	15.0 + 10.0 + 31.0 + 3.0 + 15.0 + 5.0 g	25.8	18.2	16.6	16.2	2412
Allegiance-FL + Vitavax-PCNB 3.36 LS + Thiram 42-S	15.0 + 176.0 + 31.0 g	15.0	6.0	7.6	20.4	3146
Azoxystrobin + Apron XL 3 LS + Maxim 4 FS	15.0 + 7.5 + 2.5 g	28.6	6.4	5.6	21.2	3110
LSD P = (0.05)		**11.7**	**6.8**	**7.3**	**4.7**	**1056**

TABLE 2. EFFECT OF SELECTED SEED TREATMENTS ON COTTON STAND, SKIP INDEX, AND SEED COTTON YIELD UNDER LOW DISEASE PRESSURE IN NORTH ALABAMA

Treatment	Rate a.i./100 kg seed	——Stand 25 ft row —— 14 DAP	28 DAP	42 DAP	Skip index	Seed cotton *lb/ac*
Control	—	65.6	64.0	62.4	2.2	3144
A13012 FS 125	25.0 g	57.4	55.0	61.8	2.2	3313
A13012 FS 125	25.0 g	57.2	58.4	56.6	2.8	3321
A13012 FS 125	25.0 g	49.8	62.2	52.4	2.4	3078
A13012 FS 125 + Systhane 40 WSP	25.0 + 21.0 g	50.6	46.8	51.6	5.8	2825
A13012 FS 125 + Systhane 40 WSP	25.0 + 21.0 g	51.4	55.6	51.2	3.6	3120
A13012 FS 125 + Systhane 40 WSP	25.0 + 21.0 g	53.8	55.0	53.8	3.4	3204
Apron XL 3 LS + Maxim 4 FS + Systhane 40 WSP	7.5 + 2.5 + 21.0 g	48.8	49.4	46.0	4.6	2360
Allegiance-FL + Baytan 30 + Thiram 42-S	15.0 + 10.0 + 31.0 g	50.0	47.4	51.2	4.2	3018
Allegiance-FL + Baytan 30 + Thiram 42-S + Delta Coat AD 3.24 FS	15.0 + 10.0 + 31.0 + 300.0 g	55.8	50.2	48.4	4.8	2725
Allegiance-FL + Baytan 30 + Thiram 42-S + Azoxystrobin + Allegiance-FL + Baytan 30	15.0 + 10.0 + 31.0 + 3.0 + 15.0 + 5.0 g	43.2	43.2	39.4	3.8	3076
Allegiance-FL + Vitavax-PCNB 3.36 LS + Thiram 42-S	15.0 + 176.0 + 31.0 g	45.8	47.6	44.0	4.6	2702
Azoxystrobin + Apron XL 3 LS + Maxim 4 FS	15.0 + 7.5 + 2.5 g	55.2	49.0	48.6	3.2	2783
LSD P = (0.05)		**10.3**	**12.3**	**14.9**	**2.3**	**1272**

EVALUATION OF SELECTED SEED TREATMENTS FOR MANAGEMENT OF COTTON SEEDLING DISEASE IN CENTRAL ALABAMA

K. S. McLean, A. J. Palmateer, J. L. Hutchinson, and D. Moore

This cotton fungicide test evaluated selected seed treatments for management of cotton seedling disease. The test was planted on April 11 at the Prattville Agricultural Research Unit, Prattville, Alabama. The field had a history of cotton seedling disease and the soil type was a sandy loam. Soil temperature was 65°F at a 4-inch depth at 10 a. m. with adequate moisture at planting. Fungicides were applied as a seed treatment by the manufacturer. Plots consisted of two rows, 30 feet long with a 36-inch wide row spacing and were arranged in a randomized complete block design with five replications. High disease incidence plots were infested with millet seed inoculated with *Pythium* spp. and *Rhizoctonia solani*. Blocks were separated by a 20-foot alley. The nematicide Temik 15G (5 pounds per acre) was applied in-furrow at planting.

All plots were maintained throughout the season with standard herbicide, insecticide, and fertility production practices as recommended by the Alabama Cooperative Extension System. Stand counts and skip index ratings were recorded at 2, 4, and 6 weeks after planting to determine the percent seedling loss and stand density due to cotton seedling disease. Plots were harvested on September 10. Data were statistically analyzed by ANOVA and means compared using Fisher's protected least significant difference test (P=0.05).

Cotton seedling disease incidence was moderate in central Alabama in 2002 due to cold dry weather. In the high disease incidence plots, differences ($P \leq 0.05$) in seedling stand were observed at 2, 4, and 6 weeks after planting (Table 1). At 2, 4, and 6 weeks after planting, all seed treatments improved seedling survival an average of 64% as compared to the control at 27%. A lower skip index ($P \leq 0.05$), indicating a more evenly spaced seedling stand, was observed at 6 weeks after planting in all seed treatments. Three seed treatments—A13012 FS 125, Allegiance-FL plus Baytan 30 plus Thiram 42, and Allegiance-FL plus Baytan 30 plus Thiram 42-S plus Azoxystrobin plus Allegiance-FL plus Baytan 30—increased yields over the control ($P \leq 0.05$). The average yield of seed cotton from all fungicide-treated plots was 162 pounds per acre greater than the untreated control. Under low disease pressure, stand was not increased by any seed treatment compared to the control at 2, 4, or 6 weeks after planting (Table 2). The average seedling survival for the seed treatments was 79% compared to 80% in the control. A higher skip index ($P \leq 0.05$), indicating an unevenly spaced seedling stand, was observed at 6 weeks after planting in the A13012 FS 125 and Apron XL 3 LS plus Maxim 4 FS plus Systhane 40 WSP seed treatments. No seed treatment increased yields over the control ($P \leq 0.05$) under low disease pressure.

TABLE 1. EFFECT OF SELECTED SEED TREATMENTS ON COTTON STAND, SKIP INDEX, AND SEED COTTON YIELD UNDER HIGH DISEASE PRESSURE IN CENTRAL ALABAMA

Treatment	Rate a.i./100 kg seed	Stand 25 ft row			Skip index	Seed cotton
		14 DAP	28 DAP	42 DAP		*lb/ac*
Control	—	32.2 f	32.3 f	31.8 f	10.8 a	2766 b
A13012 FS 125	25.0 g	65.2 de	72.2 de	60.0 de	6.8 bc	2887 ab
A13012 FS 125	25.0 g	73.8 cd	78.0 cd	72.2 bcd	2.8 d	3029 a
A13012 FS 125	25.0 g	76.0 cd	77.0 cd	77.6 bc	4.5 cd	2920 ab
A13012 FS 125 + Systhane 40 WSP	25.0 + 21.0 g	95.5 ab	96.3 ab	102.5 a	2.8 d	2904 ab
A13012 FS 125 + Systhane 40 WSP	25.0 + 21.0 g	79.3 cd	88.2 a-d	83.2 b	4.5 cd	2920 ab
A13012 FS 125 + Systhane 40 WSP	25.0 + 21.0 g	84.5 bc	89.7 abc	82.5 b	4.0 cd	2879 ab
Apron XL 3 LS + Maxim 4 FS + Systhane 40 WSP	7.5 + 2.5 + 21.0 g	72.0 cd	72.5 de	66.0 cde	6.5 bc	2908 ab
Allegiance-FL + Baytan 30 + Thiram 42-S	15.0 + 10.0 + 31.0 g	72.3 cd	73.2 cde	68.8 bcd	4.8 cd	2980 a
Allegiance-FL + Baytan 30 + Thiram 42-S S + Delta Coat AD 3.24 F	15.0 + 10.0 + 31.0 + 300.0 g	103.6 a	104.2 a	101.0 a	2.7 cd	2908 ab
Allegiance-FL + Baytan 30 + Thiram 42-S + Azoxystrobin + Allegiance-FL + Baytan 30	15.0 + 10.0 + 31.0 + 3.0 + 15.0 + 5.0 g	78.3 cd	78.5 cd	78.3 bc	4.5 cd	3016 a
Allegiance-FL + Vitavax-PCNB 3.36 LS + Thiram 42-S	15.0 + 176.0 + 31.0 g	72.5 cd	82.0 bcd	70.5 bcd	3.7cd	2936 ab
Azoxystrobin + Apron XL 3 LS + Maxim 4 FS	15.0 + 7.5 + 2.5 g	53.3 e	57.2 e	51.17	8.7ab	2859 ab
LSD P = (0.05)		**14.4**	**16.7**	**14.8**	**3.3**	**200**

TABLE 2. EFFECT OF SELECTED SEED TREATMENTS ON COTTON STAND, SKIP INDEX, AND SEED COTTON YIELD UNDER LOW DISEASE PRESSURE IN CENTRAL ALABAMA

Treatment	Rate a.i./100 kg seed	Stand 25 ft row			Skip index	Seed cotton
		14 DAP	28 DAP	42 DAP		*lb/ac*
Control	—	98.3 abc	95.1 bc	100.1 a-d	1.0 c	3182 a
A13012 FS 125	25.0 g	85.6 cd	90.5 bc	93.3 bcd	1.0 c	3061 abc
A13012 FS 125	25.0 g	107.8 a	107.2 ab	114.6 a	1.8 bc	3101 abc
A13012 FS 125	25.0 g	84.5 d	96.0 bc	98.8 a-d	3.3 ab	3105 abc
A13012 FS 125 + Systhane 40 WSP	25.0 + 21.0 g	89.5 cd	116.3 a	110.0 ab	2.2 abc	2948 c
A13012 FS 125 + Systhane 40 WSP	25.0 + 21.0 g	92.8 bcd	84.5 c	94.2 bcd	1.8 bc	3016 abc
A13012 FS 125 + Systhane 40 WSP	25.0 + 21.0 g	96.0 a-d	94.3 bc	106.0 abc	2.0 abc	2978 bc
Apron XL 3 LS + Maxim 4 FS + Systhane 40 WSP	7.5 + 2.5 + 21.0 g	93.0 bcd	87.3 c	89.0 d	3.5 a	3012 abc
Allegiance-FL + Baytan 30 + Thiram 42-S	15.0 + 10.0 + 31.0 g	87.0 cd	93.2 bc	96.7 bcd	1.8 bc	3105 abc
Allegiance-FL + Baytan 30 + Thiram 42-S + Delta Coat AD 3.24 FS	15.0 + 10.0 + 31.0 + 300.0 g	98.3 abc	97.5 bc	87.5 d	1.6 c	2980 bc
Allegiance-FL + Baytan 30 + Thiram 42-S + Azoxystrobin + Allegiance-FL + Baytan 30	15.0 + 10.0 + 31.0 + 3.0 + 15.0 + 5.0 g	90.7 bcd	86.0 c	95.6 bcd	2.2 abc	3000 abc
Allegiance-FL + Vitavax-PCNB 3.36 LS + Thiram 42-S	15.0 + 176.0 + 31.0 g	91.7 bcd	93.3 bc	92.6 cd	2.3 abc	3101 abc
Azoxystrobin + Apron XL 3 LS + Maxim 4 FS	15.0 + 7.5 + 2.5 g	103.2 ab	104.8 ab	94.3 bcd	1.5 c	3154 ab
LSD P = (0.05)		**13.5**	**16.8**	**16.9**	**1.6**	**201**

EVALUATION OF SELECTED IN-FURROW FUNGICIDES FOR MANAGEMENT OF COTTON SEEDLING DISEASE IN CENTRAL ALABAMA

K. S. McLean, A. J. Palmateer, J. L. Hutchinson, and B. E. Norris

This cotton fungicide test evaluated Terraclor Super X, Ridomil Gold, Quadris 4F, Rovral 4F, Delta Coat AD, and Messenger for the management of cotton seedling disease. This cotton fungicide test was planted on April 11 at the Prattville Agricultural Research Unit, Prattville, Alabama. The field had a history of cotton seedling disease and the soil type was a sandy loam. Soil temperature was 65°F at a 4-inch depth at 10 a. m. with adequate moisture at planting. Fungicides were applied as a seed treatment or as an in-furrow or spray or granular application at planting. All in-furrow fungicide sprays were applied with flat tip 8002E nozzles calibrated to deliver 6 gallons per acre at 18 pounds per square inch. In-furrow granular applications were applied with chemical granular applicators attached to the planter. Plots consisted of two rows, 30 feet long with a 36 inch wide row spacing and were arranged in a randomized complete block design with five replications. High disease incidence plots were infested with millet seed inoculated with *Pythium* spp. and *Rhizoctonia solani*. Blocks were separated by a 20-foot alley.

All plots were maintained throughout the season with standard herbicide, insecticide, and fertility production practices as recommended by the Alabama Cooperative Extension System. Stand counts and skip index ratings were recorded at 2, 4, and 6 weeks after planting to determine the percent seedling loss and stand density due to cotton seedling disease. Plots were harvested on September 10. Data were statistically analyzed by ANOVA and means compared using Fisher's protected least significant difference test ($P=0.05$).

Cotton seedling disease incidence was moderate in central Alabama in 2002 due to cold dry weather. In the high disease incidence plots, differences ($P\leq 0.05$) in seedling stand were observed at 2, 4, and 6 weeks after planting (Table 1). Rovral increased plant stand while Ridomil Gold EC, Ridomil Gold G, and Messenger decreased plant stand as compared to the control at 2, 4, and 6 weeks after planting. A lower skip index ($P\leq 0.05$), indicating a more evenly spaced seedling stand, was observed at 6 weeks after planting in the Quadris treatment. Rovral increased yield by 189 pounds of seed cotton per acre as compared to the control. Under low disease pressure, stand was not increased by any fungicide treatment as compared to the control at 2, 4, or 6 weeks after planting (Table 2). The average seedling survival for the fungicide treatments was 65% compared to 86% in the control. No differences in the skip index ($P\leq 0.05$) were observed between any fungicide treatment and the control. Rovral increased seed cotton yield by 371 pounds of seed cotton per acre as compared to the control.

TABLE 1. EFFECT OF SELECTED FUNGICIDES ON COTTON STAND, SKIP INDEX, AND SEED COTTON YIELD UNDER HIGH DISEASE PRESSURE IN CENTRAL ALABAMA

Treatment	Rate	——Stand 25 ft row——			Skip index	Seed cotton
		14 DAP	28 DAP	42 DAP		*lb/ac*
Control	——	103 bc	98 b	97 b	4.0 cd	2622 ab
Terraclor Super X 18.8 G	5.0 lb/ac	91 cd	68 c	70 c	6.6 b	2472 bcd
Terraclor Super X EC	48.0 oz/ac	125 ab	105 ab	111 ab	1.6 de	2557 bc
Quadris 4F	6.0 oz/ac	120 ab	118 ab	120 ab	1.0 e	2565 bc
Delta Coat AD	11.75 oz/cwt	124 ab	107 ab	117 ab	2.8 de	2545 bc
AGST 01001	8.82 oz/cwt	111 abc	115 ab	112 ab	2.8 de	2492 bcd
Ridomil Gold EC	1.0 oz/ac	73 de	70 c	66 c	8.5 ab	2368 cd
Quadris 4 F + Ridomil Gold	6.0 oz/ac + 1.0 oz/ac	125 ab	120ab	118 ab	2.2 de	2573 bc
Rovral 4F	6.0 oz/ac	133 a	124 a	123 a	1.6 de	2811 a
Ridomil Gold G	5.0 lb/ac	74 de	74 c	67 c	6.5 bc	2476 bcd
Messenger	2.25 oz/ac	58 e	42 d	46 c	10.2 a	2319 d
LSD P=(0.05)		**25.0**	**22.2**	**24.5**	**2.6**	**207**

Table 2. Effect of Selected Fungicides on Cotton Stand, Skip Index, and Seed Cotton Yield under Low Disease Pressure in Central Alabama

Treatment	Rate	——Stand 25 ft row——			Skip index	Seed cotton
		14 DAP	28 DAP	42 DAP		*lb/ac*
Control	——	137 ab	130	129 a	1.0 ab	2573 b
Terraclor Super X 18.8 G	5.0 lb/ac	118 bc	124	123 ab	1.1 ab	2561 b
Terraclor Super X EC	48.0 oz/ac	123 abc	126	131 a	3.0 a	2500 b
Quadris 4F	6.0 oz/ac	140 ab	114	130 a	2.3 ab	2508 b
Delta Coat AD	11.75 oz/cwt	109c	129	105 b	1.6 ab	2517 b
AGST 01001	8.82 oz/cwt	137 ab	137	128 a	1.1 ab	2553 b
Ridomil Gold EC	1.0 oz/ac	122 abc	118	121 ab	1.8 ab	2573 b
Quadris 4 F + Ridomil Gold	6.0 oz/ac + 1.0 oz/ac	142 a	131	130 a	1.6 ab	2528 b
Rovral 4F	6.0 oz/ac	117 bc	125	120 ab	1.6 ab	2944 a
Ridomil Gold G	5.0 lb/ac	126 abc	124	116 ab	0.6 b	2521 b
Messenger	2.25 oz/ac	127 abc	123	122 ab	2.0 ab	2573 b
LSD P=(0.05)		**22.6**	**29.1**	**21.1**	**1.9**	**259**

Evaluation of Selected In-Furrow Fungicides for Management of *Rhizoctonia solani* Seedling Disease in Central Alabama

K. S. McLean, A. J. Palmateer, J. L. Hutchinson, and D. Moore

Terraclor 15G, Terraclor 2E, Quadris 4F, Rovral 4F, and Delta Coat AD were evaluated for management of cotton seedling disease caused by *Rhizoctonia solani.* This cotton fungicide test was planted on April 11 at the Prattville Agricultural Research Unit, Prattville, Alabama. The field had a history of cotton seedling disease and the soil type was a sandy loam. Soil temperature was 65°F at a 4-inch depth at 10 a. m. with adequate moisture at planting. Fungicides were applied as a seed treatment or as an in-furrow or spray application at planting. All in-furrow fungicide sprays were applied with flat-tip 8002E nozzles calibrated to deliver 6 gallons per acre at 18 pounds per square inch. Plots consisted of two rows, 30 feet long with a 36 inch wide row spacing and were arranged in a randomized complete block design with five replications. High disease incidence plots were infested with millet seed inoculated with *Pythium* spp. and *Rhizoctonia solani.* Blocks were separated by a 20-foot alley.

All plots were maintained throughout the season with standard herbicide, insecticide, and fertility production practices as recommended by the Alabama Cooperative Extension System. Stand counts and skip index ratings were recorded at 2, 4, and 6 weeks after planting to determine the percent seedling loss and stand density due to cotton seedling disease. Plots were harvested on September 10. Data were statistically analyzed by ANOVA and means compared using Fisher's protected least significant difference test (P=0.05).

Cotton seedling disease incidence was moderate in central Alabama in 2002 due to cold dry weather. In the high disease incidence plots, differences ($P \leq 0.05$) in seedling stand were observed at 2, 4, and 6 weeks after planting (Table 1). Quadris, Rovral, and Delta Coat AD increased plant stand as compared to the control at 2, 4, and 6 weeks after planting. A lower skip index ($P \leq 0.05$), indicating a more evenly spaced seedling stand, was observed at 6 weeks after planting in the Rovral treatment. Rovral and Quadris increased yield by 218 and 182 pounds of seed cotton per acre as compared to the control. Under low disease pressure, stand was not increased by any fungicide treatment as compared to the control at 2, 4, or 6 weeks after planting (Table 2). No differences in the skip index ($P \leq 0.05$) were observed between any fungicide treatment and the control. The average yield of seed cotton from all fungicide-treated plots was 18 pounds per acre greater than the control.

TABLE 1. EFFECT OF FUNGICIDES ON COTTON STAND, SKIP INDEX, AND SEED COTTON YIELD UNDER HIGH DISEASE PRESSURE IN CENTRAL ALABAMA

Treatment	Rate	——Stand 25 ft row——			Skip index	Seed cotton
		14 DAP	28 DAP	42 DAP		*lb/ac*
Control	—	77.5 c	72.2 b	73.7 b	4.3 a	2686 c
Terraclor 15G	5.0 lb/ac	101.5 ab	104.3 a	91.8 ab	2.3 ab	2755 bc
Terraclor 2E	48.0 oz/ac	88.6 bc	96.0 ab	83.8 ab	4.0 ab	2690 c
Quadris 4F	6.0 oz/ac	108.5 ab	112.3 a	101.8 a	2.0 ab	2904 a
Rovral 4F	6.0 oz/ac	115.5 a	99.8 a	97.0 a	1.7 b	2868 a
Delta Coat AD	11.75 oz/cwt	120.6 a	106 a	99.2 a	3.7 ab	2791 bc
LSD P= (0.05)		**22.9**	**26.9**	**20.4**	**2.5**	**140**

TABLE 2. EFFECT OF FUNGICIDES ON COTTON STAND, SKIP INDEX, AND SEED COTTON YIELD UNDER LOW DISEASE PRESSURE IN CENTRAL ALABAMA

Treatment	Rate	——Stand 25 ft row——			Skip index	Seed cotton
		14 DAP	28 DAP	42 DAP		*lb/ac*
Control	—	119.8 a	110.0 a	108.0 a	2.2 a	2629
Terraclor 15G	5.0 lb/ac	107.5 a	124.7a	125.7 a	1.8 a	2573
Terraclor 2E	48.0 oz/ac	107.3 a	121.0 a	112.5 a	2.7 a	2698
Quadris 4F	6.0 oz/ac	117.3 a	114.7 a	113.7 a	2.7 a	2621
Rovral 4F	6.0 oz/ac	123.3 a	118.3 a	111.7 a	2.0a	2682
Delta Coat AD	11.75 oz/cwt	125.3 a	125.7 a	115.0 a	1.7 a	2682
LSD P= (0.05)		**18.4**	**28.2**	**21.9**	**2.3**	**131**

EVALUATION OF SELECTED IN-FURROW FUNGICIDES FOR MANAGEMENT OF COTTON SEEDLING DISEASE IN NORTH ALABAMA

K. S. McLean, A. J. Palmateer, J. L. Hutchinson, and B. E. Norris

This cotton fungicide test evaluated Terraclor Super X, Ridomil Gold, Quadris 4F, Rovral 4F, Delta Coat AD, Messenger, and FAC 321 for the management of cotton seedling disease. The test was planted on April 15 at the Tennessee Valley Research and Extension Center, Belle Mina, Alabama. The field had a history of cotton seedling disease and the soil type was a Decatur silty loam. Soil temperature was 65°F at a 4-inch depth at 10 a. m. with adequate moisture at planting. Fungicides were applied as a seed treatment or as an in-furrow or spray or granular application at planting. All in-furrow fungicide sprays were applied with flat-tip 8002E nozzles calibrated to deliver 6 gallons per acre at 18 pounds per square inch. In-furrow granular applications were applied with chemical granular applicators attached to the planter. Plots consisted of two rows, 25 feet long with a 40 inch wide row spacing and were arranged in a randomized complete block design with five replications. High disease incidence plots were infested with millet seed inoculated with *Pythium* spp. and *Rhizoctonia solani*. Blocks were separated by a 20-foot alley. The nematicide Temik 15G (5 pounds per acre) was applied in-furrow at planting.

All plots were maintained throughout the season with standard herbicide, insecticide, and fertility production practices as recommended by the Alabama Cooperative Extension System. Stand counts and skip index ratings were recorded at 2, 4, and 6 weeks after planting to determine the percent seedling loss and stand density due to cotton seedling disease. Plots were harvested on September 24. Data were statistically analyzed by ANOVA and means compared using Fisher's protected least significant difference test ($P \leq 0.05$).

Cotton seedling disease incidence was severe in 2002 due to cold wet weather. In the high disease incidence plots, differences ($P \leq 0.05$) in seedling stand were observed at 2, 4, and 6 weeks after planting (Table 1). At 2, 4, and 6 weeks after planting, three fungicide treatment stands were reduced compared to the control. A higher skip index ($P \leq 0.05$), indicating an unevenly spaced seedling stand, was observed at 6 weeks after planting in the Delta Coat AD seed treatment as compared to the control. No fungicide treatment increased yields over the control ($P \leq 0.05$). The average yield of seed cotton from all fungicide-treated plots was 41 pounds per acre less than the untreated control. Under low disease pressure, at 2, 4, and 6 weeks after planting, fungicide treatment stands were not different from the control (Table 2). Correspondingly, a higher skip index ($P \leq 0.05$), indicating an unevenly spaced seedling stand, was observed at 6 weeks after planting in the Delta Coat AD and TSX 18.8G treatments as compared to the control. No fungicide treatment increased yields over the control ($P \leq 0.05$). No fungicide treatment yielded more seed cotton per acre than the control under either high or low disease pressure.

TABLE 1. EFFECT OF SELECTED FUNGICIDES ON COTTON STAND, SKIP INDEX, AND SEED COTTON YIELD UNDER HIGH DISEASE PRESSURE IN NORTH ALABAMA

Treatment	Rate	——Stand 25 ft row ——			Skip index	Seed cotton
		14 DAP	28 DAP	42 DAP		*lb/ac*
Control	——	88.6 a	92.2 a	88.0 ab	1.8 b	3353 a
Terraclor Super X 18.8 G	5.0 lb/ac	69.8 bc	75.4 a-d	70.4 cb	3.0 ab	3384 ab
Terraclor Super X EC	48.0 oz/ac	82.8 ab	88.0abc	81.8 a	2.0 ab	3394 ab
Quadris 4F	6.0 oz/ac	76.0 abc	74.4 bcd	78.8 abc	2.4 ab	3374 ab
Delta Coat AD	11.75 oz/cwt	67.0 c	65.4 d	68.5 c	4.2 a	3340 ab
AGST 01001	8.82 oz/cwt	78.6 abc	84.2 abc	78.8 abc	3.0 ab	3170 ab
Ridomil Gold EC	1.0 oz/ac	82.0 ab	81.6 a-d	78.6 abc	3.4 ab	3313 ab
Quadris 4 F + Ridomil Gold	6.0 oz/ac + 1.0 oz/ac	86.8 a	90.2 ab	89.8 a	2.4 ab	3455 a
Rovral 4F	6.0 oz/ac	75.2 abc	77.6 a-d	72.8 abc	3.4 ab	3138 b
Ridomil Gold G	5.0 lb/ac	70.4 bc	71.2 cd	72.0 bc	2.2 ab	3321 ab
Messenger	2.25 oz/ac	84.0 ab	79.0 a-d	65.8 c	3.4 ab	3222 ab
FAC 321	2.0 fl oz/ac	88.8 a	85.4 abc	78.8 abc	2.2 ab	3272 ab
FAC 321 + Terraclor 2E	2.0 + 48 fl oz/ac	78.8 abc	81.2 a-d	77.2 abc	3.2 ab	3363 ab
LSD P ≤ (0.05)		**14.8**	**17.6**	**17.3**	**2.2**	**295**

TABLE 2. EFFECT OF SELECTED FUNGICIDES ON COTTON STAND, SKIP INDEX, AND SEED COTTON YIELD UNDER LOW DISEASE PRESSURE IN NORTH ALABAMA

Treatment	Rate	——Stand 25 ft row ——			Skip index	Seed cotton
		14 DAP	28 DAP	42 DAP		*lb/ac*
Control	——	94.6 ab	106.2 a	110.6 a	1.0 c	3868 a
Terraclor Super X 18.8 G	5.0 lb/ac	77.4 c-f	72.8 c-f	78.8 cd	3.2 ab	3721 ab
Terraclor Super X EC	48.0 oz/ac	96.4 a	93.0 ab	101.6 ab	1.2 bc	3708 ab
Quadris 4F	6.0 oz/ac	82.4 b-e	85.2 bcd	85.2 bcd	1.6 bc	3773 ab
Delta Coat AD	11.75 oz/cwt	72.2 def	70.0 ef	70.2 d	4.0 a	3578 ab
AGST 01001	8.82 oz/cwt	87.6 abc	88.6 b	93.6 abc	2.0 abc	3585 ab
Ridomil Gold EC	1.0 oz/ac	92.0 ab	88.6 b	89.8 bcd	1.4 bc	3607 ab
Quadris 4 F + Ridomil Gold	6.0 oz/ac + 1.0 oz/ac	86.8 abc	86.4 bcd	83.8 bcd	1.6 bc	3692 ab
Rovral 4F	6.0 oz/ac	69.2 f	68.0 f	77.4 cd	2.4 abc	3656 ab
Ridomil Gold G	5.0 lb/ac	70.2 ef	72.0 def	79.4 cd	3.0 abc	3753 ab
Messenger	2.25 oz/ac	84.6 a-d	83.0 b-e	92.6 abc	1.2 bc	3577 ab
FAC 321	2.0 fl oz/ac	83.8 a-d	81.2 b-e	81.4 cd	2.8 abc	3507 b
FAC 321 + Terraclor 2E	2.0 + 48 fl oz/ac	91.0 ab	87.2 bc	86.8 bcd	1.8 bc	3562 ab
LSD P ≤ (0.05)		**13.2**	**14.6**	**19.9**	**2.1**	**307**

*Skip index is the accumulative value to every one foot space between plants.

EVALUATION OF SELECTED IN-FURROW FUNGICIDES FOR MANAGEMENT OF *RHIZOCTONIA SOLANI* SEEDLING DISEASE IN NORTH ALABAMA

K. S. McLean, A. J. Palmateer, J. L. Hutchinson, and B. E. Norris

Terraclor 15G, Terraclor 2E, Quadris 4F, Rovral 4F, and Delta Coat AD were evaluated for management of cotton seedling disease caused by *Rhizoctonia solani*. This cotton fungicide test was planted on April 15 at the Tennessee Valley Research and Extension Center, Belle Mina, Alabama. The field had a history of cotton seedling disease and the soil type was a Decatur silty loam. Soil temperature was 65°F at a 4 inch depth at 10 a. m. with adequate moisture at planting. Fungicides were applied as a seed treatment or as an in-furrow spray at planting. All in-furrow fungicide sprays were applied with flat tip 8002E nozzles calibrated to deliver 6 gallons per acre at 18 pounds per square inch. Plots consisted of two rows, 25 feet long with a 40 inch wide row spacing and were arranged in a randomized complete block design with five replications. High disease incidence plots were infested with millet seed inoculated with *Rhizoctonia solani*. Blocks were separated by a 20-foot alley. The nematicide Temik 15G (5 pounds per acre) was applied in-furrow at planting.

All plots were maintained throughout the season with standard herbicide, insecticide, and fertility production practices as recommended by the Alabama Cooperative Extension System. Stand counts and skip index ratings were recorded at 2, 4, and 6 weeks after planting to determine the percent seedling loss and stand density due to cotton seedling disease. Plots were harvested on September 24. Data were statistically analyzed by ANOVA and means compared using Fisher's protected least significant difference test ($P \leq 0.05$).

Cotton seedling disease incidence was high in 2002 due to cold wet weather. In the high disease incidence plots, differences ($P \leq 0.05$) in seedling stand were observed at 2, 4, and 6 weeks after planting (Table 1). At 2 weeks after planting, stands in three fungicide treatments were reduced compared to the control; however, by 4 and 6 weeks the stand was reduced only in the Rovral treatment. Correspondingly, a higher skip index ($P \leq 0.05$), indicating an unevenly spaced seedling stand, was observed in the Rovral treatment as compared to the control. No fungicide treatment produced yields higher than those produced by the control ($P \leq 0.05$). Under low disease pressure, Terraclor 2E produced a reduced stand compared to the control. No stand or skip index differences were observed at 6 weeks after planting (Table 2). No fungicide treatment produced yields higher than those produced by the control ($P \leq 0.05$). The yield was lower in the Rovral fungicide treatment under high and low disease pressure as compared to the control.

TABLE 1. EFFECT OF FUNGICIDES ON COTTON STAND, SKIP INDEX, AND SEED COTTON YIELD UNDER HIGH DISEASE PRESSURE IN NORTH ALABAMA

Treatment	Rate	——Stand 25 ft row——			Skip index	Seed cotton
		14 DAP	28 DAP	42 DAP		*lb/ac*
Control	—	71 a	75 a	78 a	2.6 b	3745 a
Terraclor 15G	5.0 lb/ac	69 abc	72 a	79 a	3.0 b	3648 a
Terraclor 2E	48.0 oz/ac	65 bc	71 a	75 a	2.4 b	3635 a
Quadris 4F	6.0 oz/ac	79 a	82 a	89 a	2.0 b	3865 a
Rovral 4F	6.0 oz/ac	56 c	41 b	39 b	10.0 a	3280 b
Delta Coat AD	11.75 oz/cwt	65 bc	68 a	73 a	3.2 b	3713 a
LSD $P \leq (0.05)$		**13.8**	**16.8**	**20.0**	**2.9**	**298**

TABLE 2. EFFECT OF FUNGICIDES ON COTTON STAND, SKIP INDEX, AND SEED COTTON YIELD UNDER LOW DISEASE PRESSURE IN NORTH ALABAMA

Treatment	Rate	——Stand 25 ft row——			Skip index	Seed cotton
		14 DAP	28 DAP	42 DAP		*lb/ac*
Control	—	78 a	83	84	1.6 a	3964 a
Terraclor 15G	5.0 lb/ac	71 ab	77	75	2.8 a	3774 ab
Terraclor 2E	48.0 oz/ac	64 b	79	78	2.6 a	3674 ab
Quadris 4F	6.0 oz/ac	78 ab	77	82	2.4 a	3740 ab
Rovral 4F	6.0 oz/ac	77 ab	83	81	1.2 a	3669 b
Delta Coat AD	11.75 oz/cwt	72 ab	75	77	2.2 a	3729 ab
LSD $P \leq (0.05)$		**13.7**	**17.6**	**21.8**	**1.9**	**291**

*Skip index is the accumulative value to every one foot space between plants.

MOLECULAR STUDIES

DEVELOPING *IN VITRO* COTTON CULTURE SYSTEMS FOR RENIFORM NEMATODE STUDIES

Dewang Deng, Allan Zipf, Govind Sharma, Celeste Bell, Kara Harris, Dedrick Davis, and Yonathan Tilahun

Reniform nematodes *(Rotylenchulus reniformis)* have become an extremely serious threat to Alabama cotton producers with their continued spread into uninfected cotton production areas. However, studying infection or resistance processes is difficult in the field or even under greenhouse conditions. Plant tolerance and susceptibility to reniform nematodes could be studied in *in vitro* cotton root cultures; however, excised root cultures have not been successful in earlier investigations, hence the critical need for the present study.

The objectives of this project are (1) to develop long-term (at least 30 day) cotton root cultures, (2) to sterilize viable reniform nematodes, and (3) to establish continuous reniform infections in the root cultures.

As a complement to the successful root culture system, achieved by Deng in 2002, researchers are proceeding to sterilize viable reniform nematodes. In addition, they are working to develop successful solid root cultures for ease of maintenance and setup.

Various antiseptic treatments and treatment lengths are being investigated in order to maximize sterilization while still keeping the nematodes alive. Sterilizing agents, which include Clorox, hydrogen peroxide, and mercuric chloride, are being tested to determine the minimal effective dose.

Semi-solid media, made with different gelling agents, are also being investigated as a means for more easily viewing the infection process. However, an appropriate medium recipe for successful cotton root development has not yet been found.

ISOLATION OF GENES RELATED TO COTTON FIBER DEVELOPMENT

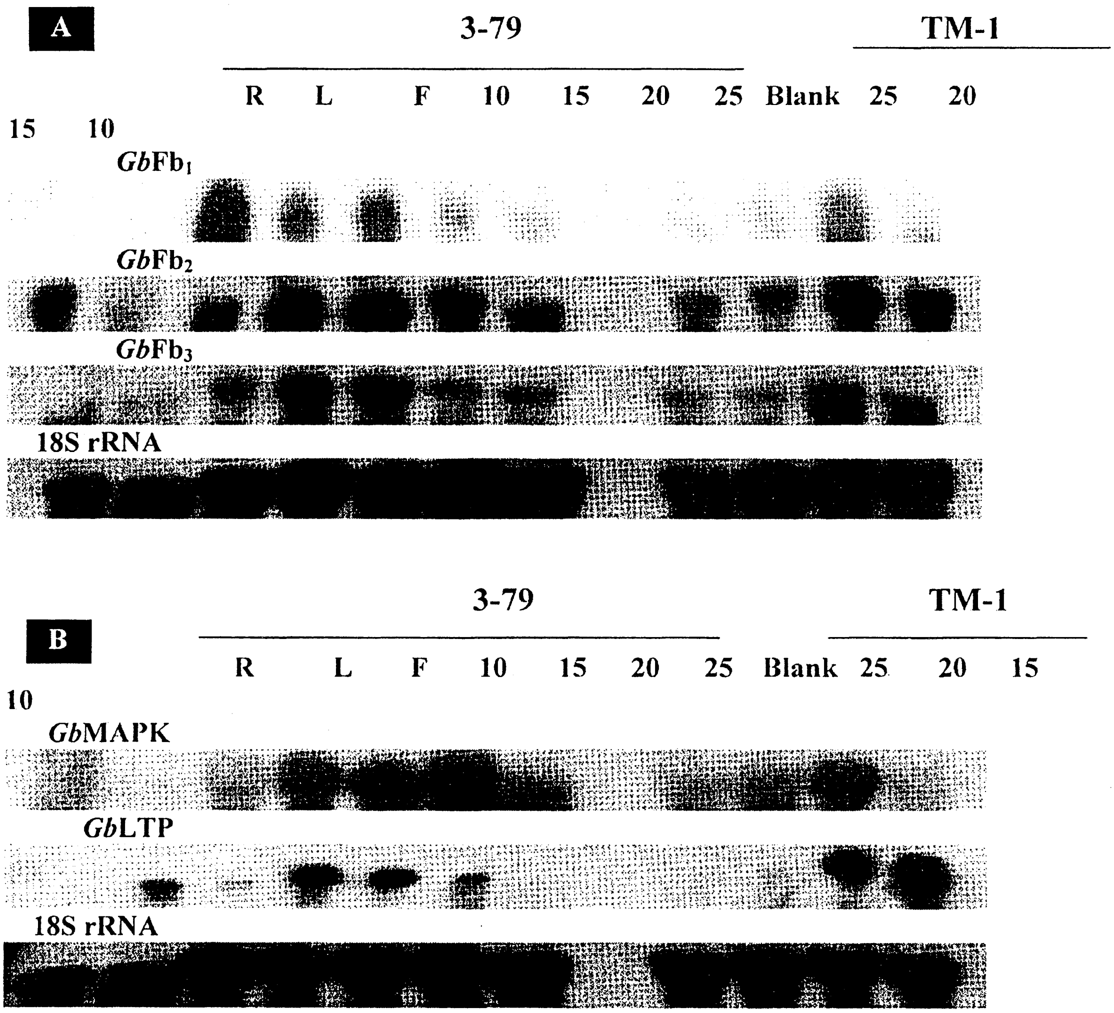
Khairy Soliman, Allan Zipf, Govind Sharma, Zhengdao Wu, and James Bolton

An important objective of cotton research at Alabama A&M University is to reveal genes that may have roles in either cotton growth or fiber quality. A number of projects trying to find genes associated with various aspects of cotton culture are being conducted through a diverse set of active collaborators. Two of these projects will be discussed in this article.

Identification of genes related to cotton fiber development using unique mutants. In collaboration with Dr. Sukumar Saha, researchers are studying the *Li-1* mutant fiber development. Short fiber and distorted stems and leaves characterize this mutant. Using Simple Sequence Repeat primers, researchers have found no obvious differences (polymorphisms) when separating polymerase chain reaction (PCR) fragments on agarose gels. The fragments are being cloned and will be sequenced on a ABI 3100 Sequencer to analyze for single DNA base pair differences (SNPs - Single Nucleotide Polymorphisms). These sequences can then be used to give unique markers, which can be used to screen the F_2 population to make a genetic map.

Identification of fiber-related genes by differential screening. Another project aims to identify cotton genes associated with fiber quality. This project uses high yielding Upland cotton, TM-1, and high fiber quality Pima cotton, 3-79. Five clones showing high expression in 20 day postanthesis (dpa) fiber tissue of 3-79 cotton were used as probes in Northern blotting of roots, leaves, flowers and fibers of different developmental stages. Northern analysis showed that the expression of the five cDNA clones was developmentally regulated and not tissue-specific (see figure). The genes for all the five cDNAs showed much higher expression levels in the fiber than in the other tissues tested with the exception of the gene for *Gb*Fb_1 in the flower. Four of the five genes were highly expressed in the early stage of fiber development (10 to 15 dpa) in both 3-79 and TM-1 fibers. The expression of these genes appeared to peak at about 15 dpa and then decreased sharply after 20 dpa. However, the expression pattern of the gene for *Gb*MAPK steadily increased in 3-79 immature fibers during primary wall synthesis (about 10 to 15 dpa), reached a maximum at about 20 dpa, and declined after 25 dpa. On the other hand, the expression level for *Gb*MAPK in TM-1 fibers was very low at about 10 dpa, but showed a peak at about 15 dpa and decreased sharply after 20 dpa. Several clones are also being investigated for their pattern of expression to try to identify those genes associated with the yield or fiber quality.

Expression pattern of the five cDNA clones in different tissues of 3-79 and developing fibers of 3-79 and TM-1 plants. Two independent Northern blots (A and B), with 30 mg of total RNA in each lane, were sequentially hybridized with the cDNA probes indicated. The loading differences in each lane were assessed by hybridization with an 18S rRNA probe from *Arabidopsis*. Note: R = roots; L = leaves; F = flowers.



Genetic Variation in Reniform Nematode Populations

Yonathan Tilahun, Dewang Deng, Allan Zipf, Govind Sharma, Celeste Bell, Kara Harris, Dedrick Davis, K. McLean, and J. Jenkins

Solutions to the threat of reniform nematodes (*Rotylenchulus reniformis*) will depend on the genetic variation (races) within the species. If the populations are uniform, then control measures may be applicable across large regions. If, however, significant variability exists, then control measures may only be effective for small populations or even sub-groups within a population. Knowing how uniform reniform nematode populations are is a critical first step before effective control measures can be undertaken.

Nematodes were collected from nine locations in six Alabama counties, spanning the northern and southern borders of Alabama (see table). The samples were obtained through the Tennessee Valley Research and Extension Center, Belle Mina, Alabama,with the cooperation of Charlie Burmester, and the

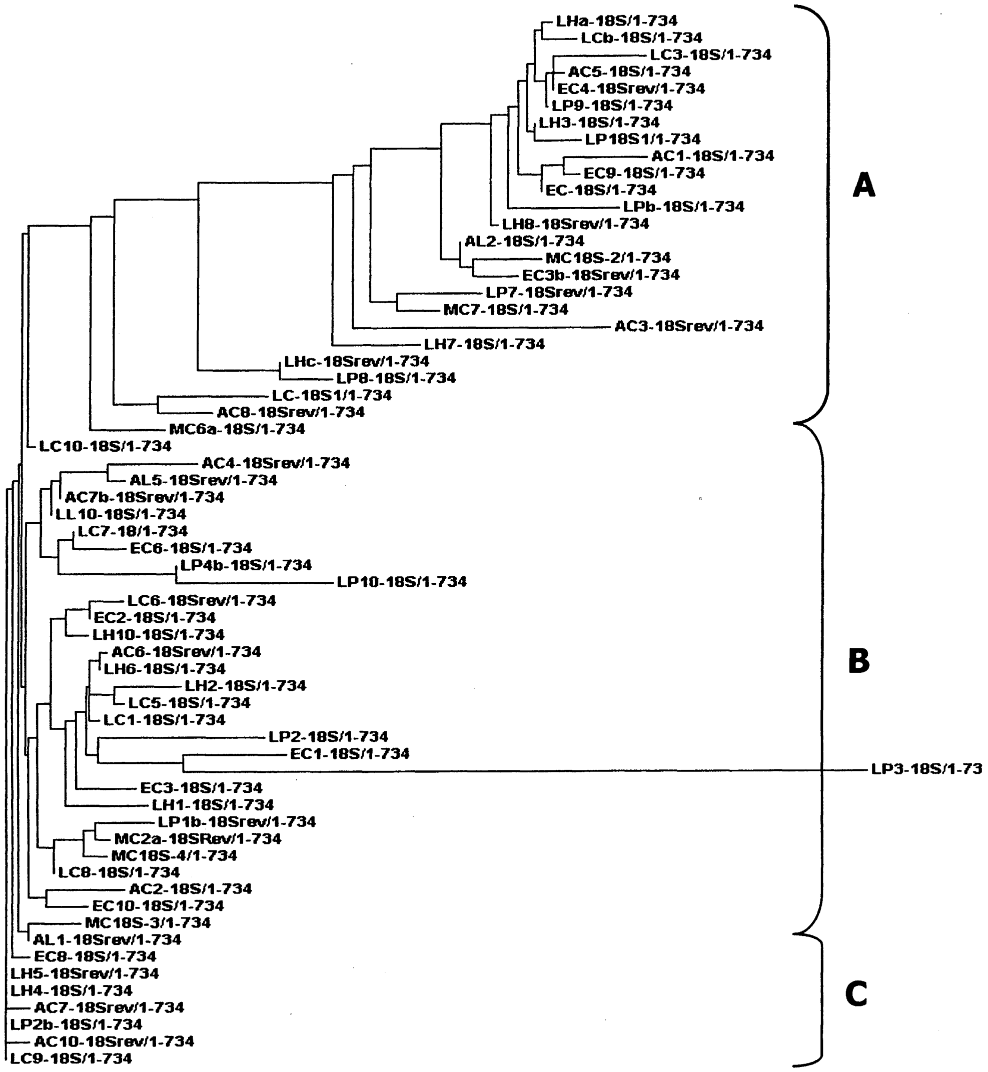
Plant Diagnostics Laboratory through the Alabama Cooperative Extension System at Auburn University with the cooperation of Ms. Kristie Siggers.

Reniform nematode population variation, not apparent from 18S rDNA primer polymerase chain reaction (PCR) bands, was detected only by sequencing and single nucleotide polymorphism analysis. Genomic differences were found, not only between different populations from different locations, but even within the populations from the same location (see figure). This high variability may be due to high genetic variability between individuals, a paradox since rRNA is considered to be "highly conserved." Another explanation may be that numerous genetically different introductions of reniform nematode were made by farm equipment, soil sampling, runoff, etc., throughout the region, resulting in established diverse populations. This is the first report of any sequence information from *Rotylenchulus reniformis*, the reniform nematode.

NEMATODE POPULATION SAMPLING SITES

County	Farm	Designation
Limestone	Unknown	LL
Limestone	Anderson	AL
Lawrence	Haney	LH
Lawrence	Posey	LP
Morgan	Collins	MC
Escambia	Unknown	EC
Autauga	Unknown	AC
Colbert	Underwood	CU

Phylogram of 18S clone sequences. First two letters of each clone correspond to location of reniform infested soil samples as per table.



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Alabama's Agricultural Experiment Station System
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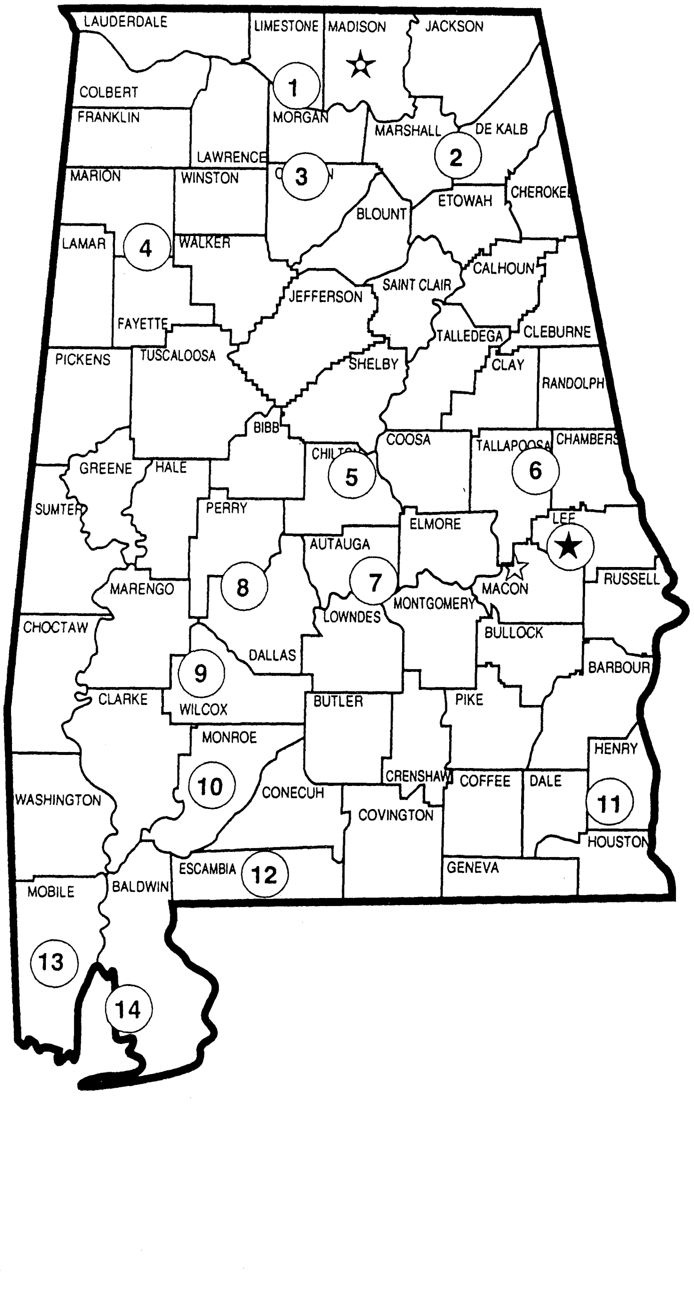

★ Main Agricultural Experiment Station, Auburn.

★ 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 Plains Agricultural Research Center, Winfield
5. Chilton Area Research and Extension Center, Clanton
6. *Piedmont Substation, Camp Hill
7. Prattville Agricultural Research Unit, Prattville
8. Black Belt Research and Extension Center, Marion Junction
9. Lower Coastal Plain Substation, Camden
10. *Monroeville Agricultural Research Unit, Monroeville
11. Wiregrass Research and Extension Center, Headland
12. Brewton Agricultural Research Unit, Brewton
13. Ornamental Horticulture Research Center, Spring Hill
14. Gulf Coast Research and Extension Center, Fairhope

*Temporarily inactive