FIBER QUALITY AND NET LOAN PRICE AS INFLUENCED BY NARROW SPINDLE PICKER ROW PATTERNS IN A NON-IRRIGATED ENVIRONMENT; FINAL REPORT

M.P. Harrison
N.W. Buehring
North Mississippi Research and Extension Center
Verona, MS
M. H. Willcutt
Mississippi State University
Mississippi State, MS
E. P. Columbus
Robert R. Dobbs
North Mississippi Research and Extension Center
Verona, MS

Abstract

A two-year (2004-2005) study on a very fine sandy loam soil at Clarksdale, MS and 4-year (2003-2006) studies on silt loam soils at Verona, MS and Falkner, MS evaluated cotton fiber quality and net loan price response to different row patterns. The row patterns used in the study were 15, 30, and 38-inch solid rows, 15-inch rows with a 2x1 skip row (2 rows of cotton with a 30-inch skip), 15-inch 2x2 skip row (2 rows with a 45-inch skip), 30-inch rows with a 1x1 skip row (cotton in 60-inch rows), 30-inch rows with a 2x1 skip row (2 rows with a 60-inch skip), and 38-inch rows with a 2x1 skip row (2 rows with a 76-inch skip). Seeding rates were 4 seed/ft of row for all 38-inch rows and 3 seed/ft of row for all 30 and 15-inch row patterns. All cotton plots were harvested with John Deere PRO 12 VRS picker units that were adjustable for all of the row patterns. The seed cotton from each plot was ginned with a mini-gin (state of the art cotton gin equivalent to a commercial gin). HVI and AFIS fiber quality analysis and net loan value showed little differences between row patterns at all locations. Environments (years) had an effect on fiber properties with only minor effects on net loan prices at Verona and Falkner, except at Falkner. Whereas in 2004 intermittent rainfall delayed harvest for 4 weeks with negative effects on fiber quality and net loan values. The high rainfall from hurricane Rita at Clarksdale resulted in lower fiber reflectance, higher yellowness values and net loan values in 2005 than 2004.

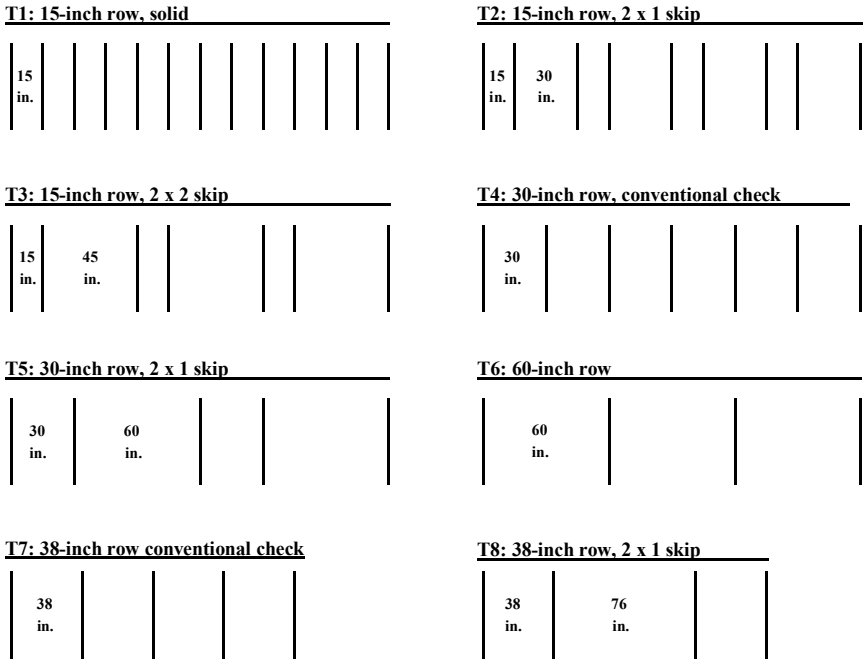
Introduction

Efficient cotton production for improved net returns is essential for Mississippi cotton growers to maintain a competitive advantage in a global economy. UNR stripper cotton and skip row cotton production systems have been used as means for improving profitability. UNR cotton yields (Atwell 1996; Buehring et al., 2001; Nichols and Snipes 2002; Shurley et al., 2002) and net returns (Parvin et al., 2002; Shurley et al., 2002) were equal or higher than conventional wide rows. However, the $0.03 to $0.05/lb discount for the fiber's (neps and trash) negative spinning quality; the inability to operate the finger strippers under high humidity or dampness in the rain belt; and the increased trash content have offset these advantages. The increased trash content in the material taken to the gin reduces gin-processing capacity (Brashears 1968; Mayfield 1999; and Anthony et al., 1999; 2000). HVI fiber quality analysis showed no differences between spindle picker, brush stripper, and finger stripper harvested cotton in 10-inch rows (Anthony et al., 1999; 2000; Willcut et al., 2001). However, their reports indicated the finger stripper samples had increased neps/g (spinning flaws in making fabric). Therefore, stripper harvested UNR cotton is most often discounted 3 to 5 cents/lb of lint; plus any reductions for bark, trash, or preparation (Willcutt et al., 2001).

Deere and Company's introduction of the new 15-inch row John Deere PRO 12 VRS spindle picker makes possible spindle picker production systems that not only approximate UNR stripper cotton systems, but also have the potential to maximize fiber spinning quality (lower neps and trash than for stripper harvested lint) while retaining the operational benefits of a spindle picker. The objective of this study was to determine the influence the 15-inch solid row and 15-inch skip row spindle picker cotton production systems have on HVI, AFIS and net loan price. Lint yield (Dobbs et al., 2008) and whole farm economic analysis (Buehring et al., 2008) for these studies have been reported.

Materials and Methods

Studies were conducted in 2003-2006 on a Marietta silt loam and Falaya sandy loam soil at Verona and Falkner, Mississippi, respectively. A study also was conducted in 2004 and 2005 on a Dubbs very fine sandy loam soil at Clarksdale, MS. Studies at all locations were conducted as a split plot with row pattern as main plot and years as subplot with four replications. Plot size was 20 ft by 120 ft with all row patterns as shown in Figure 1. Deltapine DP 449BG/RR cultivar was planted no-till into a spring prepared stale seedbed in early to late May 2003-2006 at Falkner and Verona; and late April to early May 2004-2005 at Clarksdale.



Current recommended agronomic production practices were used at all locations. Seeding rates at all locations and years were 3 seed/ft of row for all 15 and 30-inch rows and 4 seed/ft of row for 38-inch rows. All cotton plots were harvested with John Deere PRO-12 VRS picker units that were adjustable for each row pattern.

The seed cotton from the harvested plots was ginned with a mini-gin (state of the art cotton gin, equivalent to a commercial gin). Lint sub-samples were sent to Cotton Incorporated to determine fiber quality using High Volume Instrumentation (HVI) and Advanced Fiber Information Systems (AFIS) analysis. The net loan price for each treatment was calculated based on the USDA's National Commodity Credit Corporation base loan rate of $0.525/lb with premiums and discounts based on HVI fiber quality data.

All data for each location were analyzed with the Mixed Procedure Analysis using Statistical Analysis System (SAS) software (Littell et al., 1996). When no interactions were detected the data were pooled over years. Means were separated using Fisher's Protected LSD calculated at the 5% significance level. The United States Department of Agriculture (USDA), Agricultural Marketing Service, Agricultural Handbook 566 "The Classification of Cotton" (Revised April 2001) was used as a guide to interpret the HVI fiber analysis data. The "Uster® AFIS PRO-What Does the Data Mean? Common Test Results in Upland Cotton" (Uster, February 2004) publication was used as a guide in interpreting AFIS fiber properties.

Results and Discussion

Wet soil conditions in May at Verona and Falkner in 2003 delayed planting until the last days of May. Planting was accomplished at all locations from April 27 to May 10 in 2004 and 2005 and mid-May in 2006. Above normal rainfall during the growing season at all locations in 2003 and 2004 resulted in above average yield. However, the Clarksdale 2005 growing season from planting through August 26 had 4.25 inches of rainfall. Hurricane Rita in late September caused 20 to 30% yield losses (visual estimate) at Clarksdale. At Verona in 2005, the growing season had highly erratic rainfall with only 27% of normal for May, 17% above normal for June with all rainfall the first 13 days of June, followed by no rainfall from June 14 through July 4. This was followed by a wet July with 85% above normal rainfall and a 4-week period with no rainfall for August. This erratic rainfall appeared to have had a negative effect on growth and yield, especially on 15-inch row solid cotton. Falkner had excellent growing conditions all 4 seasons except for dry conditions in mid August 2005 and 2006.

HVI Fiber Properties

Verona: The analysis indicated yearly environmental effects had a greater impact on HVI fiber qualities than row patterns. Uniformity, micronaire, elongation, reflectance (Rd), yellowness (+b) and percent trash area showed differences between years with no row pattern by year interaction (Table 1). Micronaire ranged from 3.8 to 4.8 and showed no differences between years. The fiber uniformity index ranged from 79.6 to 82.8%, with 2005 having the lowest value. However, uniformity values for all years were in the intermediate classification. Fiber strength from 29.50 to 30.10/g/tex, showed no differences between years, and all were classified as strong. Elongation was greatest in 2003 with a value of 5.58% and with the lowest elongation of 4.78% in 2005, which was different from the other years. The fiber Rd reflectance values of 78.41 and 78.20 for 2005 and 2003, respectively, were equivalent and higher than the 2006 Rd values. The (+b) fiber yellowness values were higher in 2003 and 2004 than 2005 and 2006.

Table 1. HVI fiber properties and net loan price as influenced by years, averaged over row patterns (2003-2006), Verona, MS.

----------HVI Fiber Properties ----------									
Year	MIC	Length (in)	Uniformity (%)	Strength g/tex	Elongation (%)	Rd (%)	+b	Trash Area (%)	Net loan value $/lb
2003	38	1.09	82.8	29.92	5.58	78.20	7.89	0.994	0.575
2004	48	1.08	82.0	30.10	5.16	77.81	7.73	0.731	0.567
2005	43	1.07	79.6	29.69	4.78	78.41	7.15	0.519	0.550
2006	48	1.06	81.8	29.50	5.04	77.29	7.30	0.456	0.537
$LSD_{0.05}$	NS	NS	0.4	NS	0.15	0.42	0.10	0.08	0.007

Table 2. Strength, elongation, percent trash area and net loan price as influenced by row pattern averaged over years (2003-2006), Verona, MS.

Row Pattern	Strength (g/tex)	Elongation (%)	Trash Area (%)	Net loan price $/lb
15 inch solid	29.4	5.18	0.59	0.543
15-inch 2X1 skip	29.7	5.16	0.65	0.540
15-inch 2X2 skip	29.6	5.25	0.77	0.554
30-inch solid	29.7	5.26	0.62	0.563
30-inch 2X1 skip	30.0	5.08	0.71	0.563
60-inch solid	29.9	5.02	0.76	0.560
38-inch solid	29.7	5.16	0.63	0.560
38-inch 2X1 skip	30.3	4.99	0.67	0.564
$LSD_{0.05}$	0.47	0.11	0.12	0.01

Since strength, elongation, net loan value and percent trash area showed differences in row pattern and no interaction with years, the data was pooled over years (Table 2). Strength values range from 29.4 for 15-inch solid rows to 30.3g/tex for 38-inch 2x1 skip row pattern. Even though all row patterns showed strength differences, all were classified as strong. Elongation ranged from 4.99 for the 38-inch 2x1 skip row pattern to 5.18 for the 15-inch solid row pattern. Although some of these values differed significantly among row patterns, there were only minor (0.26 maximum) differences. The percent trash area ranged from 0.59 for 15-inch solid row pattern to 0.77 for the 15-inch 2x2 skip row pattern. The lower percent trash area of 0.59, 0.62 and 0.63%, for 15-inch solid row, 30-inch solid row and 38-inch solid row patterns, respectively, were not different from each other, but were less than 60-inch solid rows and the 15-inch 2x2 skip row patterns.

The net loan value showed row pattern differences with no year by row pattern interaction (Table 2). The net loan price ranged from $0.543 to $0.564/lb. The 15-inch solid and 15-inch 2x1 skip row pattern net loan price of $0.543 and $0.540/lb, respectively, were lower than all of the other row patterns. The other row pattern net loan values ranged from $0.554 to $0.564/lb and were not different.

Falkner: Row patterns and years influenced micronaire, fiber length and percent area trash. Since there were no row pattern and year interactions, these data were pooled over years (Table 3). The micronaire measurements ranged from 4.0 to 4.3 with the 38-inch 2x1 skip row pattern having the lowest value and was different from all other row patterns. However, all values were in the micronaire market classification base range. The fiber length ranged from 1.06 to 1.09 inches. The 38-inch 2x1 skip row pattern fiber length was higher than all other patterns; except for 30-inch 2x1 skip row and 60-inch solid row patterns. The fiber lengths for 30-inch 2x1 skip row, 60-inch solid row and 38-inch 2x1 skip row patterns were not different, but higher than 15-inch solid row and 15-inch 2x1 skip row patterns. The 38-inch 2x1 skip row pattern also had the highest percent trash area of 0.99, and was higher than all other row patterns. The other row pattern percent area trash was not different. Row pattern had no influence on uniformity, Rd, +b, and fiber strength with no row pattern by year interactions.

Table 3. Micronaire, fiber length and percent area trash as influenced by row pattern averaged over years (2003-2006), Falkner, MS.

Row Pattern	MIC	Length (in)	Trash Area (%)
15-inch solid	4.3	1.06	0.72
15-inch skip	4.3	1.06	0.74
15-inch 2X2 skip	4.2	1.07	0.83
30-inch solid	4.3	1.07	0.73
30-inch 2X1 skip	4.2	1.08	0.84
60-inch solid	4.2	1.08	0.76
38-inch solid	4.3	1.07	0.77
38-inch 2X1 skip	4.0	1.09	0.99
$LSD_{0.05}$	0.1	0.01	0.14

HVI fiber properties showed the effect of environment (years). Micronaire values of 3.5, 4.1, 4.5, and 4.9 for 2003, 2004, 2005 and 2006, respectively, showed differences between each year (Table 4). The lowest micronaire value of 3.5 in 2003 is probably related to the late May planting and defoliation with only 5% of the crop open. Research has shown delayed planting decreased micronaire values (Carthey and Meredith, 1988; Porter et al., 1996).

Table 4. HVI fiber properties influenced by year, averaged over row patterns (2003-2006), Falkner, MS.

	Fiber Properties						
Year	Mic	Length (in)	Uniformity (%)	Strength gm/tex	Rd (%)	+b	Trash Area (%)
2003	3.5	1.08	82.5	28.9	77.71	8.57	0.98
2004	4.1	1.06	81.3	27.3	68.56	8.03	1.23
2005	4.5	1.10	81.0	29.9	78.39	7.14	0.51
2006	4.9	1.06	81.9	29.8	77.97	7.55	0.47
$LSD_{0.05}$	0.01	0.01	0.3	0.3	0.47	0.12	0.12

But all of these values were in the base range classification. The years 2003 and 2005 fiber lengths of 1.08 and 1.10 inches were not different but were 1/32 greater in length than 2004 and 2006 lengths of 1.06 inches. Fiber uniformity showed differences between each year. But all were in the intermediate market class range. Strength ranged from 27.3 (average classification) to 29.9 g/tex (strong classification). The years 2005 and 2006 showed no difference in strength values and both values were higher than 2003 and 2004, which had values of 28.9 and 27.3 g/tex, respectively.

The Rd reflectance values ranged from 68.56 to 78.39 with 2004 having the lowest value and it was lower than all other years (Table 4). Years 2005 and 2006 showed no difference in reflectance. The reflectance value of 68.56 in 2004 was lower than all other years. The +b yellowness values ranged from 7.14 to 8.57 and showed differences between each year. The 1.23% trash area for 2004 was higher than all other years with no differences between 2005 and 2006, which had the lowest values of 0.51 and 0.47, respectively. The low reflectance, high yellowness value and high trash content for 2004 are related to weathering from 4 weeks of intermittent rainfall before harvest.

Table 5. Fiber elongation property as influenced by year and row pattern (2003-2006), Falkner, MS.

Row Pattern	Year 2003	2004	2005	2006
	Elongation			
15-inch solid	5.05	6.50	5.93	5.10
15-inch 2X1 skip	5.08	6.35	5.83	5.05
15-inch 2X2 skip	5.33	6.20	5.78	4.98
30-inch solid	5.35	6.18	5.73	4.98
30-inch 2X1 skip	5.23	6.15	5.75	5.05
60-inch solid	5.23	6.15	5.60	5.03
38-inch solid	5.30	6.18	6.13	5.23
38-inch 2X1 skip	5.23	6.05	5.88	4.88
Within and across years $LSD_{0.05}$: 0.26				

Fiber elongation showed a row pattern by year interaction (Table 5). Elongation ranged from a low of 4.88 in 2006 to 6.50 in 2004. There were differences among row patterns within and across years. In 2003, elongation ranged from 5.05 to 5.35. The 15-inch solid row had the lowest value of 5.05. While the 30-inch solid rows had the highest value of 5.35 and was not different from 38-inch solid row and 15-inch 2x2 skip row patterns. The elongation values for 15-inch solid row, 15-inch 2x1 skip row, 30-inch, 2x1 skip row, 60-inch solid row, 38-inch 2x1 skip row, and 38-inch solid row pattern were not different. In 2004, the highest value of 6.50 for the 15-inch solid row pattern was not different from 15-inch 2x1 skip row, but higher than all other row patterns.

Table 6. Row pattern influence on net loan price (2003-2006), Falkner, MS.

Row Pattern	Year 2003	2004	2005	2006
	$/lb			
15 inch solid	0.558	0.500	0.561	0.531
15 inch 2X1 skip	0.558	0.498	0.551	0.517
15 inch 2X2 skip	0.558	0.499	0.557	0.550
30 inch solid	0.557	0.497	0.570	0.543
30 inch 2X1 skip	0.560	0.536	0.564	0.540
60 inch solid	0.549	0.536	0.570	0.534
38 inch solid	0.558	0.535	0.567	0.525
38 inch 2X1 skip	0.546	0.536	0.566	0.544
Within and across years $LSD_{0.05}$= 0.021				

The 15-inch 2x2 skip row, 30-inch solid row, 30-inch 2x1 skip row, 60-inch solid row, 38-inch solid rows and 38-inch 2x1 skip row patterns showed no differences for elongation. In 2005, the 38-inch solid row pattern had the highest elongation value of 6.13, but was not different from 38-inch 2x1 skip row and 15-inch solid row patterns. The 38-inch 2x1 skip row, 15-inch solid row, 15-inch 2x1 skip row, 15-inch 2x2 skip row, 30-inch solid row and 30-inch 2x1 skip row patterns showed no differences in elongation values. In 2006, the 38-inch 2x1 skip row had the lowest value of 4.88, but was not different from all other row patterns, except the 38-inch solid row pattern which had a value of 5.23.

Net loan value showed a row pattern by year interaction (Table 6). Net loan values ranged from a low of $0.497/lb in 2004 to $0.570/lb in 2005. Net loan value showed no differences between row patterns in 2003, 2005 and 2006. In 2004, the 15-inch solid rows, 15-inch 2x1 skip rows and 15-inch 2x2 skip rows and 30-inch solid row patterns showed no differences in net loan price, but all were lower than the other row patterns. The lower net loan values for 2004 are related to the lower reflectance values, higher yellowness values and high trash content caused by 4 weeks delay in harvest from intermittent rain.

Clarksdale: Row pattern had no effect on percent area trash, uniformity and net loan price. But row pattern and year had an interactive effect on fiber micronaire, length, Rd reflectance and +b yellowness (Table 7). The micronaire values ranged from 3.8 for 60-inch solid rows in 2004 to 5.0 for the 30-inch solid rows, 15-inch 2x2 skip row, and 30-inch solid rows and 38-inch 2x1 skip row patterns in 2005. In 2005, 15-inch solid rows and 15-inch 2x1 skip row patterns had micronaire values equal to 30-inch 2x1 skip row and 38-inch solid row patterns; and were lower than all other row patterns. Except for 60-inch solid and 38-inch 2x1 skip row patterns, all other row patterns in 2004 showed no differences in micronaire. All row pattern micronaire values of 3.8 to 4.2 in 2004 and 4.7 to 4.9 in 2005 were in the USDA market classification base range. While in 2005, the 15-inch 2x2 skip row 30-inch solid, 60-inch solid and 38-inch 2x1 skip row patterns micronaire values of 5.0 placed them in the discount classification range.

Table 7. HVI micronaire, fiber length, reflectance and fiber yellowness as influenced by year and row pattern (2004-2005), Clarksdale, MS.

	Year							
Row Pattern	2004	2005	2004	2005	2004	2005	2004	2005
	MIC		Length (in)		Rd (%)		+b	
15-inch solid	4.2	4.7	1.10	1.10	80.43	73.58	7.63	8.63
15-inch 2X1 skip	4.2	4.7	1.10	1.07	80.10	74.65	7.88	8.27
15-inch 2X2 skip	4.2	5.0	1.12	1.10	79.50	74.69	7.73	8.40
30-inch solid	4.2	5.0	1.11	1.10	81.03	74.81	7.58	8.18
30-inch 2X1 skip	4.0	4.9	1.12	1.08	81.28	73.94	7.75	8.39
60-inch solid	3.8	5.0	1.12	1.10	80.35	75.13	7.83	8.09
38-nch solid	4.2	4.9	1.13	1.10	80.88	75.66	7.73	8.02
38-inch 2X1 skip	3.9	5.0	1.13	1.08	80.45	75.19	7.95	8.01
Within year $LSD_{0.05}$	0.2		0.03[1]		1.08[1]		0.26	
Across year $LSD_{0.05}$	0.3						0.31	

[1] $LSD_{0.05}$ across and within years.

Fiber length ranged from 1.07 inches in 2005 to 1.13 inches in 2004. Within years 2004 and 2005, there were no row pattern differences for length. The 38-inch 2x1 skip row and 30-inch 2x1 skip row were the only row patterns which showed differences in fiber length compared across years. The lower Rd reflectance and higher +b yellowness values for 2005 than 2004 were a result of the high rainfall amount from hurricane Rita. This caused fiber deterioration and color dullness. In 2004 the 30-inch 2x1 skip row pattern Rd reflectance value of 81.28 was higher than 15-inch 2x2 skip row pattern but was not different from all other row patterns. In 2005, there were no row pattern differences in Rd reflectance values, but all were lower than 2004. The +b yellowness values were higher in 2005 than 2004 with some row patterns showing significant differences between years. The 38-inch 2x1 skip row pattern in 2004 had the highest +b value of 7.95, which was higher than 30-inch solid row and 15-inch solid row patterns and equal to all other row patterns, In 2005, the 15-inch solid had the highest value of 8.63, but was not different from 15-inch 2x2 skip row, and 30-inch 2x1 skip row patterns. However, it was higher than 15-inch 2x1 skip row, 30-inch solid, and 60-inch solid, 38-inch solid and 38-inch 2x1 skip row patterns.

Years (environment) affected fiber length, uniformity, percent area trash and net loan price (Table 8). The increased trash area, and lower uniformity for 2005 than 2004 are related to 2005 drought during the growing season and excess rainfall from hurricane Rita. Fiber uniformity for 2004 was higher than 2005. However, both values were in the intermediate USDA cotton market classification range. Trash area percent of 0.34% in 2005 was higher than 2004. The net loan value of $0.588/lb for 2004 was higher than the $0.532/lb for 2005. This difference in net loan value is related to the lower reflectance, and higher yellowness values and the higher micronaire value for 2005 than 2004. The micronaire value was in the cotton market classification discount range. The Rd reflectance values also were lower for all row patterns in 2005 than 2004. The +b yellowness values for all row patterns were higher in 2005 than to 2004. All of these reduced fiber qualities were related to high rainfall amount and delayed harvest caused by hurricane Rita.

Table 8. HVI fiber properties as influenced by year, averaged over row patterns (2004-2005), Clarksdale, MS.

	----------HVI Fiber properties----------			
Year	Length (in)	Uniformity (%)	Trash Area (%)	Net loan Price $/lb
2004	1.11	82	0.26	0.588
2005	1.09	80	0.34	0.532
$LSD_{0.05}$	NS	1	0.05	0.130

AFIS Properties

Verona: AFIS fiber analysis indicated environment (years) generally had a greater impact on AFIS properties than row patterns. Row pattern had no effect on any AFIS fiber properties and there was no row pattern by year interaction. There were differences among years for neps, upper quartile length (UQL) by weight, short fiber content (SFC %) by weight and number, total trash count, trash count, dust count, trash size, visible foreign matter (VFM) and maturity ratio (Table 9). Neps ranged from 145 to 260/g with differences between each year. The 145/g is described as low and the 260/g is described as medium (Uster, 2004). The upper quartile length by weight ranged from 1.11 to 1.16 with differences between each year. Short fiber content by weight [SFC (w)] values ranged from 7.28 in 2006 to 12.22 in 2004. The 7.28% SFC (w) is described as low while the 12.22% SFC (w) is described by Uster (2004) as high. SFC (w) showed no differences between 2006 and 2003, and between 2003 and 2005. Short fiber content number [SFC (n)] 24.83 for 2006 was lower than the 36.39 for 2004. There was no SFC (n) difference between 2003 and 2005. The 2004 SFC (n) 36.39 is described as high (Uster, 2004), and was higher than all of the other years.

Table 9. AFIS fiber properties as influenced by years, averaged over row patterns (2003-2006), Verona, MS.

----------AFIS Fiber Properties ----------										
Year	Neps cnt/g	UQL (w)	SFC (w) [%]	SFC (n) [%]	Dust cnt/g	Trash cnt/g	Total Trash cnt/g	Trash Size (um)	VFM (%)	Mat Ratio
2003	260	1.15	8.21	28.33	262	83	345	400	1.56	0.91
2004	242	1.16	12.22	36.39	339	97	436	384	1.94	0.86
2005	184	1.11	9.08	29.35	224	66	290	389	1.23	0.90
2006	145	1.12	7.28	24.83	225	86	311	429	1.57	0.95
$LSD_{0.05}$	12	0.01	1.47	2.90	28	8	36	10	0.16	0.02

Dust counts of 224 and 225/g for 2005 and 2006, respectively, were lower than 262 and 339/g for 2003 and 2004, respectively. The dust count of 339/g for 2004 was higher than all other years. The 2004 trash counts ranged from 66 in 2005 to 97/g in 2004. The 2003 and 2006 trash counts of 83 and 86/g, respectively, were not different. The 2004 trash count of 97/g was higher than all other years. The 2004 total trash count of 436/g was higher than all other years with no differences between 2003, 2005 and 2006. Trash size of 429 um for 2006 was higher than all other years. There were no differences in trash size between 2003 and 2004 and both were different from 2006. Visible foreign mater (VFM) values ranged from 1.23 in 2005 to 1.94 in 2004, and 2004 was higher than all other years. The 2003 and 2006 VFM values of 1.56 and 1.57 were not different, but were lower than 2004 and higher than 2005.

Fiber maturity ratio ranged from 0.86 for 2004 to 0.95 for 2006. The 0.90 and 0.91 maturity ratio values for 2003 and 2005, respectively, were not different. These values were higher than 2004 but lower than 2006. The 2004 and 2005 maturity ratio values of 0.86 and 0.90, respectively, are classified as medium (Uster, 2004) and the 2003 and 2006 values were classified as high. The upper quartile length [UQL (w)] showed differences in years and row patterns with no interaction (data not shown). The 15-inch solid row, 15-inch 2x1 skip row, 30-inch solid row and 38-inch solid row pattern upper quartile lengths ranged from 1.12 to 1.14 and were not different. The upper quartile length for 38-inch solid, 15-inch 2x2 skip row, 30-inch 2x1 skip row, 60-inch solid row and 38-inch 2x1 skip row patterns ranged from 1.14 to 1.15 and were not different.

Falkner: Most often year (environmental) effects were significant for all AFIS properties. But row patterns only affected neps, upper quartile length by weight, total trash, dust counts and trash count (Table 10). There was no year by row pattern interaction for AFIS fiber properties. The 60-inch solid and 38-inch 2x1 skip row pattern nep counts of 250 and 255/g, respectively, were described as medium (Uster, 2004) and not different but higher than all other row patterns except 30-inch 2x1 skip row pattern. The other row patterns showed no differences. The upper quartile length by weight ranged from 1.12 for 15-inch solid and 15-inch 2x1 skip row patterns to 1.15 for 38-inch 2x1 skip row pattern. The 38-inch solid, 30-inch solid, 15-inch 2x1 skip row and 15-inch solid row patterns showed no difference in upper quartile length by weight. The upper quartile length by weight values for 15-inch 2x2 skip row, 30-inch 2x1 skip row, and 60-inch solid row and 38-inch 2x1 skip row patterns were not different.

Table 10. Row pattern influence on AFIS fiber properties, averaged over years (2003-2006), Falkner, MS.

Row Pattern	Neps cnt/g	UQL (w)	Dust cnt/g	Trash cnt/g	Total Trash cnt/g
15-inch solid	223	1.12	228	65	293
15-inch 2X1 skip	227	1.12	262	72	334
15-inch 2X2 skip	229	1.14	306	90	396
30-inch solid	226	1.13	239	72	312
30-inch 2X1 skip	237	1.14	275	78	354
60-inch solid	250	1.14	232	72	305
38-inch solid	228	1.13	236	72	308
38-inch 2X1 skip	255	1.15	319	85	405
$LSD_{0.05}$	21	0.01	49	14	59

Dust counts ranged from 228/g for 15-inch solid to 319/g for 38-inch 2x1 skip row pattern (Table 10). The 38-inch 2x1 skip row pattern had the highest dust count value of 319/g which is described as medium (Uster, 2004). It was also equal to 30-inch 2x1 skip row and 15-inch 2x2 skip row pattern, but higher than all other row patterns. The 15-inch solid had the lowest dust count value of 228/g and was not different from the 15-inch 2x1 skip row; 30-inch solid, 30-inch 2x1 skip row, 60-inch solid and 38-inch solid row patterns. The 15-inch 2x2 skip row pattern had the highest trash count of 90/g and was not different from the 38-inch 2x1 skip row and 30-inch 2x1 skip row patterns. Total trash counts ranged from 293/g for 15-inch solid to 405/g for 38-inch 2x1 skip row pattern. The 15-inch solid row pattern total trash count of 293/g was equal to 15-inch 2x1 skip, 30-inch solid, and 60-inch solid and 38-inch solid row patterns. The 38-inch 2x1 skip row pattern trash count of 405/g was equal to 15-inch 2x2 skip row and 30-inch 2x1 skip row pattern and higher than all other row patterns.

Years (environment) had a significant effect on neps, upper quartile length by weight, short fiber content by weight and number, dust count, trash count, total trash count, trash size, visible foreign matter and maturity ratio, with no differences due to row pattern or row pattern by year interaction (Table 11). The highest neps values of 301 and 296/g for 2003 and 2004, respectively, described as medium (Uster, 2004), were not different from each other but higher than 2005 and 2006. The higher neps in 2003 is related to a late May planting followed by defoliation when only 5% of the crop was open. The higher neps value for 2004 is possibly related to a 4-week delay in harvest due to intermittent rainy weather.

Table 11. AFIS fiber properties as influenced by years, averaged over row patterns (2003-2006), Falkner, MS.

Year	AFIS Fiber Properties									
	Neps cnt/g	UQL (w)	SFC (w)(%)	SFC (n) [%]	Dust cnt/g	Trash cnt/g	Total Trash cnt/g	Trash Size (um)	VFM (%)	MAT Ratio
2003	301	1.16	7.79	27.01	233	70	303	394	1.41	0.90
2004	296	1.11	10.46	33.19	363	88	450	366	1.80	0.89
2005	197	1.13	9.35	31.03	239	77	316	399	1.40	0.91
2006	144	1.12	7.23	24.04	214	68	283	402	1.27	0.97
$LSD_{0.05}$	15	0.01	0.52	1.09	41	10	49	12	0.21	0.01

The upper quartile length by weight value of 1.16 for 2003 was higher than all other years with no differences between years 2004, 2005 and 2006. The SFC by both weight and numbers showed differences between each year with 2004 having the highest value of 10.46% SFC (w) and 33.19% SFC (n). These values are described as medium for the 10.46% SFC (w) and high for the 33.19 % SFC (n) (Uster, 2004). Dust counts of 363/g, trash count of 88/g, total trash counts of 450/g, and visible foreign matter (1.80) for 2004 were higher than all other years; and was related to the 4 week period of intermittent rainfall before harvest. The years 2003, 2005 and 2006 showed no difference in trash counts, dust counts, total trash counts, and visible foreign matter. Trash size values of 394, 399 and 402 for 2003, 2005 and 2006 were not different but higher than 2004. Maturity ratio values of 0.90 and 0.89 for 2003 and 2004 were not different. The 2006 maturity ratio value of 0.97 was the highest value and was different from all other years.

Clarksdale: Dust counts, trash counts, total trash count, short fiber content by weight and number and visible foreign matter showed no response differences for row patterns or years, and there was no year by row pattern interactions. Row pattern also had no effect on trash size and neps. However, there were differences between years for neps and trash size (data not shown). Neps of 266/g and trash size of 357 um were higher in 2004 than 2005, which had values of 136-neps/g and trash size of 338 um. There was a row pattern by year interaction effect for upper quartile length by weight and maturity ratio (Table 12). All row patterns in 2004 showed higher upper quartile length (UQL) values than 2005 except the 15-inch solid row showed no difference between 2004 and 2005. The upper quartile length values in 2004 ranged from 1.16 to 1.20. The 15-inch solid and 15-inch 2x1 skip row pattern showed no differences in upper quartile length values and were lower than the 15-inch 2x2 skip row, 30-inch 2x1 skip row, 60-inch solid row and 38-inch 2x1 skip row patterns.

Table 12. AFIS upper quartile length and maturity ratio as influenced by year and row pattern (2004-2005), Clarksdale, MS.

	Year			
	2004	2005	2004	2005
Row Pattern	UQL (w)		Maturity Ratio	
15-inch solid	1.16	1.15	0.92	0.92
15-inch 2X1 skip	1.17	1.13	0.92	0.92
15-inch 2X2 skip	1.19	1.14	0.93	0.94
30-inch solid	1.18	1.14	0.92	0.94
30-inch 2X1 skip	1.19	1.14	0.92	0.94
60-inch solid	1.19	1.15	0.91	0.94
38-inch solid	1.18	1.13	0.92	0.93
38-inch 2X1 skip	1.20	1.15	0.91	0.94
Within year $LSD_{0.05}$	0.01		0.02	
Across year $LSD_{0.05}$	0.02		0.02	

The upper quartile length values for 38-inch 2x1 skip row, 60-inch solid row, 30-inch 2x1 skip row and 15-inch 2x2 skip row patterns were not different. In 2005, the 15-inch solid, 60-inch solid and 38-inch 2x1 skip row patterns had

upper quartile length values of 1.15. These were higher than 15-inch 2x1 skip row and 38-inch solid row pattern but not different from other row patterns. Maturity ratio ranged from 0.91 to 0.94, and was in the high category as described by Uster (2004). The 38-inch 2x1 skip row was the only row pattern which showed maturity ratio differences between 2004 and 2005. All row patterns within both 2004 and 2005 showed no difference for maturity ratio.

Conclusions

Years (environments) had a greater impact on HVI and AFIS fiber properties and net loan values than row patterns which showed little or minor influences, especially on a market classification basis (USDA, 2001). Clarksdale had lower fiber (Rd) reflectance in 2005 than 2004 and higher (+b) yellowness values in 2005 than 2004. This was reflected in lower net loan value for 2004 than 2005. The fiber reflectance and yellowness value were reflective of the high rainfall prior to harvest from hurricane Rita. The 4 week delayed harvest at Falkner, due to intermittent rainfall in 2004, had a negative effect on most AFIS properties, Rd reflectance and yellowness, which resulted in lower net loan values.

Acknowledgement

The research was funded in part by Cotton Incorporated, Mississippi State Support Cotton Inc., and John Deere and Company. The authors also acknowledge Keith Morton Farms Incorporated, Ripley, MS and Heaton Farms, Clarksdale, MS in support of this research.

References

Anthony, W. S., W. D. Mayfield, and T. D. Valco. 2000. Results of 1999 Ginning Studies of Ultra Narrow Cotton. p. 476-478 Proceedings 2000 Beltwide Cotton Conference.

Anthony, W. S., W. D. Mayfield, and T. D. Valco. 1999. Results of 1998 Ginning Studies of Ultra Narrow Row Cotton. p. 1484-1488. Proceedings 1999 Beltwide Cotton Conference.

Atwell S. D. 1996. Influence of Ultra Narrow Row on Cotton Growth and Development. P.1187-89. Proceedings 1996 Beltwide Cotton Conference.

Brashears, A. P., I. W. Kirk, and E. B. Hudspeth, Jr. 1968. Effects of Row Spacing and Population on Double Row Cotton. Texas Agr. Exp. Station MP872.

Buehring, N. W., M. H. Willcutt, G. R. Nice, and R. R. Dobbs. 2001. UNR Cotton Response to Seeding Rates. p. 125-127. In 2000 North Mississippi Research and Extension Center Annual Report. Mississippi Agricultural and Forestry Experiment Station Information Bulletin 375.

Buehring, N. W., R.R. Dobbs, M. P. Harrison, S. R. Spurlock, M. H. Willcutt and E. P. Columbus. 2008. Whole Farm Returns for Spindle Picker Narrow Row Patterns in a Non-irrigated Environment: Final report. Proceedings 2008 Beltwide Cotton Conference.

Cathey, G. W. and W. R. Meredith. 1988. Cotton Responses to Planting Date and Mepriquat Chloride. Agron. J. 80: 463-466.

Dobbs, R. R., N. W. Buehring, M. P. Harrison and M. H. Willcutt 2008. Cotton Growth, Maturity and Yield as Influenced by Narrow Spindle Picker Row Patterns in a Non-irrigated Environment: Final Report. Proceedings 2008 Beltwide Cotton Conference.

Littell, R. C., G. A. Milliken, W. W. Stroup and R. D. Wolfinger 1996. SAS Systems for Mixed Models (software) SAS Institute Inc. Cary, N.C.

Mayfield, W. 1999. Overview of Ultra Narrow Row Cotton Situation From a Ginner's Perspective. p. 414-416. Proceedings 1999 Beltwide Cotton Conference.

Nichols. S. P., C. E. Snipes, and M. A. Jones. 2002. Evaluation of Varieties and Plant Population in Ultra Narrow Cotton in Mississippi. Proceedings 2002 Beltwide Cotton Conference. CD-ROM.

Parvin, D. W., J. W. Burkhalter, F. T. Cooke, and S. W. Martin. 2002. Three Years Experience with Skip-Row Cotton Production in Mississippi, 1999-2001. Proceedings 2002 Beltwide cotton Conference. CD-ROM.

Porter, P. M., M. J. Sullivan and L. Harvey. 1966. Cotton Cultivar Response to Planting Data on the Southeastern Coastal Plains. J. Prod. Agric. 9: 223-227

Shurley, D.W., M. J. Bader, C.W. Bednarz, S. M. Brown, G. Harris, and P. M. Roberts. 2002. Economic Assessment of Ultra Narrow Row Cotton Production in Georgia. Proceedings 2002 Beltwide Cotton Conference, CD-ROM.

Willcutt, M. H., E. Columbus, T. D. Valco, and P. Gerard. 2001. Cotton Lint Qualities as Affected by Harvester Type in 10 and 30-inch Production Systems. Proceedings 2001 Beltwide Cotton Conference.

United States Department of Agriculture, Agricultural Marketing Service. (Revised April 2001) "The Classification of Cotton", Agricultural Handbook 566. 24 pp.

Uster® AFIS PRO-What Does the Data Mean: Common Test Results in Upland Cotton. Uster. February 2004.