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AGRONOMY

Effects of a Short-term Corn Rotation on Cotton Dry Matter Partitioning, Lint Yield, and Fiber Quality Production

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ABSTRACT

Although cotton (*Gossypium hirsutum* L.) has traditionally been grown under a continuous monoculture production system in the Mississippi Delta, some cotton producers have begun rotating their land with corn (*Zea mays* L.) because of economic and agronomic factors. Because of the lack of knowledge regarding corn and cotton rotation systems in this region, the objectives of this research were to determine the effect on the growth and development, lint yield, yield components, and fiber quality of cotton grown following 1 or 2 yr of corn. The four rotation production systems were 1) continuous cotton, 2) continuous corn, 3) corn-cotton-corn-cotton, 4) cotton-corn-corn-cotton. The study was conducted during the 2000 through 2003 growing seasons at Stoneville, MS, using four cotton cultivars (PayMaster 1218BR, Phytogen PSC 952, Stoneville 4691B, and SureGrow 747). Cotton was grown in the final year (2003) for all the rotation systems that had cotton as a component. Cotton was 10% taller when grown after 1 yr of corn and 13% taller after 2 yr of corn. Specific leaf weights (SLW) were 7% to 8% lower for cotton grown following corn than for continuously grown cotton. Cotton grown following 2 yr of corn yielded 13% more lint than the continuously grown cotton primarily because of the production of 13% more bolls per unit ground area. None of the other cotton yield components were different among the rotation systems. Micronaire from continuously grown cotton fiber was 1% and 3% greater than the fiber produced by cotton following 1 or 2 yr of corn, respectively. This minimal yield increase would probably not be sufficient to justify a change in cotton production systems; however, other economic factors or pest problems (disease, insects, weeds, or nematodes) might be important enough to justify a switch to this rotation.

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Cotton (*Gossypium hirsutum* L.) production has served as an economic backbone to many generations of families in lower Mississippi river alluvial flood plain (Mississippi Delta). As a consequence, many fields have remained in a continuous cotton monoculture for 30 to 40 years. Local infrastructure investments and regulations regarding participation in the various versions of the U.S. government cotton commodity support program provided little incentive for these cotton producers to pursue alternative cropping systems. This situation began to change during the mid-1990s for a variety of reasons. Passage of the 1995 US Farm Bill, commonly referred to as the Freedom to Farm Act, allowed cotton producers to grow alternative crops in response to favorable market conditions while maintaining the option to participate in the U.S. cotton program. This U.S. farm policy change coincided with a stagnation of cotton lint yields in the Mid-south during the mid- to late 1990s, presumably because a priority of the cotton breeding programs during that period was to release cultivars produced by backcrossing value-added transgenic traits into existing cultivars (Meredith, 2002). Also during this time, reniform nematodes (*Rotylenchulus reniformis* Linford & Oliveira) became a more a serious economic pathogen for cotton production in the Mississippi Delta (Koenning et al., 2004).

With the convergence of these phenomena, some Mississippi Delta cotton producers elected to temporarily rotate some of their cotton land to other crops to achieve possible yield boosts from rotations that were not being achieved by growing newer cotton cultivars or to reduce existing nematode populations by breaking the nematode reproduction cycle. Because corn (*Zea mays* L.) is a poor host plant for reniform nematode reproduction (Windham and Lawrence, 1992), it was often the alternative crop of choice. Uncertainty remained, however, regarding the nature of a cotton yield response and the minimum number of years corn should be grown to optimize the yield response because of the long tradition of maintaining a cotton monoculture on these soils.

Although only a few local rotation studies have been conducted recently (Boquet et al., 2005; Ebelhar et al., 2005), numerous cotton rotation studies have been conducted across the U.S. Cotton Belt over the years. One of the oldest rotation studies is the 'Old Rotation' cotton experiment in Alabama (Mitchell and Entry, 1998). A number of alternative crops, which are influenced by local customs and traditions of the region, can be grown in rotation with cotton. For example, in the southeastern USA, peanut (*Arachis hypogaea* L.) is often the alternative crop used in rotation with cotton (Johnson et al., 2001; Wright et al., 2005). In the mid-southern USA, corn and grain sorghum [*Sorghum bicolor* (L.) Moench.] are the primary rotational choices (Wesley et al., 2001; Boquet et al., 2005; Ebelhar et al., 2005). Grain sorghum is commonly grown in rotation with cotton in the semi-arid Texas Southern High Plains (Bordovsky et al., 1994; Booker et al., 2004). Although they were not consistent across all these studies, cotton yields were generally improved when grown following an alternative crop. The improvements in cotton yield from rotations were often attributed to either disease, insect, or nematode suppression. Few studies identified differences in cotton growth parameters that could be attributed to a rotational effect. Wright et al. (2005) documented that cotton grown after bahiagrass (*Paspalum notatum* Flüggé) had greater plant heights, plant biomass, and leaf area index (LAI) than continuously grown cotton.

With so many cotton producers considering growing alternative crops in their quest for profits, the uncertainty concerning benefits for any subsequent cotton crops can make for economically uninformed decisions. The objectives of this research were to determine the effect of growing corn for one or two years prior to growing cotton on the growth and development, lint yield and yield components, and fiber quality of the subsequent cotton crop.

MATERIALS AND METHODS

A four year corn-cotton rotation study was conducted from 2000 through 2003 near Stoneville, MS. This field study was conducted on a Beulah fine sandy loam (coarse-loamy, mixed, active, thermic Typic Dystrudept) soil that had been cropped to cotton for several years prior to the initiation of the experiment. The experimental design was a randomized block with a split-plot arrangement of treatments and eight replications. Main plots were comprised of four corn-cotton rotation production systems. Subplots were either four cotton cultivars or four corn hybrids depending on the rotation system and year. The four rotation systems were as follows: 1) continuous cotton 2) continuous corn 3) corn-cotton-corn-cotton, and 4) cotton-corn-corn-cotton. These rotation systems were initiated and timed so that cotton was grown in the final year for all the rotation systems that had cotton as a component. This strategy allowed for the testing of the various rotation system effects on cotton production under similar environmental conditions. Corn hybrids used in this study were Garst/AgriPro 9701 (Garst Seed Co.; Slater, IA), Pioneer 3223 (Pioneer Hi-Bred Int., Johnston, IA), Funk's 4653 (Tri-State Delta Chemical; Memphis, TN), and NK brand N79-L3Bt (Syngenta Seeds Inc.; Minneapolis, MN). Cotton cultivars used in this study were PayMaster 1218BR (Delta and Pine Land Co.; Scott, MS), Phytogen PSC 952 Dow AgroSciences; Indianapolis, IN), Stoneville 4691B (Stoneville Pedigreed Seed Co.; Memphis, TN) and SureGrow 747 (Delta and Pine Land Co.). Main plots were randomly assigned the first year of the study and then remained in place throughout the duration of the study. Subplots were randomly assigned within a particular main plot and were re-randomized each year of the study.

Subplots consisted of 6 rows each 7.6 m in length and spaced 1 m apart. Each year, the experimental area received a pre-plant application of 112 kg ha^{-1} N. An additional 112 kg ha^{-1} N was also side-dressed to all the corn plots at approximately the 5th or 6th leaf stage. Pendimethalin (Prowl 3.3 EC; BASP Corp.; Research Triangle Park, NC) was applied preplant incorporated at 0.532 kg a.i. ha^{-1} and metolachlor (Dual; Syngenta Crop Protection, Greensboro, NC) was applied pre-emergence at 1.067 kg a.i. ha^{-1} to the experimental area each year to aid in weed control. Additional manual weed removal was employed to handle most weed escapes. All plots were planted 19 Apr. 2000, 10 Apr. 2001, 15 Apr. 2002, and 14 Apr. 2003. Corn plots were seeded at a density of 60 500 plants ha^{-1}. Cotton plots were initially over-seeded and then hand thinned to a final population density of 65 000 plants ha^{-1}. The area was furrow irrigated as needed to minimize moisture stress. Insects were controlled as needed using standard extension recommendations for Mississippi. At the end of each growing season, the entire experimental area was disk-harrowed and sub-soiled during the fall.

Soil samples were randomly collected from the top 30 cm of soil in all the rotation system main plots after the plots had been planted during 2001 through 2003. Soil analyses were performed by Pettiet Soil Testing and Plant Analysis Lab., Leland, MS. The samples were extracted using the Mehlich 3 soil extract methodology (Mehlich, 1984), and elements were determined using an inducely coupled argon plasma emission spectrophotometer. Organic matter content was determined based on loss-on-ignition (Schuite et al., 1991).

Dry matter harvests were taken each year on the cotton subplots when these plots had approximately reached cut-out (a growth stage during which vegetative growth slows or stops because of heavy competition for assimilates from reproductive growth). These harvests occurred 110 through 113 d after planting (DAP) in 2000, 118 through 120 DAP in 2001, 112 through 114 DAP in 2002, and 105 through 108 DAP in 2003. During each harvest, the above ground portions of all plants within a 0.3-m section of one of the inner rows of each plot, previously designated for dry matter harvests, were harvested and separated into leaves, stems and petioles, squares, and blooms and bolls. Leaf area was determined by passing the leaves through a LI-3100 leaf area meter (LI-COR; Lincoln, NE). Main stem nodes were counted and the plant heights were recorded. Samples of the component parts were dried for at least 48 h at 60 °C, and dry weights were recorded. Harvest index was calculated as follows: reproductive dry weight (squares, blooms, and bolls) / total above ground dry weight.

Yield was determined by hand-harvesting the center 4.6-m section from one of the inner rows in each subplot previously designated for this purpose in lint yield determination. Three sequential hand harvests were made in 2000 and 2001, and four harvests were made in 2002 and 2003. The number of bolls harvested per subplot was counted on each harvest date. Boll mass was determined by dividing the total seed cotton harvested per subplot by the total number of bolls harvested per subplot. Seed cotton from each harvest was combined and ginned to determine lint yield and lint percentage. Average seed mass was determined from 100 nondelinted seeds per subplot. Samples of lint from each subplot were sent to Starlab (Knoxville, TN) for fiber quality analyses. Fiber strength was determined with a stelometer. Span lengths were measured with a digital fibrograph. Fiber maturity, wall thickness, and perimeter were calculated from arealometer measurements.

Statistical analyses of the cotton data were performed by analysis of variance (PROC MIXED; SAS Institute; Cary, NC). Because the rotation aspect of the rotation production system main plots meant that the crop grown in these main plots could change from year to year, years were analyzed separately. Rotation production system means were averaged across cultivars when statistically important interactions were not detected. Means were separated using a protected LSD ($P = 0.05$).

RESULTS AND DISCUSSION

Variable weather conditions among the years presented four distinct environments for growing cotton during the experiment (Table 1). In 2000, April and May were comparatively wet before the weather turned hot and dry in July and August. Excessive rainfall in August of 2001 caused cotton seed to germinate in unpicked open bolls. The years 2002 and 2003 were relatively similar to each other in terms of weather and might be considered more typical for this area (Boykin et al., 1995)

Soil analyses revealed few differences among the crop rotation production system main plots across the years (Table 2). The exception was the soil P concentration, which was substantially lower when corn was grown the prior year or years rather than cotton. This finding is not surprising considering that corn has been documented to remove more P from the soil than cotton (Heckman et al., 2003; Pettigrew and Meredith, 1997). The lack of differences in soil organic matter levels among the rotation main plots is somewhat surprising considering corn is perceived to produce more biomass than cotton. In addition, Mitchell and Entry (1998) had documented improved soil organic matter content from rotating corn and cotton compared with continuously grown cotton in the Alabama 'Old Rotation' cotton experiment. High decomposition of winter organic matter because of the relatively mild winter temperatures in this environment in combination with fall tillage may have eliminated any differences in contribution to residual biomass from the different cropping systems.

Table 1. Monthly weather data for 2000 to 2003 observed by NOAA, Mid-south Agricultural Weather Service and the Delta Research and Extension Center Weather at Stoneville, MS

Month	2000	2001	2002	2003
		Precipitation (cm)		
April	28.2	10.1	8.3	9.6
May	17.6	12.9	7.2	6.5
June	15.6	7.0	10.5	18.5
July	1.6	8.0	8.4	6.2
August	0.0	21.5	7.0	3.9
September	6.6	7.7	19.6	12.5
October	1.5	10.0	17.9	10.1
		Thermal units[z]		
April	65	145	135	114
May	269	251	214	245
June	333	310	319	288
July	401	395	397	375
August	432	366	378	392
September	266	235	309	248
October	147	77	116	127
		Solar radiation (MJ m^{-2})		
April	513	420	437	474
May	598	559	506	482
June	619	549	523	656
July	733	546	581	692
August	690	462	522	641
September	492	399	378	598
October	460	381	253	476

[z] Thermal units calculated as follows: [(maximum temperature + minimum temperature)/2] - 15.5 °C.

There was no significant interactions between cotton cultivars and crop rotation production systems for any of the dry matter partitioning, yield, yield component, or fiber quality data collected, so rotation system main plot means were averaged across cultivars. Data are only presented for the years 2001 and 2003, because they were the only years when a comparison among the various rotation systems for cotton growth and development, yield, yield components, and fiber quality was possible.

The most consistent plant trait of cotton affected by various rotation systems at cut-out was plant height (Tables 3 and 4). Cotton grown following 1 yr of corn was 7% taller in 2001 and 10% taller in 2003 than the monoculture continuously grown cotton. In 2003, cotton grown after 2 yr of corn was also 13% taller than the continuously grown cotton but was not significantly taller than the cotton grown after 1 yr of corn. Although these height differences are statistically significant, they were not greater than 16 cm and were not visually evident when walking through the field. Because the number of main stem nodes produced per plant was never affected by the various rotation systems, the effect of rotation system on the height to node ratio closely mimicked the plant height response. Although no significant differences were detected in specific leaf weights (SLW) between the rotation systems in 2001, cotton grown following 1 or 2 yr of corn produced 8% and 7% lower SLW, respectively, than the continuous monoculture cotton in 2003 (Table 4). In contrast to the increased LAI reported by Wright et al. (2005) for cotton grown after bahiagrass, no differences in cotton LAI among the various rotation production systems were observed. None of the other plant growth or dry matter partitioning traits was different among the rotation system main plots for any year.

Lint yield was not different among the rotation production systems in either 2001 or 2003 (Tables 5 and 6). In 2003, the differences among rotation systems were significant at $P = 0.06$. At this level of significance, cotton grown after 2 yr of corn produced 13% more yield than the continuous cotton monoculture. Similarly, the number of bolls produced per unit of ground area was not different among the rotation systems in either 2001 or 2003, but the 13% greater number of bolls produced when cotton was grown after 2 yr of corn would be significantly different at the $P = 0.07$ level in 2003. None of the other yield components were different among the rotation systems, so they did not contribute to our understanding of the differences in lint yield. Because 16% less of the total yield was harvestable during the first picking when the cotton was grown after 2 yr of corn compared with continuous cotton, the increased lint yield resulting from growing cotton after corn presumably comes from either more upper canopy bolls or bolls at more distal positions on the sympodial branches that are later maturing. Achieving this increased yield for cotton grown after 2 yr of corn would delay harvest and could be an issue if the weather turned unfavorable.

Differences in fiber quality traits were detected among the rotation production systems (Tables 7 and 8). Fiber strength was inconsistently affected by the rotation systems. In 2001, the fiber from cotton grown after a year of corn was 2% stronger than the fiber from the continuously grown monoculture cotton. In 2003, no differences in fiber strength were detected. Fiber micronaire was consistently reduced when cotton was grown after 1 or 2 yr of corn. In 2001, fiber micronaire was 1% lower from cotton grown after corn compared with fiber from continuously grown cotton. Cotton grown after 1 or 2 yr of corn produced fiber micronaire that was 1% and 3% lower, respectively, than micronaire of the continuously grown cotton in 2003. Although fiber maturity and perimeter (components of micronaire) were not different among rotations in 2001, the perimeter of fiber from cotton grown after 1 yr of corn was 2% larger than fiber from cotton grown after 2 yr of corn in 2003. This fiber perimeter difference did not provide any insight into the fiber micronaire differences observed in 2003. None of the fiber quality differences associated with the various rotation production systems were sufficient to result in price discounts according to the USDA loan schedule.

Table 2. Soil nutrient analyses as affected by various crop rotation and production systems in the years 2001 through 2003

Year	Crop rotation	pH	Organic matter ($g\ kg^{-1}$)	P	K	Mg	Ca	S	Z	B	CEC[z] ($cmol\ kg^{1}$)
				($mg\ kg^{-1}$)							
2001	Continuous Corn	6.6	6.1	22.3	198.4	263.3	1466.9	80.4	2.2	0.59	10.0
	Continuous Cotton	6.5	6.6	23.8	195.8	273.5	1531.6	82.8	2.2	0.63	10.4
	Corn-Cotton-Corn-Cotton	6.5	6.9	24.3	200.8	264.0	1468.0	84.0	2.8	0.64	10.1
	Cotton-Corn-Corn-Cotton	6.6	6.5	23.1	184.6	265.4	1491.4	82.3	2.1	0.58	10.1
	LSD (P = 0.05)	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
	$P > F$	0.99	0.50	0.17	0.22	0.70	0.45	0.49	0.26	0.20	0.54
2002	Continuous Corn	6.6	6.1	18.5	164.4	247.9	1339.6	80.4	2.1	0.44	9.2
	Continuous Cotton	6.5	6.1	23.6	192.6	251.5	1346.1	80.4	2.2	0.44	9.3
	Corn-Cotton-Corn-Cotton	6.6	6.9	21.3	174.1	236.3	1254.6	84.1	2.2	0.48	8.7
	Cotton-Corn-Corn-Cotton	6.5	6.3	20.3	172.5	239.0	1300.5	81.0	2.2	0.48	9.0
	LSD (P = 0.05)	ns	ns	3.2	ns	ns	ns	ns	ns	ns	ns
	$P > F$	0.91	0.29	0.03	0.14	0.28	0.46	0.29	0.57	0.22	0.35
2003	Continuous Corn	6.4	6.8	15.5	189.1	269.3	1547.6	83.5	2.0	-	10.5
	Continuous Cotton	6.3	6.1	21.1	221.8	250.5	1421.6	80.6	1.9	-	9.8
	Corn-Cotton-Corn-Cotton	6.3	6.6	19.3	224.9	248.8	1377.0	82.5	2.0	-	9.5
	Cotton-Corn-Corn-Cotton	6.3	6.8	16.8	199.9	258.1	1473.8	83.3	2.0	-	10.0
	LSD (P = 0.05)	ns	ns	2.3	ns	ns	ns	ns	ns	-	ns
	$P > F$	0.23	0.49	0.01	0.15	0.29	0.18	0.63	0.93	-	0.23

[z] Cation exchange capacity.

Table 3. Cotton dry matter partitioning at the late bloom (cut-out) growth stage as affected by different crop rotation production systems in 2001

Crop rotation[y]	Height (cm)	Main stem nodes(nodes $plant^{-1}$)	Ht:node ratio ($cm\ node^{-1}$)	Leaf area index	Specific leaf wgt. ($g\ m^{-2}$)	Total weight ($g\ m^{-2}$)	Reproductive weight ($g\ m^{-2}$)	Harvest index[z]
Continuous Cotton	114	21.6	5.31	3.73	45.7	801	333	0.41
Corn-Cotton-Corn-Cotton	122	21.2	5.76	3.76	44.6	872	368	0.42
LSD (P = 0.05)	6	ns	0.26	ns	ns	ns	ns	ns
$P > F$	0.03	0.20	0.01	0.93	0.28	0.17	0.13	0.61

[y] Crop rotation means were averaged across four cotton cultivars.

[z] Harvest index = reproductive dry weight / total dry weight.

If a level of significance of $P = 0.06$ is accepted as being biologically relevant, then the conclusion that cotton lint yield production could be improved by growing corn for 2 yr prior to growing cotton is acceptable (Table 6). This yield improvement is apparently associated with the production of more bolls compared with the continuously grown cotton. These yield results were similar to those reported by Boquet et al. (2004) and Ebelhar et al. (2005) for cotton grown in rotation with corn in the Mid-south. Unfortunately, none of the plant growth or soil fertility traits monitored offered much insight into why cotton grown after a corn rotation produces more bolls. Although cotton grown following corn was consistently taller than continuously grown cotton (Tables 3 and 4), this height differential was relatively small, and increased cotton height does not consistently correlate with increase yield production. This fact has helped promote the almost ubiquitous use of the growth regulators mepiquat choride and mepiquat pentaborate to control excessive plant height and vegetative growth in cotton across the U.S. Cotton Belt (Pettigrew and Johnson, 2005). When Wright et al. (2005) observed increased cotton yields after growing cotton following bahiagrass, they were able to relate that yield increase to a corresponding increase in the cotton LAI (photosynthetic source material) compared with that of continuous monoculture cotton. Differences in LAI were not

Table 4. Cotton dry matter partitioning at the late bloom (cut-out) growth stage as affected by different crop rotation production systems in 2003

Crop rotation[y]	Height (cm)	Main stem nodes (nodes plant^{-1})	Ht:node ratio (cm node^{-1})	Leaf area index	Specific leaf wgt. (g m^{-2})	Total weight (g m^{-2})	Reproductive weight (g m^{-2})	Harvest index[z]
Continuous Cotton	104	20.1	5.19	3.54	45.5	733	346	0.47
Corn-Cotton-Corn-Cotton	116	20.0	5.77	3.79	41.9	798	365	0.45
Cotton-Corn-Corn-Cotton	120	20.3	5.92	3.87	42.1	836	371	0.44
LSD (P = 0.05)	6	ns	0.18	ns	2.1	ns	ns	ns
$P > F$	0.01	0.76	0.01	0.69	0.01	0.44	0.81	0.10

[y] Crop rotation means were averaged across four cotton cultivars.

[z] Harvest index = reproductive dry weight / total dry weight.

Table 5. Cotton lint yield and yield components as affected by different crop rotation production systems in 2001

Crop rotation[y]	Lint yield (kg ha^{-1})	First harvest (%)	Boll number (bolls m^{-2})	Lint percentage (%)	Boll mass (g)	Seed mass (mg)	Seed number (seed boll^{-1})	Lint index (mg seed^{-1})
Continuous Cotton	1036	46.1	54	41.5	4.70	100	26.7	71.2
Corn-Cotton-Corn-Cotton	1068	43.4	55	41.7	4.75	100	26.8	71.8
LSD (P = 0.05)	ns	ns	ns	ns	ns	ns	ns	ns
$P > F$	0.35	0.39	0.39	0.51	0.67	0.92	0.86	0.38

[y] Crop rotation means were averaged across four cotton cultivars.

Table 6. Cotton lint yield and yield components as affected by different crop rotation production systems in 2003

Crop rotation[y]	Lint yield (kg ha^{-1})	First harvest (%)	Boll number (bolls m^{-2})	Lint percentage (%)	Boll mass (g)	Seed mass (mg)	Seed number (seed boll^{-1})	Lint index (mg seed^{-1})
Continuous Cotton	1266	50.8	60	41.6	5.11	106	28.1	75.3
Corn-Cotton-Corn-Cotton	1353	46.0	64	41.4	5.12	107	28.1	75.3
Cotton-Corn-Corn-Cotton	1460	42.5	69	41.7	5.11	105	28.1	75.4
LSD (P = 0.05)	ns	5.3	ns	ns	ns	ns	ns	ns
$P > F$	0.06	0.02	0.07	0.30	0.97	0.42	0.99	0.99

[y] Crop rotation means were averaged across four cotton cultivars.

detected among the rotation systems in this study. The reduced soil P concentrations caused by growing corn on the land compared with growing cotton (Table 2) cannot explain the increased lint yields in cotton grown after corn.

When cotton was grown after corn, the fiber micronaire was consistently reduced compared with monocultured cotton (Tables 7 and 8). Unlike the yield performance, the plant traits measured under the different rotation systems may offer some insight as to why the reduced micronaire occurred with a corn rotation. We speculate that different source-to-sink ratios developed among the rotation systems because of the lack of any rotation system differences in leaf area index (photosynthetic source) (Tables 3 and 4) combined with increased boll production (reproductive sink) (Tables 5 and 6) when cotton was grown after corn. Assuming a similar level of photosynthetic assimilate production among the rotation systems, the increased number of reproductive sinks (bolls) for the cotton grown after corn meant that less total assimilate would be available for any individual boll during the period of fiber secondary cell wall deposition and would lead to reduced fiber micronaire. Similar reductions in micronaire have been reported in cotton when photosynthetic assimilate supply was reduced relative to the reproductive sink size (Pettigrew, 1995; Pettigrew, 2001).

In conclusion, cotton grown following 1 or 2 yr of corn production was consistently taller than plants from a continuously grown cotton monoculture, but 2 yr of a corn rotation was necessary to produce minimal lint yield increases in a subsequent cotton crop. The fiber produced from growing cotton after corn also had a slightly lower micronaire. These yield increases were minimal and may not be sufficient to justify a change in cotton production systems; however, other economic factors or pest problems might be large enough for a producer to justify the corn/cotton rotation.

DISCLAIMER

Trade names are necessary to report factually on available data; however, the USDA neither guarantees nor warrants the standard of the product or service, and the use of the name by USDA implies no approval of the product or service to the exclusion of others that may also be suitable.

Table 7. Cotton fiber quality traits as affected by different crop rotation production systems in 2001

Crop rotation[y]	Fiber elongation (%)	Fiber strength (kN m kg^{-1})	Span length (cm)		Uniformity (%)[z]	Micronaire	Fiber maturity (%)	Fiber perimeter (µm)
			2.5%	50%				
Continuous Cotton	6.6	186	2.79	1.37	49.0	4.64	87.2	49.5
Corn-Cotton-Corn-Cotton	6.7	183	2.79	1.37	49.0	4.59	85.9	50.0
LSD (*P* = 0.05)	ns	3	ns	ns	ns	0.03	ns	ns
P > *F*	0.27	0.02	0.82	0.97	0.85	0.01	0.25	0.42

[y] Crop rotation means were averaged across four cotton cultivars.

[z] Length uniformity = (50% span length / 2.5% span length) * 100.

Table 8. Cotton fiber quality traits as affected by different crop rotation production systems in 2003

Crop rotation[y]	Fiber elongation (%)	Fiber strength (kN m kg^{-1})	Span length (cm)		Uniformity (%)[z]	Micronaire	Fiber maturity (%)	Fiber perimeter (µm)
			2.5%	50%				
Continuous Cotton	7.5	198	2.87	1.47	51.4	4.90	82.8	53.6
Corn-Cotton-Corn-Cotton	7.4	197	2.84	1.45	51.1	4.84	81.3	54.4
Cotton-Corn-Corn-Cotton	7.4	198	2.87	1.47	51.3	4.75	82.1	53.3
LSD (*P* = 0.05)	ns	ns	ns	ns	ns	0.10	ns	0.8
P > *F*	0.81	0.77	0.13	0.16	0.70	0.02	0.13	0.03

[y] Crop rotation means were averaged across four cotton cultivars.

[z] Length uniformity = (50% span length / 2.5% span length) * 100.

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