FINAL

Upland Cotton: An Economic Assessment of Providing Cost of Production Insurance

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Introduction

Cotton is a dual use crop, making contributions to both the food and fiber industries. The lint is used in the textile industry and the cottonseed is crushed to make vegetable oil, with the seed by-products used in feed for livestock and poultry. Over 12 million acres of cotton are harvested most years. This equates to production of around 17 million bales of cotton on an annual basis. Economically, the cotton crop is one of the top agricultural contributors to the U.S. economy. On the farm alone, cotton production involves more than $5 billion worth of goods and services purchased to include seed, fertilizers, agricultural chemicals, equipment, fuel, and farm labor. Altogether, the National Cotton Council estimates that the cotton crop generates about $120 billion in business revenue on an annual basis. Cotton is also one of the largest export crops both in finished goods and raw fiber. Over $2 billion worth of raw fiber cotton is sold on an annual basis. Over 3.5 million bale equivalents are exported in the form of finished goods, mainly in the form of manufactured textile products. Over the past 10 years, the U.S. supplied, on average, approximately 6.8 million bales of the world's cotton exports, accounting for about 30% of the total world export market.

Cotton is one of the most versatile agricultural products as evidenced by its many uses and almost 100% consumption, including the seed. The contribution to the U.S. economy is massive, and is expected to grow in the decades to come. Over the past few years, cotton prices have decreased. Although the lowest prices previously seen were in 1999, cotton prices are currently rivaling that low. Both domestic consumption of textile products and exports have decreased. With a strong dollar, U.S. products are more expensive to purchase. Adverse weather conditions across the Cotton Belt lowered the quality and value of the cotton produced. Texas and other states suffered several years of drought that had previously not been seen in decades.

There are two different types of cotton grown in the United States: Upland and Extra Long Staple (ELS). Upland cotton is produced in every cotton-growing state and accounts for the vast majority of cotton grown in the United States. Upland cotton is harvested on about 12 million acres across the U.S. There are several types of Upland cotton including Acala, American Upland, and California Upland, as well as over fifty different seed varieties, most of which are named after the respective cottonseed company. These varieties are planted across the southern United States and may be irrigated or non-irrigated. Although all varieties have similar insect and disease resistance characteristics, they may be managed differently according to locale and irrigation practice. Of the two types of cotton, Upland is the coarser, shorter staple (fiber length), more "grainy" cotton and is normally lower priced.

Acala is a type of Upland cotton grown in the western states, predominantly California. Acala's longer, stronger fibers are of a slightly higher quality than other Upland cotton and receive a slightly higher price. Until a couple of years ago, California producers were not permitted to grow traditional Upland cotton and therefore, could only grow ELS or Acala cotton.

As mentioned above, ELS cotton is the second type of cotton. ELS cotton gets its name from its extra long and fine fiber. It is also often referred to as Pima cotton. ELS cotton typically earns at least 25 cents more per pound than Upland cotton. This type of cotton is only grown in a handful of states on about 280,000 acres.

This document will discuss all pertinent aspects of providing Cost of Production Insurance to Upland cotton producers in the recommended pilot areas. It includes an in-depth economic analysis of cotton acreages and values, the industry, common methods of production, production perils, structural characteristics of cotton farms, the estimated impact of the program on producers, and the economic importance of cotton over the next five years.

Pilot Counties

Although there are numerous cotton producing areas in the United States, only a percentage of these have been proposed as pilots for the Cost of Production Insurance program. Table 1 lists the counties selected for the cotton pilot program and Figure 1 displays the location of the pilot areas within the United States.

Table 1: Cotton Pilot Counties

State	County
Alabama	Autauga
	Dallas
	Elmore
	Lawrence
	Limestone
	Madison
Arizona	Maricopa
	Pinal
California	Fresno
	Kern
	Kings
	Madera
	Merced
	Tulare
Georgia	Colquitt
	Mitchell
	Worth
Louisiana	Concordia
	East Carroll
	Franklin
	Tensas
Mississippi	Coahoma
	Leflore
	Yazoo
North Carolina	Halifax
	Martin
	Northampton
Texas	Bailey
	Brazos
	Burleson
	Cameron
	Castro
	Cochran
	Fisher
	Hale
	Haskell
	Hidalgo
	Hockley
	Jones
	Knox
	Lamb
	Lubbock
	Milam
	Mitchell
	Nueces
	Parmer
	Robertson
	San Patricio
	Scurry
	Swisher
	Willacy
	Williamson

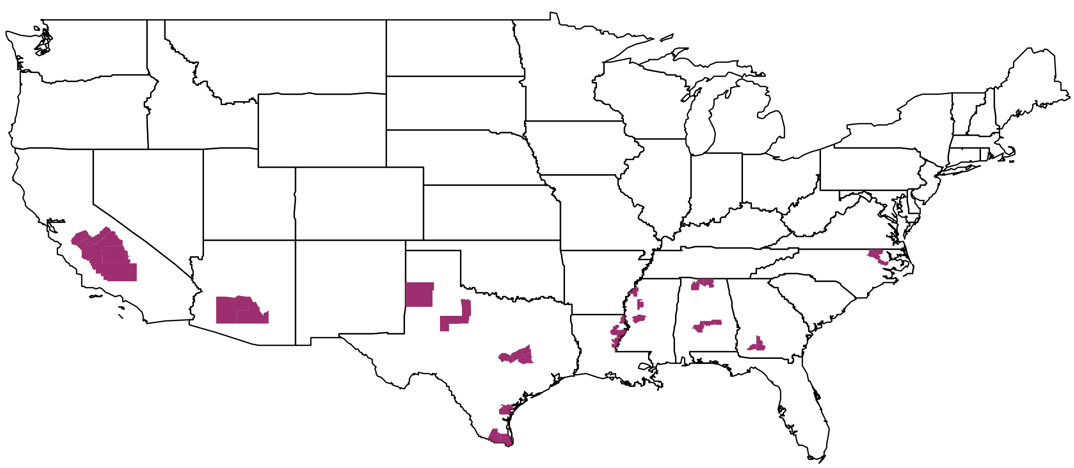


Figure 1. Cotton pilot counties.

Multiple factors were considered when selecting these pilot areas.

- Percent acreage in pilot area relative to total US acreage: Acreage represented a major element considered. We did not want the included acreage to grow too large as to become unmanageable in the pilot stage, yet we wanted the regions selected to be representative of the commodity production throughout all producing regions

- Proximity to other pilot counties: Once a particular area or region was selected, neighboring or nearby counties were often included as well. This would allow regional listening sessions to be held as well as provide insurance agents with a potential larger customer base for the COP product.
- Proximity to other pilot crops: In some instances, where similarity in production practices exist, counties for one commodity were selected based on counties for another commodity (i.e., Corn/Soybean). This also provides insurance agents in the pilot regions with a potentially larger customer base.
- Degree of grower interest: After holding listening session throughout the production areas, the degree of grower interest also influenced pilot selection.
- Loss history: While regions with demonstrated loss histories were targeted for inclusion in the pilot regions, regions with minimal loss history were considered as well to enhance the diversity of the production regions included in the pilot.
- Inclusion of underserved areas: Throughout the pilot selection, regions with little or no crop insurance programs were considered
- Representation of agriculture diversity: In the selection of pilot regions, the inclusion of as many regions as possible would give a better picture of how the COP insurance program will operate nationwide.

Often, these factors were in conflict with each other, in which case subjective analysis taking in the characteristics and needs of the individual commodity was required to arrive at the final pilot areas. While information in this report is representative of the entire domestic cotton industry, the remainder of this report will specifically address those issues pertinent to the selected pilot areas.

Economic Significance

Seventeen states in the United States report cotton production to the National Agricultural Statistics Service (NASS.) Cotton was one of the five most valuable commodities in nine states and was among the top five crops -in terms of cropland acres in fifteen of the seventeen states. Cotton is a major commodity in the South.

All counties, states, and regions referred to throughout the rest of this document are the recommended pilot areas for the Cotton Cost of Production Pilot Program.

Cropland Acres

Table 2 presents the percentage of pilot county cropland acres that are dedicated to cotton production. For many areas, cotton farming represents a significant portion of crop production. The data in Table 1 was obtained from the 1997 Census of Agriculture as the Census provided more information regarding total cropland acres. Table 2 lists 1999 cotton acreage for the pilot counties, which was the most recent data that we could collect from NASS.

Table 2: Percent of Acreage in Cotton

County	Total Crop Acres	% Cotton	County	Total Crop Acres	% Cotton
Northern Alabama			**North Carolina**		
Lawrence	71,093	34.8	Halifax	104,435	54.5
Limestone	90,163	24.4	Martin	74,588	49.8
Madison	88,621	6.2	Northampton	94,286	58.3
Total	249,877	20.9	Total	273,309	54.5
Southern Alabama			**Texas Brazos Valley**		
Autauga	26,702	37.3	Brazos	104,318	5.7
Dallas	44,832	32.7	Burleson	57,174	26.9
Elmore	34,685	55.9	Milam	133,998	10.7
Total	106,219	41.4	Robertson	72,041	16.8
Arizona			Williamson	196,545	16.9
Maricopa*	296,150	38.1	Total	564,076	14.4
Pinal*	226,588	52.4	**Texas Coastal Bend**		
Total	522,738	44.3	Nueces	323,287	31.1
California			San Patricio	244,824	33.4
Fresno*	1,157,357	30.1	Total	568,111	32.1
Kern*	893,221	29.7	**Texas Plains**		
Kings*	445,537	44	Bailey	165,550	44.5
Madera*	294,706	12.5	Castro	409,173	14.3
Merced*	434,074	17.2	Cochran	181,629	64.2
Tulare*	639,578	12.7	Hale	372,956	55.7
Total	3,864,473	25.9	Hockley	294,552	75.2
Georgia			Lamb	293,937	59.8
Colquitt	111,343	62.6	Lubbock	333,727	83.7
Mitchell	114,609	51	Parmer	309,629	19.8
Worth	107,704	53	Swisher	201,823	27.3
Total	333,656	55.5	Total	2,562,976	48.7
Louisiana			**Texas Rolling Plains**		
			Fisher	575,095	11.6
Concordia	207,952	20.9	Haskell	199,497	42.7
East Carroll	175,093	25.1	Jones	164,420	45.9
Franklin	188,414	46.4	Knox	135,696	18.6
			Mitchell	541,253	11.1
			Scurry	478,576	12.6
Tensas	184,122	45.1	Total	2,094,537	23.8
Total	755,581	34.1	**South Texas**		
Mississippi			Hidalgo	344,665	18
Coahoma	244,620	33	Cameron	190,935	27.2
Leflore	215,952	32.3	Willacy	210,535	40.9
Yazoo	174,241	37	Total	746,135	26.8
Total	634,813	33.9			

(1997 Census of Agriculture.)

*Includes ELS acreage because the Census does not separate acreage out by type of cotton.

Table 3: Acres of Upland Cotton Harvested in 1999, by County

County	Upland Acres	County	Upland Acres
Northern Alabama		**North Carolina**	
Lawrence	40,100	Halifax	51,000
Limestone	69,200	Martin	42,400
Madison	44,400	Northampton	57,500
Total	153,700	Total	150,900
Southern Alabama		**Texas Brazos Valley**	
Autauga	11,200	Brazos	6,000
Dallas	14,000	Burleson	12,700
Elmore	13,000	Milam	10,300
Total	38,200	Robertson	16,000
Arizona		Williamson	28,900
Maricopa	83,700	Total	73,900
Pinal	106,300	**Texas Coastal Bend**	
Total	190,000	Nueces	109,100
California		San Patricio	103,900
Fresno	185,000	Total	213,000
Kern	137,000	**Texas Plains**	
Kings	112,000	Bailey	71,900
Madera	26,000	Castro	59,700
Merced	61,000	Cochran	104,900
Tulare	55,000	Hale	261,600
Total	576,000	Hockley	166,700
Georgia		Lamb	169,500
Colquitt	65,000	Lubbock	253,300
Mitchell	51,000	Parmer	80,600
Worth	50,000	Swisher	72,800
Total		Total	1,241,000
Louisiana		**Texas Rolling Plains**	
		Fisher	67,300
Concordia	41,700	Haskell	79,100
East Carroll	41,600	Jones	61,500
Franklin	64,500	Knox	24,000
		Mitchell	39,700
		Scurry	42,800
Tensas	96,500	Total	314,400
Total	244,300	**South Texas**	
Mississippi		Cameron	68,000
Coahoma	93,900	Hidalgo	70,400
Leflore	89,700	Willacy	77,800
Yazoo	102,600	Total	216,200
Total	286,200		

Source: National Agricultural Statistics Service, 1999.

Value of the Crop

The value of Upland cotton in our pilot counties ranges from $2.32 million in Brazos County, Texas, to $138 million in Fresno County, California as seen in Table 4. While the production numbers are based on a county level, they are multiplied by the state-average price, as county level prices are unavailable. Table 5 indicates that the value per pilot state varies as well, from almost $150 million in Alabama to close to $1 billion in Texas.

Table 4: Value of Upland Cotton Production per County, 1999

County	Production (480lb. Bales)	Price ($ per pound)*	Value of Production ($)	County	Production (480lb. Bales)	Price ($ per pound)*	Value of Production ($)
Northern Alabama				**North Carolina**			
Lawrence	36,600	0.478	8,397,504	Halifax	50,200	0.475	11,445,600
Limestone	79,000	0.478	18,125,760	Martin	47,800	0.475	10,898,400
Madison	51,500	0.478	11,816,160	Northampton	70,300	0.475	16,028,400
Total	167,100		38,339,424	Total	168,300		38,372,400
Southern Alabama				**Texas Brazos Valley**			
Autauga	12,200	0.478	2,799,168	Brazos	11,800	0.410	2,322,240
Dallas	17,700	0.478	4,061,088	Burleson	26,000	0.410	5,116,800
Elmore	15,600	0.478	3,579,264	Milam	13,900	0.410	2,735,520
Total	45,500		10,439,520	Robertson	24,600	0.410	4,841,280
Arizona				Williamson	39,500	0.410	7,773,600
Maricopa	224,500	0.439	47,306,640	Total	115,800		22,789,440
Pinal	294,800	0.439	62,120,256	**Texas Coastal Bend**			
Total	519,300		109,426,896	Nueces	172,000	0.410	33,849,600
California				San Patricio	189,200	0.410	37,234,560
Fresno	515,000	0.562	138,926,400	Total	361,200		71,084,160
Kern	378,400	0.562	102,077,184	**Texas Plains**			
Kings	240,100	0.562	64,769,376	Bailey	70,800	0.410	13,933,440
Madera	64,000	0.562	17,264,640	Castro	83,500	0.410	16,432,800
Merced	175,500	0.562	47,342,880	Cochran	107,800	0.410	21,215,040
Tulare	123,300	0.562	33,261,408	Hale	352,300	0.410	69,332,640
Total	1,496,300		403,641,888	Hockley	149,600	0.410	29,441,280
Georgia				Lamb	209,000	0.410	41,131,200
Colquitt	95,000	0.453	20,656,800	Lubbock	220,500	0.410	43,394,400
Mitchell	70,000	0.453	15,220,800	Parmer	109,100	0.410	21,470,880
Worth	61,000	0.453	13,263,840	Swisher	105,600	0.410	20,782,080
Total	226,000		49,141,440	Total	1,408,200		277,133,760
Louisiana				**Texas Rolling Plains**			
				Fisher	33,700	0.410	6,632,160
Concordia	74,600	0.444	15,898,752	Haskell	34,100	0.410	6,710,880
East Carroll	67,300	0.444	14,342,976	Jones	22,500	0.410	4,428,000
Franklin	94,200	0.444	20,075,904	Knox	22,700	0.410	4,467,360
				Mitchell	18,600	0.410	3,660,480
				Scurry	22,600	0.410	4,447,680
Tensas	157,000	0.444	33,459,840	Total	119,600		30,346,560
Total	393,100		83,777,472	**South Texas**			
Mississippi				Cameron	83,300	0.410	16,393,440
Coahoma	141,800	0.451	30,696,864	Hidalgo	74,400	0.410	14,641,920
Leflore	142,000	0.451	30,740,160	Willacy	78,400	0.410	15,429,120
Yazoo	161,000	0.451	34,853,280	Total	195,800		46,464,480
Total	444,800		96,290,304				

(National Agricultural Statistics Service, 1999)
1999 state average price.

Table 5: Value of All Cotton Production by State

State	Production (1000s of 480lb. bales)	Price ($ per pound)	Value of Production ($1000s)
1999			
Alabama	625	0.478	143,400
Arizona	716	0.439	150,876
California	1,580	0.562	426,221
Georgia	1,567	0.453	340,728
Louisiana	901	0.444	192,021
Mississippi	1,731	0.451	374,727
North Carolina	816	0.475	186,048
Texas	5,050	0.410	993,840
2000			
Alabama	540	0.543	140,746
Arizona	760	0.598	218,150
California	2,200	0.694	732,864
Georgia	1,640	0.575	452,640
Louisiana	910	0.541	236,309
Mississippi	1,730	0.501	416,030
North Carolina	1,440	0.610	421,632
Texas	3,950	0.514	974,544
2001			
Alabama	935	*	*
Arizona	730	*	*
California	1850	*	*
Georgia	2110	*	*
Louisiana	1220	*	*
Mississippi	2570	*	*
North Carolina	1480	*	*
Texas	4400	*	*

(National Agricultural Statistics Service, 2001.)

Note: * indicates data is not yet available from NASS

Value of All Crops in the Area

Table 6 illustrates the total monetary value of all agricultural crops grown within the pilot areas.

Table 6: Value of All Agricultural Crops Grown

County	Value ($1000s)	County	Value ($1000s)
Northern Alabama		**North Carolina**	
Lawrence	14,893	Halifax	53,218
Limestone	23,097	Martin	53,903
Madison	17,381	Northampton	41,584
Total	55,371	Total	148,705
Southern Alabama		**Texas Brazos Valley**	
Autauga	6,932	Brazos	7,771
Dallas	15,438	Burleson	12,525
Elmore	13,374	Milam	18,581
Total	35,744	Robertson	11,204
Arizona		Williamson	31,610
Maricopa	382,451	Total	81,691
Pinal	190,214	**Texas Coastal Bend**	
Total	572,665	Nueces	63,110
California		San Patricio	57,257
Fresno	2,116,147	Total	120,367
Kern	1,786,994	**Texas Plains**	
Kings	369,277	Bailey	36,526
Madera	507,829	Castro	89,798
Merced	577,894	Cochran	37,051
Tulare	1,122,523	Hale	116,637
Total	6,480,664	Hockley	67,569
Georgia		Lamb	100,811
Colquitt	93,140	Lubbock	94,436
Mitchell	69,253	Parmer	100,222
Worth	56,407	Swisher	46,450
Total	218,800	Total	689,500
Louisiana		**Texas Rolling Plains**	
		Fisher	18,197
Concordia	53,652	Haskell	28,482
East Carroll	61,128	Jones	22,000
Franklin	67,875	Knox	15,454
		Mitchell	12,890
		Scurry	14,048
Tensas	70,436	Total	111,071
Total	253,091	**South Texas**	
Mississippi		Cameron	69,651
Coahoma	92,072	Hidalgo	181,134
Leflore	84,282	Willacy	45,120
Yazoo	58,754	Total	295,905
Total	235,108		

(1997 Census of Agriculture.)

Farm Characteristics

Cotton farms vary in several ways. The prime example is farm size. As indicated in Table 7, farms in the pilot counties have from about 170 acres to 880 acres of cotton. According to the 1997 Census of Agriculture, the national average cotton acreage per farm is 433 acres.

Table 7: Average Size of Farms

County	Farm Size (acres)	County	Farm Size (acres)
Northern Alabama		**North Carolina**	
Lawrence	576.0	Halifax	403.4
Limestone	406.5	Martin	168.8
Madison	181.9	Northampton	248.5
Southern Alabama		**Texas Brazos Valley**	
Autauga	343.3	Brazos	395.9
Dallas	564.0	Burleson	480.5
Elmore	510.3	Milam	243.9
Arizona		Robertson	431.5
Maricopa*	609.2	Williamson	192.9
Pinal*	539.1	**Texas Coastal Bend**	
California		Nueces	591.7
Fresno*	607.3	San Patricio	501.1
Kern*	717.5	**Texas Plains**	
Kings*	784.4	Bailey	420.9
Madera*	379.4	Castro	247.2
Merced*	405.5	Cochran	863.5
Tulare*	318.0	Hale	404.8
Georgia		Hockley	654.9
Colquitt	316.9	Lamb	401.6
Mitchell	445.8	Lubbock	538.0
Worth	328.0	Parmer	230.4
Louisiana		Swisher	318.2
Concordia	482.7	**Rolling Plains**	
		Fisher	417.9
East Carroll	338.1	Haskell	350.3
Franklin	330.8	Jones	414.8
Tensas	664.1	Knox	356.4
		Mitchell	541.7
		Scurry	372.7
Mississippi		**South Texas**	
Coahoma	877.9	Cameron	283.9
Leflore	651.2	Hidalgo	479.8
Yazoo	631.8	Willacy	724.3

(1997 Census of Agriculture.)
*Includes ELS acres because the Census does not report acreage by type of cotton.

Many other crops are grown in the same areas as cotton. Table 8 illustrates some of the crops grown in each area along with the number of acres of each according to the 1997 Census of Agriculture. In addition to these crops, rice, tobacco, peanuts, and sugarcane are crops that may also be grown in these areas.

Table 8: Other Crop Acreage in Pilot Areas

Region	Barley Acres	Corn Acres	Cotton Acres	Hay Acres	Sorghum Acres	Soybean Acres	Wheat Acres	Orchard Acres	Vegetable Acres
Northern Alabama	0	31,582	52,176	62,861	0	92,434	18,159	0	0
Southern Alabama	0	7,214	44,013	34,046	0	11,527	33,065	0	0
Arizona	55,976	7,822	231,314	104,735	0	0	56,349	26,219	28,092
California	42,927	0	1,002,088	592,084	0	0	230,525	1,383,145	322,792
Georgia	0	18,785	185,171	10,399	0	8,316	7,272	0	0
Louisiana	0	0	257,739	9,271	24,569	281,225	17,083	0	0
Mississippi	0	53,518	214,890	8,390	7,496	316,379	23,146	0	0
North Carolina	0	22,537	148,947	4,522	0	25,940	9,666	0	0
Texas Brazos Valley	0	100,654	80,970	174,536	107,937	5,197	25,156	0	0
Texas Coastal Bend	0	36,708	182,282	14,795	328,492	0	4,168	0	0
Texas Plains	0	298,127	1,249,029	64,506	318,418	46,663	379,742	0	0
Texas Rolling Plains	0	0	185,918	63,392	30,299	628	289,605	0	0
South Texas	0	63,045	200,030	18,363	336,470	5,474	4,931	0	0
Total	98,903	639,992	4,034,567	1,130,301	1,145,496	793,783	1,063,824	1,409,364	350,884

(1997 Census of Agriculture.)
*Includes ELS acres because the Census does not separate acreage out by type of cotton.
Zeros indicate no data available in the 1997 Census County Highlights.

Northern Alabama: Lawrence, Limestone, Madison
Southern Alabama: Autauga, Dallas, Elmore
Arizona: Maricopa, Pinal
California: Fresno, Kern, Kings, Madera, Merced, Tulare
Georgia: Colquitt, Mitchell, Worth
Louisiana: Concordia, East Carroll, Franklin, Tensas
Mississippi: Coahoma, Leflore, Yazoo
North Carolina: Halifax, Martin, Northampton
Texas Brazos Valley: Brazos, Burleson, Milam, Robertson, Williamson
Texas Coastal Bend: Nueces, San Patricio
Texas Plains: Bailey, Castro, Cochran, Hale, Hockley, Lamb, Lubbock, Parmer, Swisher
Texas Rolling Plains: Fisher, Haskell, Jones, Knox, Mitchell, Scurry
South Texas: Cameron, Hidalgo, Willacy

Farmers or operators may have primary occupations that do not relate to the farm production. Table 9 shows the number of operators whose principal occupation is farming and the number of operators whose occupation is something other than farming.

Table 9: Occupation of Operator

	Principal Occupation of Operator (all farms)			Principal Occupation of Operator (all farms)	
County	**Farming**	**Other**	**County**	**Farming**	**Other**
Northern Alabama			**North Carolina**		
Lawrence	426	861	Halifax	254	92
Limestone	375	752	Martin	276	113
Madison	371	602	Northampton	235	107
Total	1,172	2,215	Total	765	312
Southern Alabama			**Texas Brazos Valley**		
Autauga	167	181	Brazos	380	704
Dallas	187	248	Burleson	562	775
Elmore	205	355	Milam	740	915
Total	559	784	Robertson	520	769
Arizona			Williamson	85	1,199
Maricopa	776	867	Total	2,287	4,362
Pinal	369	172	**Texas Coastal Bend**		
Total	1,145	1,039	Nueces	282	287
California			San Patricio	284	212
Fresno	4,108	2,484	Total	566	499
Kern	1,274	723	**Texas Plains**		
Kings	671	408	Bailey	299	142
Madera	977	696	Castro	371	118
Merced	1,752	1,079	Cochran	184	92
Tulare	3,022	2,424	Hale	577	263
Total	11,804	7,814	Hockley	424	251
Georgia			Lamb	550	315
Colquitt	326	308	Lubbock	591	477
Mitchell	247	217	Parmer	444	155
Worth	243	163	Swisher	317	212
Total	816	688	Total	3,757	2,025
Louisiana			**Texas Rolling Plains**		
			Fisher	316	287
Concordia	212	80	Haskell	347	264
East Carroll	193	51	Jones	387	48
Franklin	434	298	Knox	174	122
			Mitchell	177	201
			Scurry	292	314
Tensas	156	46	Total	1,693	1,236
Total	995	475	**South Texas**		
Mississippi			Cameron	434	468
Coahoma	150	31	Hidalgo	624	749
Leflore	184	62	Willacy	163	80
Yazoo	226	198	Total	1,221	1,297
Total	560	291			

(1997 Census of Agriculture.)

Supply and Demand

Table 10 summarizes world cotton production for the past six years. At the time of this report, reporting for the 2000/01crop year is almost complete with an expected U.S. production level of 17.2 million bales. World production (including the U.S.) is expected to be 88 million bales, thus the U.S. share would remain at a level 19.5 percent of the world market.

Table 10: Foreign and Domestic Production

Area	Production per Year (million bales)					
	1995/96	1996/97	1997/98	1998/99	1999/00	2000/01 (July)
United States	17.9	18.9	18.8	13.9	17.0	17.2
World	93.1	89.6	91.6	84.9	87.4	88.0
U.S. % of world production	19.2	21.1	20.5	16.4	19.5	19.5

(Cotton Incorporated, 2001)

The USDA's July 2001 report reflects a net increase of 200,000 bales in this year's domestic production and a 100,000 bale decrease in imports as compared with the 1999/2000 crop year. Supply is relatively unchanged with only a 100,000 bale increase over the prior year.

Demand is expected to decline 1.5 million bales from the 1999/2000 levels. The major culprit here is mill use. This is attributed to competition from textile imports that have offset much of the growth in domestic retail demand. Mill use is seen declining 1.3 million bales to 8.9 million, the lowest mill use seen since 1990. Demand, at 15.5 million bales, is unchanged from June's estimate, resulting in ending stocks of 5.6 million bales and a stocks-to-use ratio of 36.1%.

Table 11: Supply and Demand (million bales)

	1997/98	1998/99	1999/00	2000/01 July
Beginning Stocks	4.0	3.9	3.9	3.9
Production	18.8	13.9	17.0	17.2
Imports	0.0	0.4	0.1	0.0
Supply	22.8	18.2	21.0	21.1
U.S. Mill Use	11.3	10.4	10.2	8.9
Exports	7.5	4.3	6.8	6.6
Demand	18.8	14.7	17.0	15.5
Ending Stocks	3.9	3.9	3.9	5.6
Stocks/Use Ratio	20.7%	26.5%	22.9%	36.1%

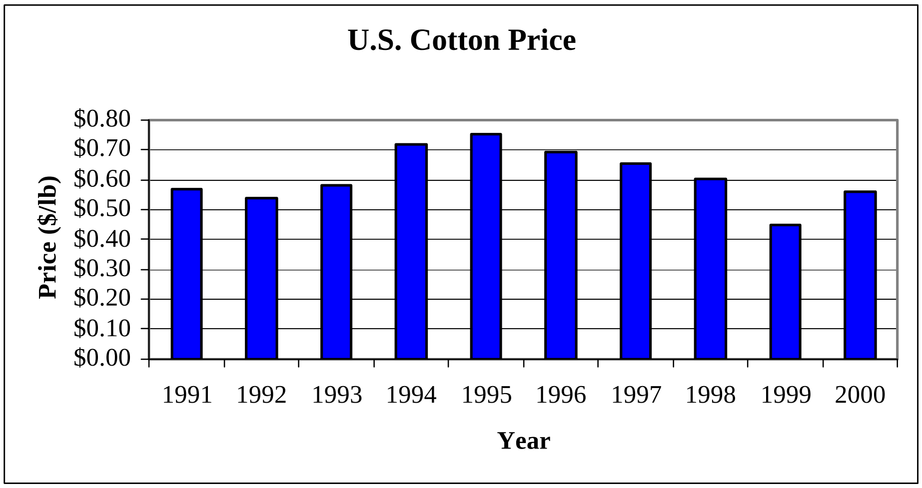
(Cotton, Inc., 2001.)

Prices

Cotton prices have exhibited a downward turn in recent years. This is attributed to the decrease in domestic consumption of textile products and a decrease in exports. The dollar has been strong in comparison with other currencies, making American products more expensive to purchase. In addition, China has emerged as a major competitor in the world cotton market, producing nearly 20 million bales per year. Adverse weather conditions suffered by farmers have also affected prices. In some areas, an increase in insect and disease problems proved detrimental to product quality. Cotton was placed into lower than normal grades, which in turn earned lower prices.

Because of the small rebound in price in year 2000, cotton producers were optimistic about increasing prices going into the 2001 crop year. As mentioned above, producers responded by increasing production acreage by more than 800,000 acres. At planting time, producers viewed the cotton crop as having relatively favorable net returns over competing crops when considering the cotton marketing loan program and the crop insurance program. Producers could not have been more wrong. As of July 2001, producers are seeing spot market quotes in some areas in the low 40-cent range per pound of cotton, which is some of the lowest prices on record.

Figure 2 depicts the trend in national prices over the past 10 years.



(Source: National Agricultural Statistics Service, 2001)
Figure 2: U.S. Cotton Price

Economic Significance for Next Five Years

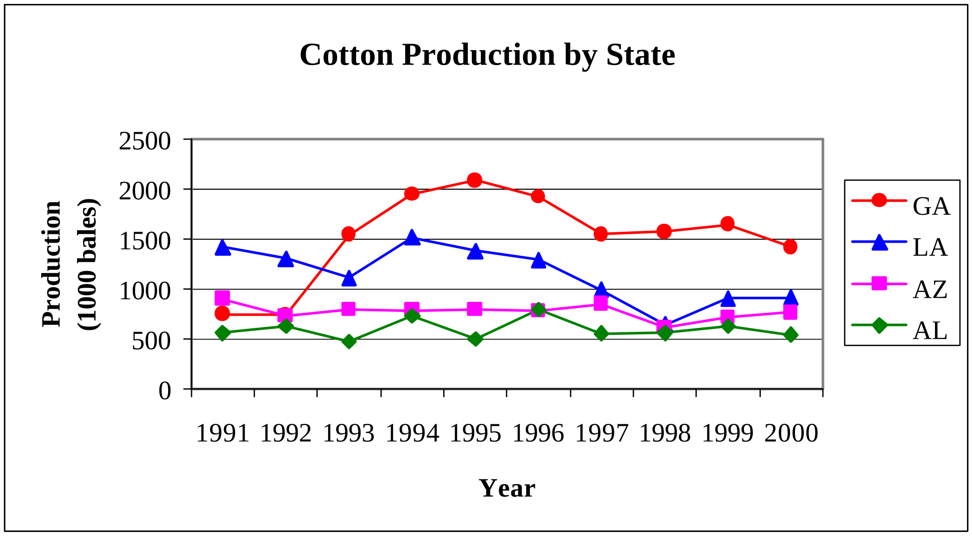
According to the extension agents and agronomists that were interviewed, cotton is a very substantial industry, both within states and pilot counties. In most of the pilot areas, cotton is either the top or one of the top commodities in production acreage and value.

Cotton is the largest, most significant commodity in the Arizona pilot areas. While agricultural lands have begun to be incorporated into the Phoenix metropolitan area, cotton acreage is continuing to grow and cotton specialists expect it will remain that way for at least the next five years.

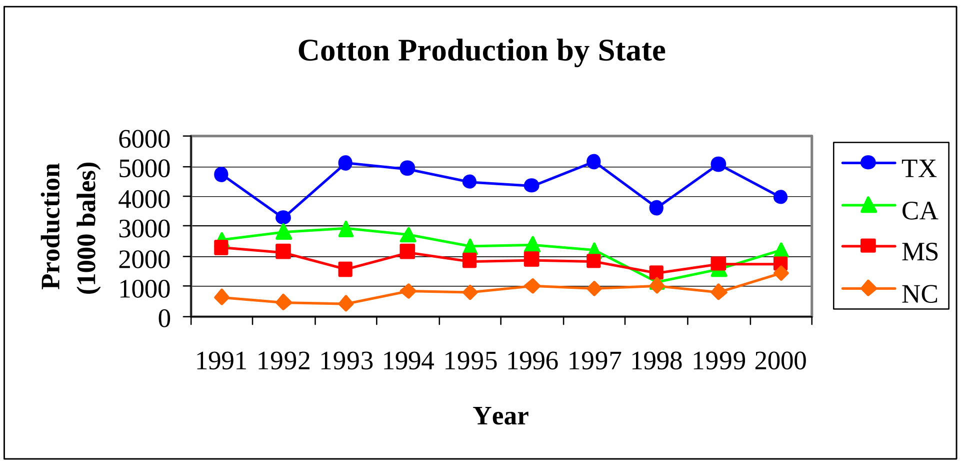
Cotton specialists in California say that if cotton in the San Joaquin Valley is in trouble, the rest of the valley is also. California is unique due to its numerous specialty crops. Cotton affects the markets of these specialty crops, because if a producer chooses to get out of cotton production, he/she will most likely begin producing vegetables or perennials. The increases in production of those crops, which are not able to be stored, may easily create excesses and drive down their market prices.

Specialists in Louisiana, Georgia, North Carolina and Texas indicate that cotton will always be significant to their areas. In many of the areas, cotton is the top commodity and there are not any other feasible alternatives due to average rainfall and potential profitability. For this reason, they conclude that cotton will continue to be significant in their regions. However, there may be some changes due to price fluctuations in cotton and other primary crops in the region.

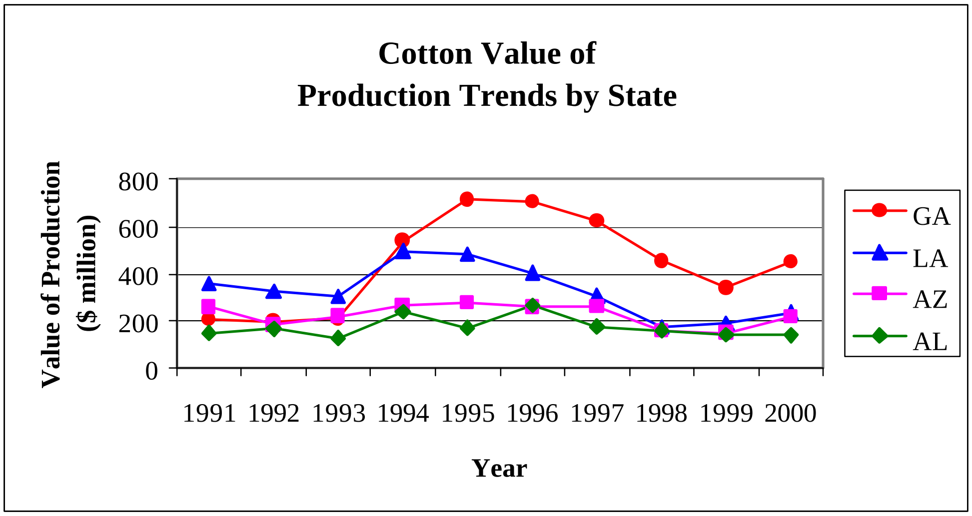
The following graphs depict the trends in production and value of production in the pilot states over the past ten years. The majority of areas saw an increase in production and value for multiple years, peaking in 1995. The industry dipped severely in 1998. Figure 3, Figure 4, Figure 5, and Figure 6 show production and value trends by state for the last 10 years. Georgia and Texas show the greatest fluctuations in production and value. The Texas cotton industry is especially erratic in its movements.



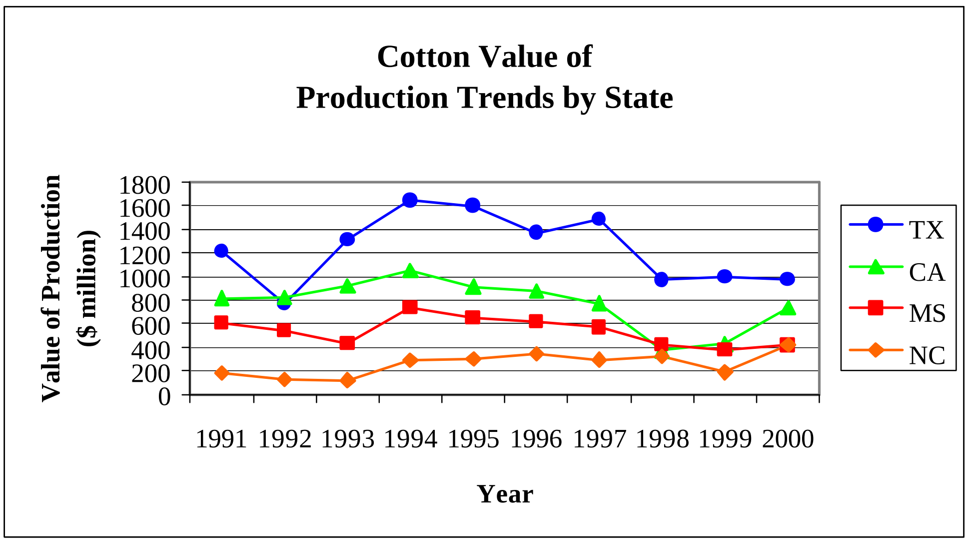
(Source: National Agricultural Statistics Service, 2001)
Figure 3: Cotton Production by State



(Source: National Agricultural Statistics Service, 2001)
Figure 4: Cotton Production by State (II)



(Source: National Agricultural Statistics Service, 2001)
Figure 5: Value of Production by State



(Source: National Agricultural Statistics Service, 2001)
Figure 6: Value of Production by State (II)

Table 12 utilizes AgriLogic's proprietary econometric models to forecast future trends within the cotton industry. Production over the next five years is expected to decrease initially, and will then remain relatively flat to increasing as the current lower levels of demand eventually stabilize with the current high levels of supply. Planted and harvested acres are also projected to decrease initially, and should then remain relatively constant to increasing for the same reasons. Yields are projected to increase 5% over the five-year period, as producers utilize more efficient methods of production. Disappearance is projected to follow the same pattern as production and acreage—an initial decrease, then a leveling out to possibly increasing trend. Price is projected to remain within a $0.51 to $0.55 range over the period. Stock-to-Use ratio is expected to decrease slightly through 2004, and should then begin to increase in correlation with the minor increase in production.

Table 12: AgriLogic's U.S. Cotton Projections

Major Crops Supply/Use					
	2002	2003	2004	2005	2006
Cotton					
Production (mil 480 lb. bales)	18.6	18.4	17.7	17.7	17.8
Acres planted (mil. acres)	14.9	14.7	14.1	14.0	14.0
Acres harvested (mil. acres)	14.2	13.9	13.3	13.2	13.3
Yield per harvested acre	629.3	633.2	637.6	641.3	645.6
Supply:					
Beginning stocks (mil. 480 lb. bales)	8.7	9.6	10.1	9.9	9.9
Production (mil. 480 lb. bales)	18.6	18.4	17.7	17.7	17.8
Total supply	27.2	27.9	27.8	27.6	27.7
Disappearance:					
Mill use (mil. 480 lb. bales)	8.7	8.9	8.9	8.9	8.9
Other use (mil. 480 lb. bales)	0.0	0.0	0.0	0.0	0.0
Total domestic use	8.7	8.9	8.9	8.9	8.9
Net exports (mil. 480 lb. bales)	8.9	8.9	8.9	8.9	8.9
Ending total stocks (mil. 480 lb. bales)	9.6	10.1	9.9	9.9	10.0
Total disappearance	27.2	27.9	27.8	27.6	27.7
Price of cotton ($/lb.)	$0.49	$0.49	$0.51	$0.52	$0.53
Loan rate ($/lb.)	$0.52	$0.52	$0.52	$0.52	$0.52
Stock-to-Use ratio	54.43%	56.26%	55.72%	55.63%	56.06%
Value of Production	**$ 9.11**	**$ 9.02**	**$ 9.03**	**$ 9.20**	**$ 9.43**

(Source: AgriLogic, Inc.)

Operation of Model

These forecasts were generated using AgriLogic's econometric model, NATMOD. NATMOD is a fully simultaneous model, which weighs all supply and demand conditions for each segment of the agricultural industry. The industry segments range from crucial input sectors such as land, fertilizer, and chemicals, to the commodity markets in which the products are marketed. The model forecasts future market conditions based on the combined characteristics of all influencing factors, from macroeconomic conditions to projected future market supply conditions.

The initial step in the execution of the model is to develop a projection of future supply and demand conditions based on current environmental circumstances within each respective agricultural market. The process begins with an estimation of the relative supply conditions for the upcoming year. The supply for each commodity is determined as a combination of historical acreage and shifts deemed necessary due to variation in profitability between commodities. The relationships between all model elements (acreage, yield, commodities, etc) were established through an examination and correlation of historical data.

Once a supply of commodities is established, the next step is to evaluate its effect on the commodity markets. The demand for these crops is established as a summation of all potential markets' demands for a crop and its by-products. NATMOD categorizes demand into several segments, specifying utilization as food, feed, seed, net exports, ending stocks, or any other statistically significant use of the commodity. Market demands are quantified as a series of regressions on historic and current market relationships and conditions.

The model then uses the supply and demand calculated in combination with the Newton Rapson method to identify an appropriate market-clearing price for each commodity. The Newton Rapson method is a recursive process adjusting price levels up or down until the intersection is discovered between the supply and demand curves. The Newton Rapson method solves numerically for an appropriate combination of market clearing prices, which cannot be obtained algebraically due to current market prices' non-linear relationship with demand and supply functions. In addition, the price assignment method is constrained by the demand side equations that define the relationships between the various markets. Once the intersection is discovered simultaneously for all crop and livestock markets, a combination of the forecast prices are assigned to the respective commodities. Each individual commodity's forecasted price, supply, and demand is then available for review.

Cotton Production

Cultural Factors

Description of the Crop

The cotton plant is usually considered a perennial, although it is planted annually where it is grown commercially. The woody, herbaceous plant has a long taproot and attains a height of two to five feet or taller under favorable conditions. Cotton grows best with high temperatures and adequate soil moisture and fertility. Air temperatures in the 90° to 95° F range are considered optimum for growth. Little or no growth can be expected at 60° F or below. Temperatures in excess of 100° F for several days can be unfavorable, especially if soil moisture becomes deficient. The taproot grows downward into moist soil at a rate of about one inch per day for five weeks or longer. During the growing season the daily growth rate of roots may average half an inch.

When cotton plant emerges, the first leaf structures are called cotyledon or seed leaves. They appear on the lowest node and are borne on opposite sides of the main stem. The nodes above the seed leaves bear a single true leaf. These leaves have a spiral arrangement around the stem. The true leaves have five or more clearly defined lobes. At the base of each main stem leaf, in the angle between the leaf and the stem, there are two to three buds. They are called axillary buds and give rise to the vegetative and fruiting branches. The vegetative branches are normally restricted to the lower nodes on the stem. In most American Upland cottons, the first fruiting branch begins developing at the fifth or sixth node above the seedling leaves. The fruiting branches produce floral buds, called cotton squares, which develop into bolls. Flowers (blooms) are creamy white when they first open. Fertilization occurs on the day that the flowers open, and turn pink the day after anthesis (the period of opening of a flower). Boll development begins shortly thereafter. The interval between corresponding nodes on successive fruiting branches (vertical flowering interval) is two to three days, and the interval between successive flowers on the same fruiting branch (horizontal fruiting interval) is five to six days.

Flowering usually begins about seven to eleven weeks after planting. Determinate varieties stop growing after boll development. In contrast, indeterminate varieties are usually late maturing and continue flowering until halted by frost, drought, insect attack, or some other cause. The flower bud is usually discernible three to four weeks before the flower opens. Many of the squares, flowers, or developing bolls drop off naturally. This is called shedding. As a result, it is estimated that only 35% to 40% of the squares produce mature bolls under normal conditions. The most critical time for developing fruit is three to ten days after pollination. The period between flowering and opening of mature bolls is six to eight weeks, depending on growing conditions. Cloudy conditions and below normal temperatures during this period can increase the boll maturation period.

Fruit of the cotton plant is the enlarged three to five-loculed ovary commonly referred to as a cotton boll. Mature bolls vary in size and shape depending on the variety and environmental conditions but are usually one and a half to two inches in diameter. Bolls that set during the first three weeks of fruiting are usually the largest and contain the highest quality fiber. Normally, late set bolls are smaller and may contain finer and less mature fiber, depending on temperature and moisture levels during the boll maturation period. Normally, 65 to 90 bolls are required to produce one pound of seed cotton. However, some varieties produce relatively small bolls that may require 100 bolls or more to produce one pound of seed cotton.

Fiber length development is determined during the first three weeks after flowering. Increases in micronaire value, as well as fiber strength, occurs during the next three to four week period after length is established. Moisture stress during the first three weeks after flowering can restrict fiber length. Adequate temperature is a critical factor in determining the strength and maturity of lint.

The cotton plant can adapt to different environmental stresses. In a severe drought, the plant may be only six inches high but still capable of producing several bolls. A plant of the same variety grown under adequate moisture or irrigation may be five feet in height and produce 40 to 50 bolls. Depending on other stresses, the number of bolls that develop is kept in balance with the vegetative growth of the plant. The fruiting-vegetative balance is affected by several factors. A shift in vegetative growth is associated with excess nitrogen and soil moisture, coupled with cool, cloudy conditions. This shift is intensified even further if initial fruit set is poor or if excessive shedding has taken place. Warm, sunny weather, adequate, but not excessive moisture, nitrogen, and minimal insect stress encourage fruiting.

A population of 30,000 to 65,000 plants per acre is the optimum range for maximum yield. Although the cotton plant can adjust to variable spacing, uniform distribution of plants in the row produces the highest yields. Under dryland conditions a plant population in the lower range is desirable, especially in low rainfall areas.

Cottonseed is frequently planted at rates higher than necessary to achieve adequate stands. A dense stand results in crowding in the drill-row. High plant population encourages fruit set at a higher position on the plant, which contributes to delayed maturity. Severe crowding can result in barren plants that function as weeds because they compete for moisture and nutrients.

Planting date, variety, available moisture, and temperature during the fruiting period influences the time required for specific growth and development stages in the cotton plant. Other factors such as soil type and the level of insect, weed and disease pressure can also alter the time required to reach various growth and fruiting stages.

Varieties

Transgenic varieties accounted for approximately 72% of all upland cotton planted in the U.S. in 2000. Transgenic varieties are genetically modified to be resistant to herbicides (BXN and Roundup Ready), pests (Bt), or both (stacked.)

Varieties grown in the Arizona pilot areas are anywhere from 70% to 80% transgenic, being mostly Bt. Around 25% of all Upland in California (including both California Upland and Acala) is of transgenic variety. In Georgia and Louisiana, stacked varieties are predominant. Approximately 30% of producers in North Carolina continue to use the conventional varieties. The other 70% prefer Roundup Ready, but have not been able to get it the last couple of years and therefore, are using more stacked varieties. Some areas of Texas also utilize mostly transgenic varieties with as much as 80% to 90% in the Brazos Valley, 60% to 75% in the Rolling Plains (which is mostly Roundup Ready), and over 70% in the Plains. However, transgenic varieties have not yet dominated some areas such as the Texas Coastal Bend, where the most common varieties are conventional varieties, and in South Texas, where only approximately 10% of the cotton is transgenic. Some of the resistance to growing transgenic varieties is due to the belief that they provide less yield potential and poorer quality than conventional varieties.

The USDA Agricultural Marketing Service reported that more than 23 seed companies, including Deltapine, Paymaster, Stoneville, Sure-Grow, California Planting Cotton Seed Distributors (CPCSD), and Aventis, marketed more than 180 cotton varieties in 2000.

Deltapine-owned varieties were the most popular Upland cotton planted in the U.S. in 2000, accounting for 39% of all U.S. acreage. Deltapine varieties led in Alabama, Arizona, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, and Virginia. Deltapine’s most popular varieties were transgenic varieties, which contributes to the high percentage of genetically altered cottonseed that was planted last year. The DP 451 B/RR variety accounted for 6.4% of all Upland cotton planted, and the DP 458 B/RR variety accounted for 5.7%.

The second most popular is the Paymaster brand. In 2000 almost 32% of U.S. cotton acreage was planted using Paymaster varieties. Paymaster cotton led in Oklahoma, Tennessee, and Texas. The most popular Paymaster varieties were also transgenic varieties. The PM 2326 RR variety accounted for 9.5%. The PM 1218 BG/RR variety was second with 5.9%, while the PM 2200 RR variety followed with 5.4%.

Stoneville-owned varieties were the third most popular, accounting for 11.9% of the U.S. acreage in 2000. Stoneville varieties were the most commonly used in Missouri and the second most common in Arkansas, Louisiana, and Mississippi. The BXN 47 variety, the most popular Stoneville variety, accounted for 6.6% of the U.S. acreage.

The Sure-Grow brand was the fourth most popular variety last year, accounting for 8.3%, followed by CPCSD with 2.6% of total acreage. CPCSD varieties were the leading variety planted in California covering almost 62% of Upland acreage in the state.

Table 13 lists the most popular variety in each state and the percentage of acreage it covers.

Table 13: Most Popular Varieties for 2000 by State

Pilot State	Variety	% of Acreage
Alabama	Deltapine DP 458 B/RR	14
Arizona	Deltapine Nucotton 33	26
California	CPCSD Acala MAXXA	32
Georgia	Deltapine DP 458 B/RR	15
Louisiana	Deltapine Nucotton 33 B	21
Mississippi	Deltapine DP 451 B/RR	27
North Carolina	Stoneville BXN 47	12
Texas	Paymaster PM 2326 RR	26

(Cotton Incorporated, 2001.)

Tillage

Conventional Tillage

Tilling is the process of loosening and turning the soil over to prepare for planting. A machine, usually a disk plow, breaks up soil. The objective is to provide a firm, moist, weed-free seedbed that will not constrict roots. Fertilizers, herbicides, and micronutrients are often added to the soil at this time. This method requires additional trips across the field, which results in higher costs for the farmer. This method disturbs the soil's entire surface and is performed prior to and/or during planting.

Conservation Tillage

Conservation tillage is a tilling system that strives to minimize soil erosion, nutrient loss, crop damage, and decreased water storage capacity. This is accomplished by leaving residue cover on the surface of the soil after planting. At least 30% of crop residue must be left after planting to qualify as a conservation tillage system. Crop residue is the leftover stalks and leaves of the crop left on the field after harvest. The soil is left virtually undisturbed from harvest to planting. Weeds are controlled using herbicides, cover crops, and limited cultivation.

Conservation tillage provides many benefits to farmers including reduced labor requirements, fewer work hours, and reduced fuel costs. The field has increased water infiltration into the soil, reduced erosion, and improved long-term productivity. This method is gaining popularity across the country.

No Tillage

Some farmers choose not to till their fields at all; instead they rely on burn-down chemicals to rid the fields of weeds prior to planting and follow with pre-emerge or post-emerge herbicides. No-till systems are considered a form of conservation tillage. This practice is used mainly in areas where soil erosion is a problem. However, yields are not quite as large when using this method.

Utilized Tillage by Area

Over the past few years, increasingly more reduced or no-till practices have been used in various regions of the United States. The pilot areas are no exception. There is limited reduced till in Arizona pilot areas, and due to a mandatory state plow-down program for pink bollworm in California's San Joaquin Valley, tilling is almost entirely performed using conventional practices. In Northeast Louisiana, approximately 90% of the acreage is worked using some type of reduced tillage. Over half of the North Carolina pilot area uses strip till, and the rest of the state continues to use conventional practices. Texas provides a wide variety of practices. In the Brazos Valley, there is little no-till, but there is not as much conventional tilling as in the past. The Coastal Bend is another area that has not yet adopted many reduced tillage practices. While little residue management has been performed in the Rolling Plains, specialists are anticipating more reduced till in 2001. In South Texas the producers have adopted conservational tillage practices although in some cases it has created difficulties in killing the cotton plant and increased boll weevil problems.

Other Field Preparations

Vast differences in field preparations are used on cotton acreage. In Arizona, fields are plowed, leveled, and shaped. California conducts its bed preparations in winter and irrigates before planting in order to plant into moisture. Narrow rows are more prevalent in the Texas Coastal Bend. Producers in the Rolling Plains of Texas typically perform bed preparations early and then reshape to plant. Many South Texas farmers begin preparations early as well, by applying herbicides in September or October and then fertilizing. Some growers in the Plains of Texas plant small grains as ground cover to reduce potential erosion.

Propagation

Cotton originated as a perennial crop in tropical climates. However, it has been bred and adapted for use as an annual in temperate climates. This means that all plants are removed from a field after harvest, and new plants are grown from seeds planted each year. Farmers choose the type of seed based on their needs and their growing conditions.

Planting

Cool weather is an important factor influencing Upland cotton seedling vigor and stand establishment. An early planting date is essential for early harvest and potential maximum yield realization. An optimum planting date takes into account soil temperature, weather conditions, and the seedling variety being planted. Optimum soil temperatures for planting are 65°F at 8 a.m. with a favorable five-day forecast (no cool fronts or storms).

Cotton is generally planted in rows 30 to 40 inches apart. The typical interval is 38 inches. Planting concentrations range from 25,000 to 60,000 plants per acre. This breaks down to between two to five plants per row foot. Planting concentrations vary according to climate conditions, soil types, and production efficiencies.

Skip-row planting patterns are common non-irrigated planting practices for cotton in many areas of Texas. This practice consists of a pattern of alternating rows of cotton and idle land throughout the field. Skip-row crops grown under irrigation require less fallow area than dryland crops. Furrow irrigation of a skip-row pattern is more efficient than sprinkler irrigation, since sprinklers irrigate the entire planted and fallow area. On clay soils, less fallow area is desirable than on a sandy soil since the lateral root growth is less extensive.

Too many plants in an area decrease chemical effectiveness, resulting in later fruiting, and cause excessive vegetative growth. Conversely, having too few plants reduces efficiency and often results in excessive weed growth. Producers should plant based on seeds per foot versus pounds per acre due to differences in the number of seeds per pound for each variety. Populations should be adjusted for row width. One practice that is used in North Carolina and the Texas Coastal Bend is to plant 3 seeds every 12 to 14 inches rather than to plant evenly spaced seeds. This is practiced to reduce seed costs.

No-till practices are often used in conjunction with ultra-narrow row (UNR) layout. Rows are spaced only 7.5 to 10 inches apart, allowing for more cotton to be grown per acre. This practice is intended to reduce mid-season herbicide treatments as well, because the high concentration of cotton plants chokes out any weeds.

Cotton can be planted in either furrows or raised beds. Soil temperatures tend to be 3ºF to 4ºF higher in beds than in furrows. Some farmers, like those in the Texas Brazos Valley, the Coastal Bend, and South Texas, find that raised bed planting leads to an increased germination rate, more uniformity in development, and greater ease and efficiency in pest control and other production operations.

Liming and fertilizer recommendations should always be based on a soil test. The lower limit of pH on clay soils is 5.6 and 5.8 on lighter, sandier soils, and the upper limit is approximately 6.5 for most soil types.

Irrigation

Moisture management is considered the key to increased production. Each plant requires roughly 0.1 inches of water per day until squares form. When blooming starts, each plant needs between 0.25 and 0.4 inches of water per day. Water needs are reduced as the first open bolls appear. Plants may require less water if irrigation is timed to provide plants with water at critical demand periods.

Too much water may cause problems such as decreased growth rates and reduced fiber quality. Therefore, irrigation systems are customized to the needs of an area. Center pivot, furrow, sprinkler, and Low Energy Precision Application (LEPA) systems provide farmers with choices as to which system best benefits the crops in that region. Furrow systems are used in heavier soils, like those in the Lower Rio Grande Valley. LEPA systems allow farmers to apply water at ground level, which decreases evaporation and increases efficiency.

Preferred irrigation practices vary across the country and often even within a county or region depending on type and availability of water. None of the cotton produced in Georgia and North Carolina irrigated while all cotton grown in Arizona and California is irrigated. Arizona and California producers practice mainly furrow irrigation, but there is some sprinkler or flat-planted flood irrigation. Louisiana and Texas' Brazos Valley are also predominantly furrowed, but also have quite a bit of center pivot irrigation. While 60% of South Texas produces dryland cotton, nearly all the acreage that is irrigated is furrow irrigation. San Patricio County, which is in the Texas Coastal Bend, is experiencing an increase in irrigation. While several irrigation practices are represented in the county, most of the irrigation is center pivot. Mostly dryland cotton is grown in Texas' Rolling Plains. The acreage that is irrigated displays a variety of practices such as drip, furrow, and center pivot. In the Plains of Texas, about half of the cotton is irrigated and producers typically use center pivot or LEPA systems, which are encouraged in order to maximize water use capacity.

Table 14 shows the amount of irrigated and dryland acreage in each pilot area.

Table 14: Irrigated and Dryland Cotton Acres

County	Irrigated Cotton Acres	Dryland Cotton Acres	County	Irrigated Cotton Acres	Dryland Cotton Acres
Northern Alabama			**North Carolina**		
Lawrence	**	24,769	Halifax	1,000	55,876
Limestone	2,127	19,824	Martin	**	37,139
Madison	**	5,456	Northampton	484	54,445
Total	2,127	50,049	Total	1,484	147,460
Southern Alabama			**Texas Brazos Valley**		
Autauga	**	9,956	Brazos	3,106	2,833
Dallas	193	14,471	Burleson	9,692	5,684
Elmore	**	19,393	Milam	**	14,391
Total	193	43,820	Robertson	10,243	1,839
Arizona			Williamson	**	33,182
Maricopa*	3,338	0	Total	23,041	57,929
Pinal*	1,223	0	**Texas Coastal Bend**		
Total	4,561	0	Nueces	**	100,597
California			San Patricio	1,277	80,408
Fresno*	348,003	0	Total	1,277	181,005
Kern*	265,462	0	**Texas Plains**		
Kings*	196,108	0	Bailey	25,753	47,898
Madera*	36,806	0	Castro	50,946	7,384
Merced*	74,620	0	Cochran	51,468	65,100
Tulare*	81,089	0	Hale	170,085	37,589
Total	1,002,088	0	Hockley	107,422	113,936
Georgia			Lamb	125,247	50,647
Colquitt	18,427	51,282	Lubbock	177,922	101,283
Mitchell	14,818	43,576	Parmer	48,740	12,553
Worth	11,132	45,936	Swisher	39,869	15,187
Total	44,377	140,794	Total	797,452	451,577
Louisiana			**Texas Rolling Plains**		
			Fisher	2,400	77,000
Concordia	625	42,818	Haskell	9,072	76,051
East Carroll	12,570	31,381	Jones	**	1,205
Franklin	34,254	53,082	Knox	13,542	11,759
Tensas	5,440	77,569	Total	22,614	89,015
Total	52,889	204,850	**South Texas**		
Mississippi			Hidalgo	38,649	23,241
Coahoma	38,053	42,713	Cameron	26,717	25,235
Leflore	32,151	37,532	Willacy	3,394	82,794
Yazoo	6,037	58,404	Total	68,760	131,270
Total	76,241	138,649			

(1997 Census of Agriculture.)

*Includes ELS acreage because the Census does not separate acreage out by type of cotton.

**Indicate acreage numbers were not provided in the Census.

Rotations

A three-year rotation of cotton, grain sorghum, and other small grains is typically the recommended schedule in most states. Some soil building crops may be used, but these are not as common due to moisture limitations in many cotton-producing areas. Chemical residues, root rot, and other contaminants may affect rotation timing and the type of crops planted, depending on what is needed to combat the problem.

However, grains used in the rotation vary between regions. Rotations with corn and sorghum are common, but rotations with wheat, barley, alfalfa, soybeans, tobacco, and peanuts may also be seen. Some areas in Arizona, North Carolina, and the Rolling Plains of Texas grow continuous cotton.

Soils

Cotton is grown in a myriad of coarse soil types, including clay, sand, and loam. This crop prefers warm soil temperatures, at least 60ºF, although some varieties grow best if soil temperatures are in the 80's. This is especially true when planting. The soil must reach temperatures of at least 65° F (tested at 8:00 am) for three consecutive days and should have a favorable five-day weather forecast before planting. This temperature depends on variety. A favorable forecast is dry weather with high temperatures between 80 and 90° F and the lows above the upper 40's.

Cotton is a very pH sensitive crop. It grows best in the pH range of 5.8 to 6.5, preferably toward the higher end of this range. Liming is a very common method for combating low pH levels. Adding lime to the soil increases the uptake and utilization of soil nutrients essential to plant growth.

Nutrients and Fertilizers

Nitrogen, potassium, and phosphorous are necessary macronutrients for cotton. Nitrogen controls growth rate, as it does in many plants. Nitrogen deficient plants exhibit yellowish leaves that dry up and turn brown. Fruit set also decreases. Recommended nitrogen levels range from 50 to 70 pounds per acre, depending on the region.

Phosphorous regulates the energy exchange within the plant. A deficiency is closely related to low soil pH. Soil testing and proper placement of the plants are the best methods for preventing a deficiency. Symptoms include stunted growth and darker than normal color.

Potassium is not as easily lost as nitrogen through leaching, but it still requires replenishment. Leaching losses can usually be corrected by an addition of 25 to 30 pounds of potash per acre. Potassium loss results in mottling and curling of leaves and eventual leaf loss.

Cotton also requires an array of secondary nutrients and micronutrients. These include calcium, magnesium, sulfur, boron, copper, manganese, and zinc. Each of these elements affects plant growth, health, and yields. Farmers are encouraged to test the soil before planting to ensure proper mineral levels and to have adequate time to plan fertilizer schedules for the upcoming season.

Fertilizer types and application schedules depend upon the needs of the soil in a particular area. Some fields need less nitrogen and more boron, while others require sulfur and potassium. Local extension agents have information specific to the region available to farmers.

Climate

Cotton production is reported in 17 states across the U.S., and each varies greatly in climate. As seen in Table 15, the proposed pilot areas also vary in climate. Temperatures, rain levels, and freeze conditions all differ, even within the states themselves. However, cotton generally prefers warm weather and requires a long growing season for fruiting and fiber maturation. Irrigation requirements are determined based upon normal rainfall and groundwater supplies for an area. Some areas may receive upwards of 25 inches of rain per year, on average, but the crops may still require some irrigation because of variation and duration in temperature from year to year.

Table 16 gives the average number of growing days and the dates of the first and last frost.

Table 15: Historical Climate

Pilot County Areas:	Avg. Mean Temp. (F)	Avg. High Temp. (F)	Avg. Low Temp. (F)	Avg. Total Precip. (Inches)	Avg. Num. of Days Above Freezing
Northern Alabama	59	71	46.9	57.6	299
Southern Alabama	66	78	55	51.1	338
Arizona	73	86	59	7.7	356
San Joaquin Valley	63	76	50	10.9	342
Georgia	68	78	58	45.6	351
Louisiana	62	73	53	51.3	-
Mississippi	64	76	53	52.6	329
North Carolina	61	73	50	43.7	304
Texas Coastal Bend	72	81	63	30.4	359
Texas Plains	59	74	45	20.7	248
Texas Rolling Plains	62	77	48	20	283
Texas Brazos Valley	68	80	57	35.4	352
South Texas	74	85	63	106	364

(Weatherbase, 2001)

Northern Alabama: Lawrence, Limestone, Madison
Southern Alabama: Autauga, Dallas, Elmore
San Joaquin Valley: Fresno, Kern, Kings, Madera, Merced, Tulare
Texas Coastal bend: Nueces, San Patricio
Texas Plains: Bailey, Castro, Cochran, Hale, Hockley, Lamb, Lubbock, Parmer, Swisher
Texas Rolling Plains: Fisher, Haskell, Jones, Kent, Mitchell, Scurry,
Texas Brazos Valley: Brazos, Burleson, Milam, Robertson, Williamson
South Texas: Cameron, Hidalgo, Willacy
Blank cells indicate data was not available.

Table 16: Growing Season Days & Dates of First and Last Frost

Region	Growing Season	Last Frost	First Frost
Northern Alabama	196	15-Apr	15-Oct
Southern Alabama	262	15-Mar	15-Nov
Arizona	303	15-Feb	15-Dec
San Joaquin Valley	303	15-Feb	15-Dec
Georgia	230	30-Mar	31-Oct
Louisiana	262	15-Mar	15-Nov
Mississippi	230	30-Mar	31-Oct
North Carolina	196	15-Apr	15-Oct
Texas Coastal Bend	303	15-Feb	15-Dec
Texas Plains	180	30-Apr	15-Oct
Texas Rolling Plains	230	30-Mar	31-Oct
Texas Brazos Valley	262	15-Mar	15-Nov
South Texas	303	15-Feb	15-Dec

(Source: WeatherBase, 2001)

Life Cycle of the Crop

The commercially grown cotton plant is considered an annual in the United States, although it is truly a perennial plant. In its native habitat, cotton does not die in the fall. Instead, the plant becomes dormant during periods of drought and resumes growth with the return of favorable weather conditions. The commercially grown plant is planted on an annual basis. Planting occurs during early spring. At crop maturation, the plant is defoliated, and then the lint and cottonseed are harvested. The plant is usually destroyed during field preparation for the next growing season.

Planting Dates

Table 17 presents the planting dates for the pilot states. Planting dates will vary because of the climatic differences among the growing regions. An early planting date is essential for early harvest and potential maximum yield realization. The optimum planting date takes into account soil temperature, weather conditions, and the seedling variety being planted.

Table 17: Planting Dates by State

Pilot State	Begin	Most Active	End
AL	12-Apr	Apr 24 - May 24	6-Jun
AZ	15-Mar	Apr 1 - Apr 30	15-May
CA	1-Apr	Apr 15 - Apr 30	15-May
GA	20-Apr	Apr 25 - May 25	5-Jun
LA	17-Apr	Apr 26 - May 16	2-Jun
MS	14-Apr	Apr 28 - May 28	9-Jun
NC	21-Apr	May 1 - May 20	8-Jun
TX	10-Mar	May 5 - Jun 6	30-Jun

(National Agriculture Statistics Service, 1997.)

Stages of Development

Cotton planting begins as early as February in South Texas and as late as June in northern areas of the Cotton Belt such as in the Plains of Texas. Seedlings emerge from the soil within one to two weeks after planting. Growers cultivate the rows of young cotton to provide a 6-to 8-week weed-free period following planting. Approximately 45-60 days after planting, depending on temperature, the cotton begins to bloom. Cotton first produces a small square (flower bud), which produces a white bloom. The white bloom turns pink after one day and then falls off as the bolls develop. Approximately 30 days after bloom, the boll is mature but not open. Under normal weather conditions, an open boll ready for harvest is produced approximately 65 days after bloom. Plant maturity can be determined by using a sharp knife to cut into the bolls. If the boll is watery or jelly-like on the inside, it is immature. If boll development is such that the knife cannot slice through the lint, the boll is nearly mature. If the seed coating is tan-colored and the seed leaves (cotyledons) are fully developed, the boll is mature.

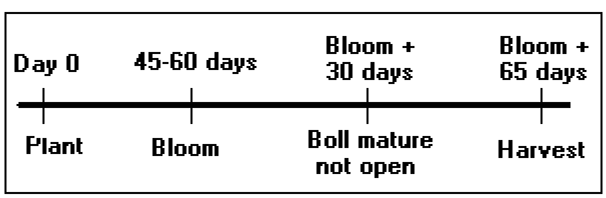


Figure 7: Plant Development

Planting

As mentioned previously, cotton is often planted in rows 30 to 40 inches apart. The typical interval is 38 inches. Planting concentrations range from 25,000 to 60,000 plants per acre. Planting concentrations vary according to climate conditions, soil types, and production efficiencies. Depending on the variety and seed depth planted, cotton emerges from the ground as early as five or as late as twenty days after planting. Seedling leaves appear on the day of cotton emergence. True leaves will appear seven to ten days later. After 30 to 35 days of vegetative growth, the first square will be formed on a fruiting branch (branch producing a boll) arising from the axial (node) of the fifth to seventh true leaf. This important event marks the visible beginning of reproductive growth. The plant will normally continue to produce additional fruiting branches in an orderly manner up the main stem. Fruiting branches are distinguished by their zigzag appearance, where a leaf and square are formed at each angle.

Each fruiting branch may produce several squares. However, over 90% of the harvestable bolls will be found at either the first or second position on a fruiting branch. When plant populations are high, 90% of the harvestable bolls may be found at the first position on the fruiting branch.

Bloom Period

Cotton normally blooms for 7 or 8 weeks. Stresses associated with drought, nematodes, and fertility can shorten the bloom period significantly. The bloom period also can be lengthened by poor fruit retention or excess nitrogen with adequate rainfall.

Boll Opening Period

The boll-opening period is a time that requires more monitoring of the crop than during the growth stage. The number of open bolls allows the producer to gauge the time schedule for defoliation and determine whether boll openers (chemicals to split the hulls on the bolls) are justified. Boll opening refers to the outer hull of the cotton boll splitting open revealing the white lint of the cotton inside. This event represents a fully matured cotton boll that is ready for picking once the lint has dried and reached the proper moisture level. Cotton is generally considered safe to defoliate when 60% to 75% of the bolls are open, preferably the latter. Percentage open is simply determined by counting the number of open and closed harvestable bolls on a sample of several plants in a field.

Defoliation

Defoliation generally refers to removal of the green leaves from the plant to aid in harvest. Timing of defoliation is critical to ensure optimum yield and fiber quality. Several factors can be used to determine the proper time for harvest-aid application. The first is the traditional method of counting open and unopened bolls. Defoliation should proceed when at least 60% (preferably 75%) of bolls are open. A second indicator involves slicing bolls with a sharp knife. Bolls are considered mature -- and ready for harvest aid applications -- when bolls cannot be sliced without "stringing" the lint. Bolls are mature when the seed embryo contains only tiny folded leaves (no "jelly" within the developing seed) and the seed coat begins to turn yellow or tan. Assuming the crop is uniformly fruited in the upper canopy, 4 bolls above the uppermost cracked boll are mature and ready for defoliation.

Harvesting

Cotton is an annual crop in the U.S., harvested mostly once per year. Like planting dates, harvest dates will vary dramatically across the U.S. because of the regional climatic differences.

Table 18 lists the normal harvesting periods for each of the pilot states.

Table 18: Harvesting Dates by State

State	Begin	Most Active	End
AL	22-Sep	Sep 20 - Oct 20	15-Dec
AZ	15-Sep	Oct 10 - Nov 10	25-Dec
CA	1-Oct	Oct 15 - Nov 1	15-Nov
GA	20-Sep	Oct 5 - Nov 15	15-Dec
LA	15-Sep	Sep 28 - Oct 20	13-Nov
MS	15-Sep	Oct 6 - Nov 3	17-Nov
NC	27-Sep	Oct 7 - Nov 15	15-Dec
TX	10-Aug	Oct 1 - Dec 2	28-Dec

(National Agriculture Statistics Service, 1997.)

Cotton harvesting typically involves two pieces of equipment: a cotton harvester and a cotton module builder. A cotton harvester picks cotton from the plants, while a cotton module builder compresses the cotton into large bales. Strippers and pickers are the two basic types of harvesters. Stripper-type harvesters strip the entire plant of both open and unopened bolls along with many leaves and stems. Special devices at the gin then remove any unwanted material. Strippers work most satisfactorily after defoliation, or when a frost has killed the green vegetative growth. Picker machines, which are often referred to as spindle-type harvesters and may be used for multiple harvests, remove the cotton from open bolls and leave the bur on the plant. The spindles, which rotate at a high speed, are attached to a drum that also turns, causing the spindles to enter the plant. The cotton fiber is wrapped around the moistened spindles and then taken off by a special device called the doffer, from which the cotton is delivered to a large basket carried above the machine.

Modules

The module builder permits the harvest operation to be independent of trailer availability and ginning capacity. This allows cotton harvest to proceed uninterrupted during favorable weather conditions. Cotton is usually stored in the field prior to ginning in a module. In general terms, a module is a stack of un-ginned cotton with a tarp over the top to repel rain. The modules are created by the module builder using hydraulics to compress and form the un-ginned cotton into a large rectangular shape. Modules should contain approximately 14 bales, or 21,000 pounds, of seed cotton. Several factors have an impact on the effectiveness of the module system. The most important factor is moisture. Cotton should be at or below 12% moisture at harvest. The cotton is normally monitored by temperature for 7 days to ensure no temperature rise that would signal decomposition. Modules are also placed where water will drain away from the module. Making modules too large causes handling problems.

Ricking

A practice that was more widely used in the past, but is not used as much any more is ricking. Ricking is the storage of seed cotton on the ground on the turnrow. Plastic is required to protect seed cotton in ricks from rain, but must be monitored for condensation of moisture on the underside of the plastic. Ricks should be placed on high, well-drained soils. Ricked seed cotton can be kept until the end of the gin season. Front-end loaders are used to pick up seed cotton and place it in trailers to be transported to the gin. Ricking is not used in humid, high-moisture areas.

Alternate-year Bearing

Cotton is not known as an alternate-year bearing crop, because it is destroyed and replanted the following year with the exception of rotations.

Cotton Marketing

When all the proper conditions are met utilizing the module storage system, seed cotton can be stored up to six months, if necessary, with little or no reduction in lint and seed quality. Ricks are typically removed from the field as soon as possible during the harvest.

Post-harvest Movement

Producer to Buyer

From the cotton field, the ginner usually picks up modules so that the ginner can maintain their schedule of operations during their "heavy traffic" portion of the season. The ginner usually receives the cottonseed as payment for both ginning and delivery of the cotton to the gin. Though agreements vary from region to region, this arrangement is the most prevalent.

After the ginning is complete, the lint fiber is baled into 480 to 500 pound bales wrapped in plastic. A sample is taken from every bale and delivered to the USDA classing office for that region. Once the cotton has been classed, or graded, the cotton can be marketed. If the cotton is not sold immediately at the current market price, the producer may store it for sale at a later date. The cottonseed is almost always sold immediately at the gin or storage facility as it is marketed directly at harvest.

Labor, Equipment, and Facilities

Availability of labor during harvest does not seem to be a limiting factor because of the nature of the cotton harvest. The cotton harvester and cotton stripper are single person operated pieces of equipment. While some farming operations run several harvesters at a time, most have made preparations well in advance to have labor available. Because many farms are family-owned operations, they are completely operated "within the family," making labor readily available.

The equipment is typically owned by the individual farmer and is well maintained both during the harvest and with preparatory maintenance prior to harvest. Some producers will choose to lease equipment if necessary.

Because the gins haul the cotton to their facilities and handle the process from that point forward, the producer isn't responsible for labor, equipment, or facilities beyond harvest.

Post-harvest Damage

Cotton can become damaged at several points after harvest, and moisture is the key to most of this damage. While still in the field, the cotton must be monitored closely for temperature changes in the modules. A significant temperature rise indicates decomposition is taking place. Once the temperature rise has been detected, the cotton must be immediately transported to the gin for ginning, or damage in the form of staining and weakened fiber will result. The cotton may also suffer mold and mildew damage if it is allowed to remain in the field. This in turn will result in a lower grade of cotton upon grading.

Moisture also presents a potential risk to the cotton module left in the field. The cotton must be kept dry and free of moisture and humidity, otherwise the cotton can suffer severe decreases in quality. If the module is placed in a poorly drained area or if the tarp leaks or is damaged during a storm, the cotton quality may be significantly reduced. When damage of this type occurs in the module, the producer suffers an economic loss. Cotton that may have earned $0.65 per pound when originally harvested would now likely only earn $0.55, resulting in a loss of $0.10 per pound. If this producer had a yield of 1,000 lb. he would basically lose $100 per acre.

Pricing Mechanisms

The cash market is the market where most growers normally sell their crop. Most producers contract with their local cotton buyers before harvest to sell their cotton at market price upon delivery. Cotton producers have several other options including:

- placing the lint cotton in an approved warehouse and obtaining a government loan, redeeming it at a later date for cash sale or forfeit title to the government;
- placing the lint cotton in a warehouse to hold for cash sale at some later date;

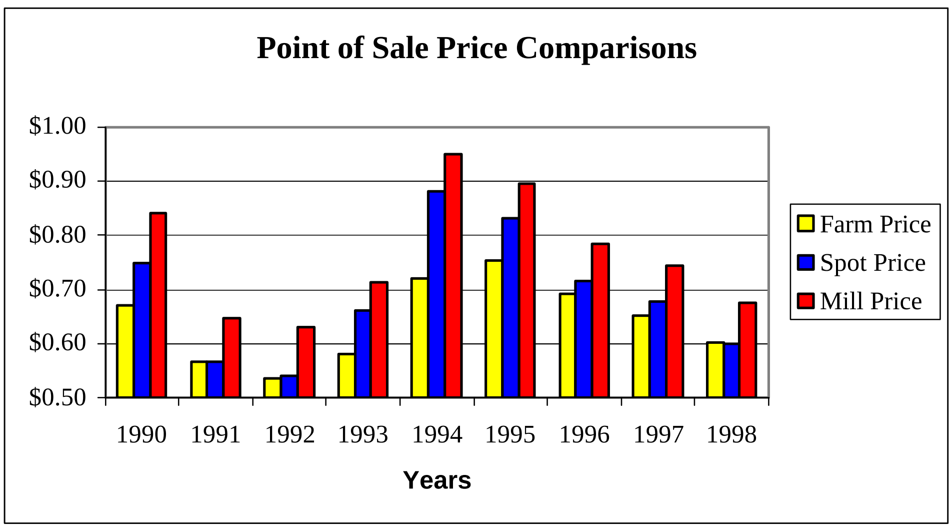
- contracting the crop to a buyer before harvest under specific terms that may vary;
- "hedging" using cotton futures and options and at harvest selling the lint cotton for cash or placing it in the government loan for future sale;
- and delivering to a producer-owned marketing organization.

Prices fluctuate throughout the various points of sale. Slight differences may be observed in farm price, spot price, and mill price. The following table and chart give a ten-year history of average farm, spot, and mill prices throughout the United States. The difference in the farm price and mill price can be attributed to the cost of hanging, trucking, shipping, etc. These additional expenses increase the mill price. Table 19 and Figure 8 illustrate the difference in prices at different points of sale at a national level. Prices in the pilot regions follow a similar pattern.

Table 19: Point of Sale Price Comparisons

Crop Year	Farm Price	Spot Price	Mill Price
1990	67.10	74.80	84.06
1991	56.80	56.68	64.69
1992	53.70	54.10	63.01
1993	58.10	66.12	71.24
1994	72.00	88.14	95.04
1995	75.4	83.03	89.58
1996	69.30	71.59	78.37
1997	65.20	67.79	74.44
1998	60.20	60.12	67.66

Average crop year prices for base quality upland cotton
Source: Compiled from reports of the Agricultural Marketing Service



(Source: Economic Research Service, 1999)
Figure 8: Point of Sale Price Comparisons

Price History

Table 20 shows historic prices of Upland cotton for the past 10 years by state. While we have mentioned that Acala cotton generally earns an average of 5 cents more per pound, due to quality, it is not separated from all other Upland prices in the NASS data represented in the table. However, average California prices are higher than other state averages. We conclude this is due to the Acala prices received, and the large portion of Acala production in California. Other than the differences in Acala prices, there are no price differences based on variety. Cotton prices are based on quality.

Table 20: Upland Cotton Price per Pound

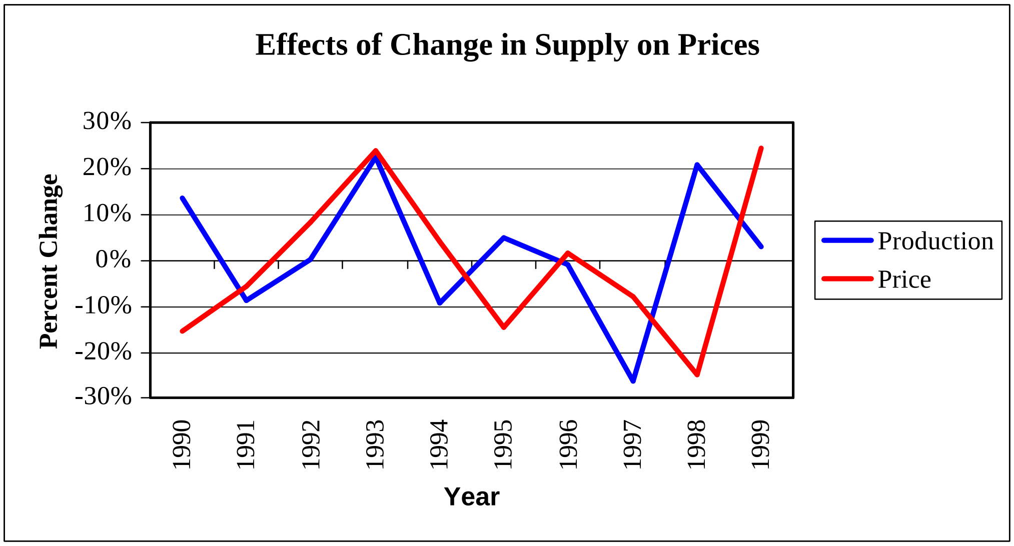
Year	($ per pound)							
	AL	AZ	CA	GA	LA	MS	NC	TX
1990	0.690	0.692	0.769	0.694	0.661	0.654	0.690	0.632
1991	0.566	0.604	0.666	0.600	0.531	0.552	0.593	0.536
1992	0.562	0.530	0.606	0.557	0.526	0.526	0.574	0.491
1993	0.571	0.581	0.657	0.599	0.577	0.575	0.577	0.535
1994	0.691	0.706	0.803	0.733	0.685	0.717	0.727	0.696
1995	0.729	0.729	0.821	0.766	0.732	0.734	0.783	0.746
1996	0.709	0.697	0.765	0.705	0.655	0.680	0.719	0.656
1997	0.673	0.647	0.732	0.677	0.649	0.649	0.659	0.601
1998	0.606	0.547	0.678	0.614	0.572	0.604	0.649	0.561
1999	0.478	0.439	0.562	0.453	0.444	0.451	0.475	0.410
2000	0.543	0.598	0.694	0.575	0.541	0.501	0.610	0.514

(National Agricultural Statistics Service, 2000.)

Table 21: Effect of Change in Cotton Supply on Price

Year	Production (1000 bales)	Price	% Change Production	% Change Price
1990	15147	0.671		
1991	17216	.568	14%	-15%
1992	15710	.537	-9%	-5%
1993	15764	.581	0%	8%
1994	19324	.72	23%	24%
1995	17532	0.75	-9%	4%
1996	18414	0.64	5%	-15%
1997	18245	0.65	-1%	2%
1998	13476	0.60	-26%	-8%
1999	16294	0.45	21%	-25%
2000	16799	0.56	3%	24%

(National Agricultural Statistics Service, 2001.)



(Source: National Agricultural Statistics Service, 2000)
Figure 9: Effects of Change in Supply on Prices

From Table 21 and Figure 9, there is a recognizable trend. Typically, when production decreases, price increases, and vice versa. This is the case in all years with the exception of 1992, 1993, 1994, and 1997. On average, a 2.1% increase in production over the last ten years was associated with a 9% decline in price.

Contracts

Producers have options in planning their marketing program for cotton. Available risk management tools include both forward contracts and futures markets. In our research, we have found that in some areas, these tools are used frequently and effectively, and in other areas, they are not used at all. The following section outlines the basic options available to cotton producers:

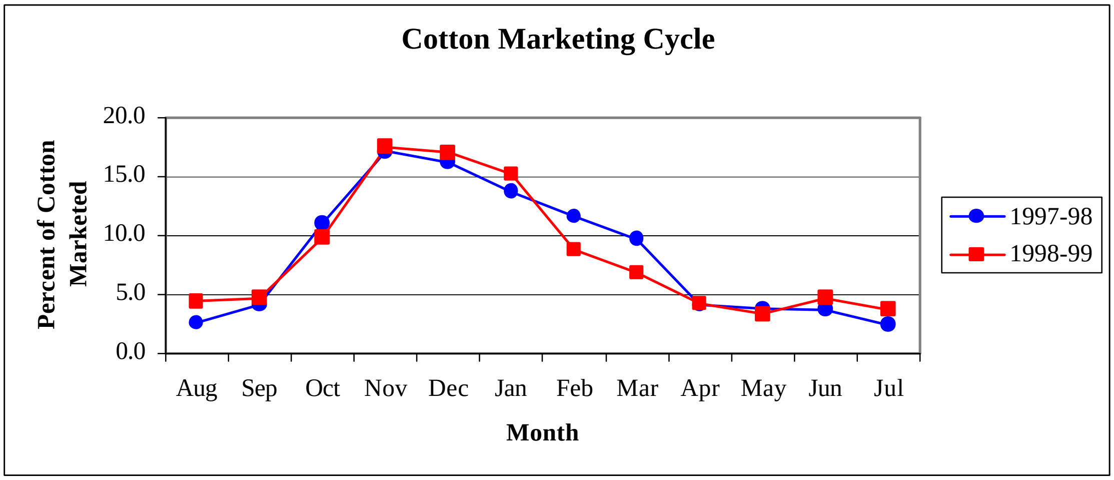
Cash Market – When a producer sells on the cash market, the producer is simply selling the crop at the current market price when the cotton "crosses the scales." This is the simplest method of crop delivery, and requires no out of pocket costs or margin money up front. The major disadvantage is that the producer is at the mercy of the current market price and will never know if he or she will make a profit until the crop is harvested and delivered. Even if the producer stores cotton for later sale, which occurs frequently in the northern states where on-farm storage is abundant, the producer is still speculating and could potentially lose more money if prices continue to decline.

Cash Contract – With a cash contract, commonly called forward contract, the producer is promising to deliver a specific amount of cotton at a specific price at harvest. The advantages of this method are that the producer knows the exact delivery price well in advance, no margin money is required, and that it is simpler and less costly than hedging in the futures market. The major disadvantage is flexibility, because the market price at the time of sale is rarely equal to the contracted price. Because of the contract, the price is locked in, and if market prices are above the contracted price, the producer must sell at the lower, already agreed upon price, forgoing potential profits. If the producer has a low yield crop year, and does not produce the contracted amount of cotton, the producer will have to buy the cotton on the open market to fulfill the contract. He could possibly pay more than the contracted price by buying it on the open market and have to assume a loss by selling at the contracted price.

Futures Market – The futures market offers the producer maximum flexibility, but at a higher price. The producer can buy put options that require someone to buy the cotton at a set price. If the price moves up, the producer can always sell at the higher price, and simply loses the premium he paid for the put option. If the price moves down, the put option purchased guarantees a floor price that the producer will receive. The producer can re-evaluate the situation throughout the season as the price changes and potentially lock in a better position. The major drawback is that futures and options cost money up front and sometimes require margin money depending on the particular type.

Marketing Season

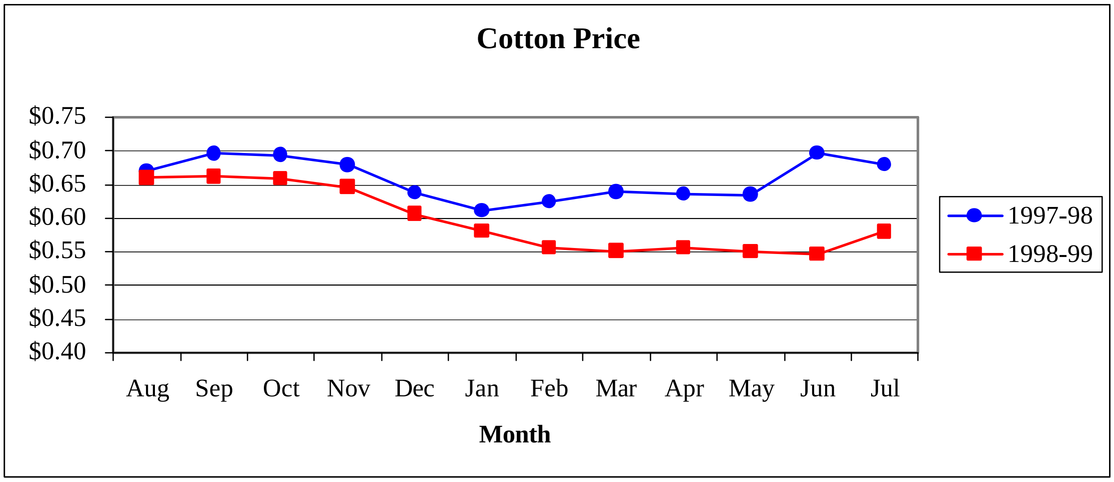
Cotton is not a commodity that is restricted by marketing windows. However, more of the crop is marketed at certain times than at others. Figure 10 shows the monthly percent of cotton marketed across the nation for two years. As expected, peak time for marketing cotton is November through January just after the cotton is ginned.



(Source: Economic Research Service, 2000)
Figure 10: Percent of U.S. Cotton Marketed by Month

Seasonal Cotton Prices

Figure 11 illustrates the changes in monthly prices that cotton producers received for two different years. While this is not a large sample of data, a price pattern can still be recognized. Prices are highest before harvest and decline during the months of peak marketing.



(Source: National Agricultural Statistics Service, 2000)
Figure 11: Monthly U.S. Cotton Prices

Grading Standards

Cotton, like most other commodities, is subject to grading standards published by the USDA. Appendix A contains the standards for grading and colors for Upland cotton. The written form of these standards is not very informative unless the actual samples provided by the USDA are available to visually inspect. Quality determination and control is particularly important in cotton marketing. Government classing offices categorize cotton samples based on grade, fiber length, uniformity, fineness, strength and whiteness. Variations of these characteristics within each bale of cotton are extremely costly to most producers, since the low end of the range for each characteristic is the accepted basis for trading. Grading standards and quality deficiencies are discussed in greater detail within the Loss Valuation section of the report.

Sampling

At the gin, cotton fibers are separated from the seed, cleaned to remove plant residue and other foreign material, and pressed into bales of about 480 to 500 pounds. A licensed sampling agent takes a sample of at least 4 ounces from each side of the bale and the 8-ounce total sample is delivered by the agent or designated hauler to the USDA classing facility serving the area. Gin and warehouse operators serve as licensed sampling agents and perform this function under USDA supervision.

Upon arrival at the USDA classing facility, samples are conditioned to bring the moisture content to specified ranges before the classing process begins. Samples are delivered to classing stations by conveyor. Fiber measurement results are electronically sent to the classing facility's computerized database and are immediately available to the customer. At this point, the producer can market the cotton. The classing process stays abreast of the ginning of the crop, providing producers and buyers with crucial quality information at time of sale. At the peak of the season, USDA classes and provides data on as many as 2 million bales per week, nationwide. USDA operates 13 cotton classing facilities in the regions of the U.S. that produce cotton and are referred to as the Cotton Belt. The facilities are designed specifically for cotton classification and are staffed exclusively with USDA personnel. USDA sells sample remnants, with proceeds applied to classification costs.

Marketing Orders

Cotton is not marketed under any state or federal marketing orders.

Crop Utilization

U.S. textile mills annually mill over 5 billion pounds of cotton fiber. More than half of this quantity (64%) goes into apparel, 28% into home furnishings and 8% into industrial products.

According to the cotton market outlook of the Economic Research Service, as competition from textile and apparel imports has forced restructuring in the U.S. mill industry, cotton consumption by mills has declined 2 million bales since the near-record 11.3 million in 1997/98. While the North American Free Trade Agreement (NAFTA) has hastened this change, the United States remains a key supplier of both semiprocessed products and raw cotton to Mexico. U.S. exports of raw cotton have generally accounted for about 25 percent of global trade in recent years. However, the downturn in U.S. total cotton demand in 2000/01 has generated more than a million-bale production surplus, pushing U.S. stocks to their highest level in 12 years. According to the USDA's Agricultural Baseline Projections to 2010, structural adjustments in the U.S. textile and apparel industry reflect full phaseout of the Multi-Fiber Arrangement's import quotas on textiles and apparel, scheduled to be complete in 2005. Following full liberalization of these restrictions, the United States is expected to import more processed cotton products, primarily apparel. Consequently, U.S. upland cotton mill use declines slightly throughout the baseline period.

Upland cotton exports increase after 2004/05, but export gains do not completely offset the decline in mill use.

Annual cottonseed production averages 5.7 million tons. More than 9 billion pounds of whole cottonseed and cottonseed meal are used in feed for livestock, dairy cattle, and poultry. More than 154 million gallons of cottonseed oil are used for food products, ranging from margarine to salad dressing.

Table 22 depicts crop utilization from 1989 to 1999. Domestic mill use is greatly affected by two factors, textile imports, and domestic retail demand. The table reflects a small range of fluctuation in mill use. Exports are affected by a much wider array of forces including foreign production, strength of the U.S. dollar, and foreign policy. This is reflected in the table below with a much wider range of fluctuation in export cotton.

Table 22: Cotton Utilization (bales)

Crop Year	Mill Use	Exports	Total
1989	8,759	7,694	16,453
1990	8,657	7,793	16,450
1991	9,613	6,646	16,259
1992	10,250	5,201	15,451
1993	10,418	6,862	17,280
1994	11,198	9,402	20,600
1995	10,647	7,675	18,322
1996	11,126	6,865	17,991
1997	11,349	7,500	18,849
1998	10,401	4,344	14,745
1999	10,200	5,700	15,900

(Source: Economic Research Service, 2000.)

Facilities

There are numerous facilities involved in moving cotton from harvest to the consumer. They can be privately owned by producers and others or they can be producer-owned cooperatives. The first is the cotton gin. The principal function of the cotton gin is to separate lint from seed, but the gin must also be equipped to remove foreign matter, moisture, and other contaminants that significantly reduce the value of the ginned lint. Gins must produce a quality of lint that brings the grower maximum value, while meeting the demands of the spinner and consumer.

Warehouses are necessary to store the baled cotton from the gin and the cottonseed, on occasions when storage is necessary. Most of the time, the cottonseed is directly marketed from the gin and shipped to the processor. Once the cotton is in bale form, it may be stored indefinitely. Almost all warehouses are owned by producer cooperatives, most of which are the same as the gin producer cooperatives.

Large corporations, such as consumer products retailers and livestock feed retailers, typically privately own the cottonseed processors. While the producer is responsible for the cotton bales, even in storage, the cottonseed is marketed directly from the gin and the producer's identity is lost immediately.

Handling of Crop

The National Agricultural Statistics Service published data detailing the quantity of cotton ginned in the United States. Table 23 summarizes the year 2000 ginning data on a state level. Appendix F breaks down ginnings by county, however, data is unavailable in some instances. The information is withheld in order to avoid disclosing individual gins and their capacity. Most information relating to processing capacity is kept strictly confidential.

Table 23: Bales Ginned in 2000

Pilot State	Bales (480 lbs.)
Alabama	551,750
Arizona	761,000
California	2,239,800
Georgia	1,669,000
Louisiana	936,150
Mississippi	1,707,000
North Carolina	1,452,400
Texas	3,978,700

("Cotton Ginnings," NASS , 2001.)

Risk Profile and Analysis

Natural Perils

Every cotton-producing state has suffered various types of losses. These types and their loss values are listed in tables in Appendix B. They are listed according to the significance of economic damage.

Weather

Drought

Cotton is considered one of the most drought-tolerant field crops grown in the United States. However, according to the article "Drought Management for Cotton Production," published by North Carolina Cooperative Extension, the Federal Crop Insurance Corporation rates drought as the greatest cause of disasters of cotton crops. This statement is also substantiated by the information contained in the Causes of Loss tables in Appendix BAppendix B. Drought before bloom can reduce the number of fruiting branches by first bloom. As the crop begins to bloom, it must begin filling bolls. This process causes the plant's demand for water to rise dramatically. Drought will not only slow down plant development, but will also cause the plant to shed small bolls and squares due to this increased demand for water. Drought following the bloom has the greatest effect on cotton yield and lint quality.

Heat and winds often accompany a season of drought, increasing the severity of the drought. In addition to contributing to drought, winds can strip cotton plants of their leaves and bolls and even break stalks. Winds can also be responsible for decreasing the effectiveness of irrigation and sprays by causing drift during application, as well as causing erosion.

Hail

Hail is one of the most prevalent natural perils for farmers. Hailstorms are responsible for beating and stripping cotton plants of leaves, branches, and the cotton bolls. Hail can cause a cotton farmer to suffer reduced or no yield, as well as reducing the quality of the crop.

Rain

While rain is a very important element for a successful crop, poorly timed rain can be detrimental to it. Rain on open bolls that are ready for harvest can delay harvest because the lint is too moist. It can also cause a reduction in the quality of the crop.

Weeds

Managing weeds is critical for successful cotton production. Cotton grows more slowly early in the season and is less competitive with weeds than other row crops. This often makes weed control more difficult than with crops like soybeans. Also, herbicide options are more limited than those of other crops. However, technological advancements have increased the weed management options for cotton. Cotton must compete against weeds for space, light, nutrients, and water. In addition to the effects of competition, trash, and stains caused by weeds reduce harvesting efficiency and negatively impact lint quality.

Insects

The management of insect pests is an integral part of any cotton production system. It increases producers' profits and reduces the amount of environmental contamination from pesticides. Protecting early fruit from insects sets the stage for a proper vegetative-fruiting balance during the remainder of the season. Failure to have proper scouting and/or poor timing of insecticide applications will ultimately result in reduced returns from each insecticide dollar.

Aphids

Aphids are slow moving, soft-bodied insects. Adult cotton aphids are approximately 1/10 of an inch long and roughly pear shaped. Aphids damage cotton by sucking juices from the plant and secreting honeydew. The secreted honeydew falls onto open cotton, and a black, sooty mold, which develops on the contaminated lint, may stain the lint. High populations on young cotton plants cause the leaves to curl down or crinkle. Plants may also become stunted and die, especially when they are young.

Beet Armyworm

The beet armyworm can cause a wide range of damage including damaged blooms, squares, small bolls, and may even bore into the stalk. Beet armyworm moths deposit eggs in masses, usually on the bottom of leaves. The newly hatched larvae feed en masse, skeletonizing leaves near their birthplace. As they mature, they disperse, eating the fruit and foliage.

Boll Weevil

The adult boll weevil is a brown to grayish-brown beetle. The larva is a small, legless grub with a brownish head and chewing mouthparts. Although adult boll weevil feeding causes little damage, it indicates the presence of weevils and that egg laying will soon follow. Most of the damage is due to larval development inside squares and bolls. Feeding larvae eventually cause cotton squares and small bolls to shed or damage developing lint in larger bolls. Heavily infested cotton may produce much foliage, but few mature bolls. The boll weevil has been a major pest of cotton for more than a century in the United States, seriously impacting cotton production and competitiveness in the international market. Boll weevil eradication has been in effect for several years, with eradication being achieved in the southeast and western cotton producing states. Ongoing programs are being conducted in the mid-south and southwest states with new regions adopting eradication programs every year.

Bollworm and Tobacco Budworm

Two of the most common cotton pests are the bollworm and the tobacco budworm. They are different insects, but the larvae are nearly identical when observed in the cotton field. The two insects are easily distinguishable during the adult (moth) stages. Newly hatched larvae usually begin feeding on tender leaf surfaces, younger squares and other tender vegetation before attacking the terminals. Larger larvae feed on the terminals and may even devour the contents of large bolls. Feeding damages or destroys the squares, blooms, and bolls. Injured squares flare and drop from plants usually within 5 to 7 days. Large larvae feed on bolls, squares, and pollen in open flowers.

Cabbage Loopers

Cabbage Loopers are light green insects that feed upon leaf foliage, with feeding occurring on the leaf area between the leaf veins, leaving a net-like appearance. Severe feeding while immature bolls are in the field reduces yield significantly, while feeding damage late in the season may not cause any loss of yield.

Cotton Fleahopper

The adult cotton fleahopper is approximately 1/8 inch long. It is flat with an elongated, oval outline and prominent antennae with a yellowish-green body. The cotton fleahopper feeds on anthers of small squares and sucks sap from leaf buds. Its feeding causes the squares to turn brown and die, resulting in a "blasted" appearance. When fleahoppers are abundant, heavy bud loss may occur on preflowering plants. The cotton fleahopper prefers terminal bud clusters including young leaves and tiny squares. The piercing, sucking habit of nymphs and adults interferes with normal growth patterns in cotton.

Cotton Leafworm

The cotton leafworm damages cotton by destroying the foliage and staining the fiber. Feeding patterns of cotton leafworms are characteristic because they feed on the underside of leaves between the veins, skeletonizing them. The skeletonizing of leaves causes a reduction in photosynthetic potential. Although this insect is essentially a leaf feeder, it can attack squares and small bolls.

Cutworms

Several species of cutworms attack cotton in the seedling stage causing wilted plants, or plants that are cut off at the ground. The larvae usually feed at night and hide in the soil or under leaf trash during the day. The larvae vary in color, are often greasy-looking, and curl up into a ball when touched.

Fall Armyworms

Fall armyworm larvae have distinct body hairs, are light to medium brown, and have a smooth appearance. Fall armyworms prefer blooms and bolls and can feed on mature bolls that are normally resistant to bollworm penetration. When abundant, they generally eat all available foliage and then crawl in armies to adjoining fields. Fall armyworms are general feeders and do not confine themselves to cotton.

Tarnished Plant Bug (Lygus Bug)

These insects feed by inserting their needle-like mouthparts into the tender plant parts and sucking sap. Small squares usually turn dark and drop off, while bolls may develop abnormally. Feeding on squares and small bolls usually causes fruit shed. The most important period of plant susceptibility is during the first 3 weeks of squaring with the first week being the most critical. During heavy infestations fruit removal can be excessive and of economic importance. Occasionally, damaged squares and bolls do not shed. Although squares may bloom, floral parts are damaged and show evidence of feeding. If an injured boll does not shed, it opens abnormally and may have lint damage.

Spider Mites

Mites damage cotton by feeding on the sap of leaves, stems and squares. Since they suck sap and chlorophyll from the leaves, it reduces the photosynthetic area and interferes with normal maturation of the cotton plant. Leaves may turn reddish when the infestation becomes heavy. Spider mites cause more harm to cotton plants during hot, dry weather and usually attack cotton in the latter part of the season.

Stink Bugs

Stink bugs begin invading cotton in early to mid-July and can build to damaging levels in August. They feed by inserting their long, piercing mouthparts and sucking out the plant juices, thereby injuring squares and bolls. This may cause small bolls to fall from the plants. Although larger bolls commonly remain on the plant, feeding injury results in hardened, dry locks. At each feeding site there is a hardened spot. Lint beneath the feeding spot may be stained or reduced in grade. Boll-rotting organisms also are associated with the feeding of these insects.

Thrips

Thrips are small insects that feed on the cotton plant, resulting in reduced yield, reduction in stand, stunting, and delay of plant growth. Adult and larval forms of thrips feed on young leaves, terminals, and other plant parts. Thrips are early season pests of seedling cotton. They may be a problem under cool, wet conditions when plant growth is slowed. They may be especially numerous in cotton grown near maturing small grains. Thrips damage cotton leaves and terminal buds. Their feeding ruptures cells that cause stunted plants and crinkled leaves that curl upward. During severe infestations, terminal buds may be destroyed, causing excessive branching of the plants and delaying plant growth.

Whiteflies

The adult whitefly is about 1/16 inch long and snowy white. These moth-like insects are very active and fly readily when disturbed. These insects are easily observable when flying about the cotton plant. They excrete honeydew much like aphids. Infested leaves lack vigor, wilt, and may turn yellow.

Nematodes

Nematodes are a plant parasite that attack the root system of the cotton plant, resulting in stunting, wilting, and reduced yields. Nematode populations build up during the growing season and are usually highest in August or September. Nematodes can be managed, but are rarely ever eliminated from a crop.

Root-knot Nematode

This nematode is fairly widespread throughout cotton growing regions, is usually found in spots or areas within a field, and is rarely found in the entire field. Root-knot nematodes are normally limited to sandy soils. Galls on the root are the trademarks of the root-knot nematode.

Reniform Nematode

Reniform nematodes may start out as spots in a field but quickly spread through the entire field. This nematode is almost impossible to recognize on the roots, as it does not present any distinctive symptom.

Diseases

Ascochyta or Wet Weather Blight

Both seedlings and older plants are susceptible to Ascochyta and wet-weather blights, but younger cotton is more seriously injured. An entire stand may be lost as a result of the fungus attacking the hypocotyl and killing the plant. Serious outbreaks of the disease may follow extended rainy periods with serious defoliation occurring. The damage is generally spotty and many plants recover when dry, warmer weather returns. The disease occurs on the leaves, stems, and branches.

Bacterial Blight

Bacterial Blight is also known as angular leaf spot, vein blight, black arm and boll rot, depending on the portion of the plant infected. This organism affects all above ground parts of the cotton plant during any stage of its growth. Infected leaves shed from seedlings and older plants. Occasionally, a black, water-soaked area occurs along a large vein in a leaf. Spots on bolls appear as round, water-soaked areas, but later turn dark brown or black. Spotted bolls may fail to open and lint may be discolored with a yellow stain. Before boll rot is evident, dark, irregularly shaped spots can be found on bracts surrounding the lower portion of the boll. Black spots or cankers may occur on the stems or branches (black arm) causing girdling and death of some branches.

Cotton Root Rot

Root rot appears suddenly, starting in early summer. It causes rapid wilting, followed by death of the plants within a few days. Usually, the leaves of the plant are not shed, but remain attached. The disease kills plants in circular areas ranging from a few square yards to an acre or more in size. The root system of affected plants decays. Scraping the taproot reveals darkened, reddish to wine-colored stain. If examined soon after death, the stems will be near normal color internally. Vascular streaking is not present as in the wilt diseases. Fine, light brown strands of fungal threads (rhizomorphs) are usually found on the roots. Under moist conditions, spore mats may appear on the soil surface near diseased plants.

Seed Rot

A number of organisms in the soil and on or in the seed cause seed decay, a soft watery rot. Seed deterioration can also result from improper handling of seed during harvest.

Vascular Wilt Diseases

Vascular wilt diseases are caused by soil borne fungi. Since the symptoms of both Fusarium and Verticillium wilts are similar, they are quite often confused in the field. Examining the internal discoloration of the stem is the best way to determine which wilt is present.

Fusarium Wilt disease - This fungus may attack cotton seedlings, but the disease usually appears when the plants are more mature. Seeds from diseased plants can become infected and serve to spread the fungus. Affected plants are first darker green and stunted, followed by yellowing of the leaves and loss of foliage. First, symptoms appear on lower leaves around the time of first flower. The leaf margins wilt, turn yellow, then brown, and move inward. Infected plants fruit earlier than normal with smaller bolls that open prematurely. Wilting occurs rapidly following a rain preceded by a dry spell. Soils in which Fusarium wilt occurs also favor root knot nematodes and the two are often found together. Control of nematodes is of major importance in reducing Fusarium wilt.

Verticillium Wilt disease - Young plants infected with Verticillium wilt show yellow leaves and stunting, and often die. Following the seedling stage, older plants exhibit a chlorotic mottling on the leaf margins and between the major veins. Plants attacked during later stages of growth display a mottling on the lower leaves first, later progressing toward the top of the plant as the season progresses. Often a single branch shows symptoms in the early stages of disease. Yellow progresses inward, followed by brown, and the leaf finally dies. Severely affected plants shed all their leaves and most of their young bolls. The fungus causing Verticillium wilt can survive in the soil as small, dark resting bodies called sclerotia. The sclerotia can withstand adverse environmental conditions. Susceptible plants growing in Verticillium infested soil may not be severely attacked if environmental conditions are not suitable for fungal growth. The disease is more prevalent during periods of cool, wet weather.

Economic Perils

As with any commodity, the cotton industry faces numerous economic perils such as:

- Imports – increased imports increases domestic supply
- Exports – decreased exports increases domestic supply
- Consumer Spending – decreased spending reduces cotton mill use, which reduces cotton demand
- Monetary Exchange Rates – unfavorable exchanges rates for the US dollar can reduce exports
- Supply – an increase in supply drives price down
- Demand – a decrease in demand drives prices down
- Input Costs – an increase in input costs increases production costs

While this list reflects numerous perils, their impact can be reduced to impacts on gross income and expenses. With respect to income, income is derived from price, which is ultimately determined by the levels of supply and demand. As for expenses, any changes to input costs are directly reflected in the production costs.

So to the individual producer, the greatest economic perils derive from price changes and production / input cost changes. Accordingly, impact on a producer's economic risk can be illustrated by relating these two variables as shown in Table 24. The conclusions from this table is that whenever prices fall or production costs increase, the cotton producer runs a greater risk of loss as the change increases the chance that income will not cover expenses. The greatest risk occurs when production costs increase and price decreases.

Table 24: Impact of Price and Production Costs on Risk

		Production Costs	
		↑	↓
Price	↑	-	↓
	↓	↑	-

The USDA ERS provides economic outlooks for various commodities. As published in the ERS' Cotton and Wool Outlook Reports, cotton producers have faced the economic peril of declining prices over the past six years (Table 25). There has been a decline in price even though acreage has remained relatively constant and production has declined as well. This can be attributed to a decline in net exports over the past six years resulting in ending stocks of cotton increasing from 1995 to 1996 and remaining relatively constant through 2000. With the supply of cotton not decreasing and demand not increasing (mill use declined as well), the price for cotton has not been able to rebound to breakeven levels. If the current market situation persists, cotton producers will continue to face economic uncertainty.

Table 25: Economic Information of U.S. Cotton from 1995 through 2000.

COTTON	Units	1995	1996	1997	1998	1999	2000
Price	$/lb.	0.77	0.71	0.66	0.65	0.45	0.40
Acres Planted	mil acre	13.89	14.64	13.89	13.39	14.87	15.35
Acres Harvested	mil acre	13.33	12.87	13.41	10.68	13.42	13.37
Production	mil lbs	8755.20	8640.00	9019.20	6681.60	8145.60	8197.92
Imports	mil 480 lb bales	0.40	0.41	0.01	0.44	0.10	0.55
Exports	mil 480 lb bales	0.89	0.80	0.69	0.62	0.60	0.71
Net Exports	mil 480 lb bales	0.49	0.39	0.68	0.18	0.50	0.16
	mil lbs	235.20	187.20	326.40	86.40	240.00	78.00
Ending Stocks	mil lbs	1636.80	1905.60	1857.60	1891.20	1881.60	1789.92
Mill Use	mil lbs	5376.00	5342.40	5448.00	4992.00	4915.20	4780.80

Loss Potential

When assessing the significance of both natural and economic perils, for purposes of Cost of Production Insurance, the total possible losses are more important than the cause of the loss. Under COP, the cause of loss (unless uninsurable) has no bearing on the indemnity paid. The presiding factor is whether or not the expenses actually incurred by the producer are greater than the income from that crop, minus the deductible. If expenses are greater than income, then the producer receives an indemnity payment. The following analysis by AgriLogic, Inc., estimates potential losses by region by estimating average loss per county and total county/region loss. The following methodology was used:

Attempts were made to obtain a historical data set of producer yields for each county from the Farm Service Agency's (FSA) national databases. However, there was inconsistency in the available data sets and the producer-level yields could not be utilized, therefore county-level yields were used. AgriLogic recognizes the less variable nature of county yields and therefore has incorporated variability in yields by applying the standard deviation in the average historical county yield. In performing the potential loss calculations, the standard deviations were applied to the county average yield to account for producer-level yield variability.

A normal distribution was assumed in order to allocate a percentage of the producers to each yield distribution. AgriLogic made the assumption that the majority of the producers would have an average yield. The distribution was 50% of the producers have an average yield, 20% of the producers would have an increase in yield of one standard deviation and 5% of the producers would have an increase in yield of two standard deviations. The converse was used as well, 20% of the producers would have a decrease in yield of one standard deviation and 5% of the producers would have a decrease in yield of two standard deviations.

To estimate loss, three elements are necessary: yield, price, and cost of production. First, county-level yields were collected from 1991-2000 in each of the regions to reflect the yield pattern for the last ten years. If there was more than one county in the particular region, the yields were averaged. The yields were then adjusted using two standard deviations above and two standard deviations below the base yield. Yields were adjusted to take into consideration producers in the region with above and below normal yields. Next, state-level prices were used for the same time period to reflect a similar price pattern. The expenses per acre (cost) of growing the commodity were then determined using the region's average cost of production. These expenses were based on average enterprise budgets in a given year. For each year after the budget was dated, a 2.031% rate of inflation [average annual rate of inflation for the Gross Domestic Product (GDP) from 1991 – 2000] was factored in and for each year prior to the representative budgeted year, the expenses were decreased 2.031%.

To begin the calculation, the 10-year average yield was multiplied by the 10-year average state price to determine the average expected gross income per acre. For any years that the average cost of production expenses were greater than the expected gross income, the expected gross income was used in place of the expenses. When the expenses were less than the expected gross income, the expenses were used, and were inflated or deflated at a rate of 2.031%, up to the expected gross income. This calculation was preformed to ensure that a producer was not guaranteeing an indemnity payment. (Under COP insurance, producers are only allowed to insure expenses up to their expected gross income for the year). Next, to determine the potential loss, the production expenses were multiplied by the coverage level elected and the result was subtracted from the expected gross income. If the resulting number was positive, no loss occurred. If the amount was negative, the potential loss was the absolute value of the resulting number. The loss for each year was determined by taking into account the percentage of producers who were expected to fall within each of the deviations. Again, this was done to take into account the potential loss for average producers and producers who fall above or below the posted average yield. The losses for each of the ten years were added together, and divided by ten, to calculate the average payout per acre, per year. To determine the total area payout, the average payout was multiplied by the number of insured acres in the area, according to the Federal Crop Insurance Corp. 2000 Crop Year Statistics Business Summary. A sample potential indemnity calculation used to estimate loss is provided in Appendix C.

Table 26 summarizes the AgriLogic, Inc. estimates of loss for each region.

Table 26: Potential Indemnity Payouts

Region	Average Liability Per Acre	Average Payout Per Acre	Insured Acreage	County Payout For Insured Acreage
Northern Alabama	$292.83	(20.76)	169,774	($3,524,919.05)
Southern Alabama	$246.72	(24.26)	38,415	($931,948.91)
Arizona	$573.56	(4.96)	189,888	($942,320.03)
San Juaquin Valley	$536.21	(2.75)	625,737	($1,722,973.21)
Georgia	$333.23	(9.04)	170,968	($1,545,615.59)
Louisiana	$330.96	(6.38)	269,370	($1,717,597.70)
Mississippi	$350.56	(12.07)	301,451	($3,638,854.84)
North Carolina	$190.99	(0.67)	153,060	($102,472.02)
Texas Coastal Bend	$258.06	(21.92)	222,015	($4,867,469.65)
Texas Plains	$248.66	(16.33)	1,628,930	($26,602,885.26)
Texas Rolling Plains	$119.27	(13.86)	356,905	($4,945,869.06)
Texas Brazos Valley	$188.09	(0.20)	78,208	($15,947.30)
South Texas	$234.25	(16.56)	251,638	($4,167,595.09)

(Source: AgriLogic, Inc., 2001)
(Source: *Federal Crop Insurance Corp. 2000 Crop Year Statistics as of 9/23/01)

Based on these estimates, those regions with low estimated losses could expect lower premiums under the proposed Cost of Production program.

Loss Valuation

Loss valuation and grading standards go hand in hand. Cotton is unique in that if the crop can be harvested, it can be utilized in some form or another. Higher-grade cotton is utilized for fine fabric, while lower grade cotton may be used in bed mattresses.

Quality Deficiencies

Quality deficiencies that lead to lower prices are derived from the cotton grading standards as published by the USDA. When the cotton is graded below the highest standard for each category listed below, the cotton receives a lower grade, and is then marketed for a lower price.

Color-- Cotton must fall within a range of color standards established by the USDA. Essentially, the whiter the color is, the higher the grade. The grading standards are attached as Appendix A. Unless producers have obtained an official sample from the USDA to visually observe, understanding the written standards is difficult at best. The color of cotton fibers can be affected by rainfall, freezes, insects, fungi, and by staining through contact with soil, grass, or the cotton plant's leaf. Excessive moisture and temperature levels can also affect color while cotton is being stored, both before and after ginning.

Strength **--** Fiber strength is largely determined by variety. However, it may be affected by plant nutrient deficiencies and weather. To test for strength, a "beard" of cotton is clamped in two sets of jaws, one-eighth inch apart, and the amount of force required to break the fibers is determined. There is a high correlation between fiber strength and yarn strength. Also, cotton with high fiber strength is more likely to withstand breakage during the manufacturing process.

Length **--** The cotton plant's exposure to extreme temperatures, water stress, or nutrient deficiencies may shorten the fiber length. Excessive cleaning and/or drying at the gin may also result in shorter fiber length. Fiber length affects yarn strength, yarn evenness, and the efficiency of the spinning process at the textile mill.

Micronaire **--** Micronaire is a measure of fiber fineness and maturity. An airflow instrument is used to measure the air permeability of a constant mass of cotton fibers compressed to a fixed volume. Fiber fineness affects processing performance and the quality of the end product in several ways. Yarns made from finer fiber result in more fibers per cross-section, which in turn produces stronger yarns. Dye absorbency and retention varies with the maturity of the fibers. The greater the maturity, the better the absorbency and retention.

Trash-- Any trash (plant leaves, stems, etc.) in the harvested cotton degrades the quality of the cotton. Trash also holds much more moisture than the cottonseed and lint; therefore deductions in grade are quite severe as the amount of measurable trash increases.

Table 27 depicts the quality of Upland cotton for the 2000 crop year. On average, approximately 50% of the cotton was of the highest grade, with 82% of the cotton scoring in the higher quality "white grade."

Table 27: Quality Summary of Upland Cotton

	PERCENT OF BALES									
	WHITE GRADES				LIGHT SPOTTED GRADES				OTHER	BARKY
CLASSING OFFICE	MID+	SLM	LM-	TOT	MID+	SLM	LM-	TOT	GRADES	GRADES
Florence, SC	72.7	23.7	0.8	97.2	1	1.4	0.1	2.5	0.3	2.5
Macon, GA	30.3	43.5	11.8	85.6	0.9	8.5	4.1	13.5	0.9	3
Birmingham, AL	53.1	28.4	5.4	86.9	4.1	6.2	1.6	11.9	1.2	2.6
Rayville, LA	39.3	38.8	4.1	82.2	5.7	8.9	2.4	17	0.8	0.3
Memphis, TN	56.8	27.7	1.7	86.2	5.4	7.2	1	13.6	0.2	0.4
Dumas, AR	32.1	38.3	3.1	73.5	5.6	16.5	3.6	25.7	0.8	0.4
C. Christi, TX	63.4	14.6	1.9	79.9	11.2	7.2	1.1	19.5	0.6	1.8
Abilene, TX	52.2	5.7	4.2	62.1	16.4	5.7	8.2	30.3	7.6	21.6
Lubbock, TX	34.8	24.9	1.5	61.2	12	21.8	1.6	35.4	3.4	33.8
Lamesa, TX	46.6	17.8	0.6	65	16.3	15.2	0.6	32.1	2.9	20.8
Phoenix, AZ	62.5	28.7	4.1	95.3	3	0.7	0.4	4.1	0.6	6.4
Visalia, CA	81.7	15.2	0.7	97.6	1.6	0.3	0.1	2	0.4	0.2
AVERAGE	52.4	27.2	3.1	82.8	5.6	8.6	1.8	16	1.2	

(Cotton Incorporated, 2001.)

Legend

MID+ Percentage of bales classified as Middling, Strict Middling, and Good Middling
SLM Percentage of bales classified as Strict Low Middling
LM- Percentage of bales classified as Low Middling, Strict Good Ordinary, and Good Ordinary
TOT Total percentage of bales classified as "White."
Other Grades Percentage of bales classed as "Spotted," "Tinged," "Yellow- Stained," or "Below Grade."
Barky Grade Percentage of bales from each classing office containing bark.

Alternative Uses

No real alternative uses exist for cotton. Virtually all cotton that is harvested is utilized in some form. The particular use of the cotton depends on the grade, color, fiber length, and fiber strength. For example, high-grade cotton would probably be spun at a textile mill into cloth to be used for garments, sheets, etc. Lower grade cotton that is damaged with poor quality color will more than likely be used in the making of products such as bed mattresses, or something else less visible to the naked eye. Prices received for the cotton is strictly determined by the grade of cotton. The typical range from the highest to lowest grade is 15 to 20 cents per pound of cotton.

Production Budgets

Budgets have been collected from extension, Farm Credit Banks, and individual producers. To date, AgriLogic has collected approximately 199 cotton budgets. Multiple budgets should be collected throughout a given year to make accurate comparisons. In some cases, expense categories vary so the categories were organized into three general categories: fixed, variable, and land. Averages and standard deviations were calculated to help explain discrepancies between expenses. Appendix D contains a sample budget form listing individual expense categories. A table providing the averages and standard deviations is also provided in Appendix D.

In Alabama, 13 Farm Credit Bank budgets were used to find an average cost and standard deviation ranging in date from 1992-2000 and fourteen producer budgets were used ranging in date from 1998-2000. In Arizona, 4 extension, 6 Farm Credit Bank, and 1 producer budgets were used ranging from 1996-2001 in date. For California, AgriLogic used 31 producer budgets and 6 extension budgets ranging from 1995-2001. One 2000 producer budget was used for Georgia. For Louisiana, 3 Farm Credit Bank budgets and one producer budget was used; they were all for 2001. One 2000 North Carolina producer budget was used, and in Texas 44 Farm Credit Bank budgets and 3 producer budgets were used. For Texas the budgets ranged from 1991-2000.

Timing of Inputs

Table 28 gives an estimate of typical input times. It should be noted that pilot regions in South Texas would have slightly earlier input times for most expenses. All other pilot regions follow about the same timeline.

Table 28: Timing of Inputs

Expense	Time of Input
Fertilizer	Before planting
Chemicals	Some before planting; mid April to mid May through July
Seed	April
Fuel, Lube, Utilities	Mid March through first week of July
Repairs & Maintenance	Many producers do annual maintenance work in the winter; other repairs and maintenance are ongoing
Hired Labor	Mid March through August
Other Labor	Mid March through August
Custom Applications	Some fertilizer custom applications are done prior to planting; most other custom applications are done mid May through August
Harvesting/Picking	Mid September through October
Ginning	Mid September through October; ginning costs are usually covered by seed costs; in the event that seed costs exceed ginning costs, the producer receives a rebate
Irrigation	June - August 20
Other Variable Costs	Throughout season
Operating Loan Interest Expense	Increase throughout the season
Land Fees	Cash rent - April; Share rent - after harvest
Commodity Insurance	End of season
Capital Replacement	Throughout season
Other Fixed Expenses	Year round

Loss Control Techniques

Cotton producers have several management tools available that can prevent losses throughout the production cycle. Most are considered common sense practices that must be carried out during the seasons as a part of good farming practices.

Specific Techniques

Variety Selection

Variety selection is one of the first steps in planting a successful crop. Different regions have different soil characteristics, different weather patterns, and several other area specific characteristics that must be considered when selecting the variety.

Planting Date

Another key factor early in the season that will determine the degree of success is timely planting. Achieving an early stand paves the way for a uniform crop that will grow rapidly in favorable weather conditions during early spring. An early crop also allows the cotton plants to achieve a good root system before weeds and grass set in. Another benefit is an earlier harvest, because more favorable weather is generally associated with an early harvest. The probability of fewer harvesting delays will result in less weight loss in the field.

Planting Methods

It is important that cotton is planted on ground that will allow for a good stand. This ground needs to be free of living vegetation. Most planting is done on flat or raised beds. However, in Texas, some planting is done in furrows to allow the cotton optimum moisture levels; according to one Texas producer, this practice is usually unsuccessful and should not be considered a good management practice. Ultra narrow planting is still in a trial phase and should not be a producer's only method of loss control. Skip row planting is common, and usually has good results.

Early Season Insect Control

The first 3 to 4 weeks of fruiting represents 75% or more of the total crop yield as well as the highest quality fiber. These early fruit positions are critical to a good crop yield and must be protected by spraying when necessary. Cotton producers must scout their fields closely to make sure the insect population is under control and the crop is making adequate progress.

Fertilizer Program

Plant nutrients must be available in sufficient quantities for proper growth and development. On heavier-textured soils, all fertilizer materials may be applied before planting. On sandy soils, half the nitrogen and all the phosphate are typically applied preplant. The remaining nitrogen is usually applied, sometimes through the irrigation system, before squaring. The peak use of nutrients occurs during the fruiting period. Moderate to high phosphate levels must be available in soils surrounding the seed zone to encourage germination and rapid seedling emergence, especially during sub-optimum planting conditions. Rapid emergence and continued growth of healthy seedlings plays a key role in determining the health of the crop. Adequate nitrogen levels are highly important early in the planting season, but should be low or near depletion at the end of the season. This makes the plant less attractive to insects and conditions the plants to be more responsive to the harvest-aid program or defoliation.

Cost of Production Insurance Loss Control Techniques

Cost of Production (COP) Insurance is intended to cover against losses relating to price (be it due to market or quality issues) in addition to yield. Under most other insurance programs, growers are primarily concerned with causes relating to yield loss (CAT and MPCI) or loss in income (AGR), but not both. Therefore, loss control techniques recommended under the COP Insurance program would utilize a combination of the loss control methods implemented under yield and revenue programs. However, other than situations where the commodity can be contracted, low prices due to the commodity market are generally out of the grower's hands. Therefore, growers should concentrate on implementing control techniques that ensure against loss in quality and yield. Producers who can contract their commodity for a specific price and do so would be implementing a loss control technique against low market prices

Initial Insurability Requirements

The following requirements will be included in the Basic Provisions of the Cotton COP Insurance provisions:

- (a) Insured must have share of the crop,
- (b) The crop is not (unless allowed by the Special Provisions or by written agreement):
  - (1) Colored cotton lint;
  - (2) Planted into an established grass or legume;
  - (3) Inter-planted with another spring planted crop;
  - (4) Grown on acreage from which a hay crop was harvested in the same calendar year unless the acreage is irrigated; or
  - (5) Grown on acreage on which a small grain crop reached the heading stage in the same calendar year unless the acreage is irrigated or adequate measures are taken to terminate the small grain crop prior to heading and less than 50% of the small grain plants reach the heading stage.

Cost of Production Information

The COP Insurance Program allows producers to insure their costs of production against multiple perils and causes of loss. Therefore, costs of production budgets are necessary for the development of this program.

Availability of Records

Many avenues have been explored in efforts to collect this data on state, county, and producer levels. Not only have we contacted producer cooperatives, commodity associations, marketing groups, extension services, and universities, but we have also made requests to the producers themselves at the commodity listening sessions. Budget forms are available from our office or on our website. These budgets contain information on specific costs per acre to produce commodities in the pilot areas. These costs may include fuel, fertilizer, labor, packing and selling expenses, and equipment, among others. For COP Insurance purposes, the expenses are divided into variable, fixed, and land expense categories. A categorized list of insurable expenses for the COP Insurance program is provided Appendix D.

Quality and availability of this data is of importance. As the scope of data collection narrows toward an individual producer level, data becomes less available. Some producers are reluctant to provide information about their operations because of competition. The same can be said of Farm Business Associations, cooperatives, and other organizations, many of which have strict confidentiality policies.

These budgets will be used as guides to establish limitations on budget expenses. The reliance on gathering budgets diminishes, even disappears, as the program begins the pilot phase. First, a requirement of the policy is to never insure expenses greater than expected gross income. Under current economic conditions, expected gross income rarely exceeds production costs. Accordingly, for purposes of estimating risk, expected gross income will be the value used in determining potential liability. Secondly, the producers, at the time of application and at time of claim (if applicable) will be providing budget information necessary to establish the database for production costs to be used in the rating of the policy. All producers who take out a COP Insurance policy will provide their expenditures at the time of application. Eventually, producer information provided at time of application would become the database and the information used in rating. Therefore, the program becomes self-sustaining.

Cotton is measured in pounds or bales per acre. One bale is equivalent to 480 pounds of cotton lint, although actual bale weights often range from 480 to 500 pounds. About two thirds of the harvested crop is composed of the seed, which is crushed to separate its three products–oil, meal and hulls. The cottonseed makes up about 15% of the total financial return to the farmer, which is typically “traded” for the ginning costs. Fiber is the most important factor, but the cottonseed’s value is high enough to ensure great interest in cottonseed economics, since 15% can be more than the margin of profit in many farming operations.

Yield Estimation

Yield estimates are not necessary for Cost of Production Insurance, unless the crop produced will not be harvested. In that case, the adjustment methods found in the Cotton Cost of Production Loss Adjustment Manual will be used to determine yield.

Potential Impact of the Proposed Program

The proposed Cost of Production Insurance program is being designed to enhance the basic insurance program by providing an alternative to Catastrophic (CAT) level insurance and another risk management tool for the producer. The program can also provide capital preservation to the farmer, ensure the stability of lending institutions, and encourage opportunities for minority, small, and new or beginning farmers by allowing the producer to insure up to 90% of his variable costs, fixed cost and his land cost. The COP Insurance program could also establish a permanent safety net for producers by covering his cost of production and allowing him to survive some bad times without being financially ruined. This should reduce the exodus of capital and people from the rural communities and ensure agricultural land stays in production.

General Impact

When new programs are developed for a commodity, it is often feared that it will encourage many additional producers to shift into production of that commodity, resulting in increased production and decreased price. Cost of Production Insurance is a "non-revenue enhancing" program similar to car insurance and does not provide any economic incentive to plant a crop. It covers only the costs that a producer actually incurs. A producer must incur a loss to receive an indemnity payment, and will still be responsible for a percentage of the loss incurred. However, the loss suffered is a fraction of what it would be without the insurance. As discussed above, there is little incentive for producers to increase production or for producers of other commodities to transfer to cotton production.

The Cost of Production program will also have an impact on farm lenders. Because a producer can insure a percentage of his/her costs, a lender thereby has an implicit guarantee (up to 90%) on that loan. Such a guarantee would potentially lower interest rates for producers insured under Cost of Production.

Impact on Producers

The immediate impact of the proposed program is a lower level of risk assumed by producers. The incentive still remains to produce a marketable crop, as the producer must incur a loss to receive an indemnity payment. Since the program is "non-revenue enhancing," there will most likely be no shift from producing other commodities to cotton production.

Producers in other insurance programs, who experience several years of adverse weather resulting in low production, may be unable to obtain enough insurance to cover their costs of production. The coverage they can buy is linked to and limited by their actual production history. In many cases, farmers find their insurable yields declining and their premium rates increasing. The recent approval of providing an option to producers to limit their low yields to 60% of the county "T" Yield has been of some assistance in this area.

Uninsured growers in some areas may find Cost of Production an economical form of protection when they may not have viewed other programs as such. This program may also reduce the number of producers utilizing other insurance products. Because the program is individually rated, producers with a low to moderate loss history will be drawn to the program. The premiums for those producers will be lower than those with more extensive loss histories. Therefore, riskier producers will probably remain insured under other insurance programs. This may require an increase in premium under those programs to accommodate the higher overall risk levels and to remain actuarially sound.

COP insurance provisions have also eliminated the use of optional units. This allows for reduction in premiums across the board and helps mitigate potential fraud and abuse. The elimination of optional units is a vital step towards providing a low cost program in terms of premiums paid by producers and indemnities paid by the government.

Producers that are currently uninsured, or purchasing catastrophic coverage, may find Cost of Production insurance a more attractive option than the current federal crop insurance programs.

Impact on Small Producers

Long term, we anticipate a "sustaining effect" as limited resource and small producers will be able to remain in business longer than they might have been able to under current programs. Cost of Production will most likely prove to be a lower cost product for these producers, and may in turn increase insurance participation within this group. It will most likely improve the chance of obtaining a loan for the small producers since there is an implicit 90% guarantee.

With COP, cotton producers will have some economic incentive to increase production, but not any more than what exists with current insurance programs, such as GRP and MPCI at a CAT coverage level. COP is designed to be an additional risk management tool for producers. In fact, some producers may choose to take advantage of COP's safety net and insure the acreage they already farm under COP. For farmers of uninsured crops, the economic incentive to switch to cotton may be tempered by the need for a substantial up-front investment, such as specialized equipment. According to ERS, 90% of the US eligible acreage of cotton is covered under an existing program. Therefore, there is only a small number of cotton producers who do not currently have some form of coverage.

The COP premiums are individually rated based on the producer's production history. Without adequate history, the new producer's premiums would likely be too high and would discourage production of a new commodity. If the producer chooses to participate in COP, and the production costs are more than the expected gross income, depending on the level of coverage chosen, the producer has the potential to recover up to 90% of their production costs.

History of Disaster Payments and Other Programs

According to the Farm Service Agency's History of Budgetary Expenditures of the Commodity Credit Corporation (CCC), report from April 2001, there was one disaster payment made for upland cotton. In 1990, $17,000 in disaster payments was paid to producers. While CCC does not publish payments at a state or county level, payments for all commodities on a national level are provided in Table 29
.

Table 29: Historical Disaster Payments

($1000)						
1987	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**
556,470	15,403	3,408,218	1,460,167	8,667	959,065	872,150
1994	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
2,461,491	577,086	14,077	2,250	(-1868)	1,913,183	1,251,309

(Source: Commodity Credit Corporation, 1987-2001.)

With the 1996 Farm Bill, disaster payments in their current form were redefined and producers received other forms of government payments. These include AMTA Payments (previously Production Flexibility Contract Payments), Loan Deficiency (LDP) Payments, and Marketing Loss Assistance (MLA) Payments. As seen in Table 30, since the 1996 Farm Bill has been in effect, Upland Cotton producers have benefited significantly from these programs. While AMTA payments have declined over the last five years, both LDP and MLA payments have increased significantly.

Table 30: Upland Cotton Program Payments for 1996-2000

Year	Program Payments for Upland Cotton ($1000's)		
	AMTA	**Loan Deficiency Payments**	**Marketing Loss Payments**
1996	$ 687,311	$ 0	$ 0
1997	$ 605,163	$ 5	$ 0
1998	$ 640,932	$ 2,766	$ 0
1999	$ 616,049	$ 326,620	$ 316,229
2000	$ 571,862	$ 668,037	$ 1,224,609
Total	**$ 3,121,317**	**$ 997,428**	**$ 1,540,838**

(Source: FSA: History of Budgetary Expenditures of the Commodity Credit Corporation, April, 2001)

Similar Insurance Programs

Yield-Based Coverage

MPCI (Multiple Peril Crop Insurance)

This program provides comprehensive protection from weather related loss and other unavoidable natural hazards. This program provides buy-up and CAT (catastrophic risk protection) and provides protection against poor quality, low yields, prevented planting, and replanting costs. Farmers can insure up to 75% of their yield in all areas and up to 85% in many areas. They can also insure up to 100% of the expected market price of the crop.

CAT (Catastrophic Risk Protection)

Catastrophic crop insurance protects producers from major crop losses due to unavoidable events such as drought, flooding, hail, insects, disease, etc. It guarantees 50% of the producer's average yield and currently pays 55% of the expected market price for any yield shortfall.

GRP (Group Risk Plan)

The Group Risk Plan is designed to insure against the widespread loss of production of a crop within a specific county. This is based on the assumption that when a county's yield is low, so is the individual farmer's yield. Producers may insure up to 90% of the expected county yield. Farmers whose crop losses follow the county pattern typically select this type of insurance. Producers may not purchase GRP and MPCI coverage for the same crop in the same year.

Revenue Protection

CRC (Crop Revenue Coverage)

This coverage protects producer income based on expectations for both price and yield. Should either or both fall and cause the crop revenue to fall below the guarantee, then losses are paid based upon the higher of an early season price or a harvest season price.

IP (Income Protection)

This program protects against drops in gross income when price and/or yield declines from early-season expectations.

Participation and Loss

Appendix E contains a table that summarizes historical participation and losses paid for several insurance programs during the past ten years. These programs include CAT, CRC, IP, and MPCI.

United States
Department of
Agriculture

Agricultural
Marketing
Service

Cotton
Division

United States Standards for the Leaf Grade of American Upland Cotton

Effective August 5, 1993

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United States Standards for Cotton

CFR 7 - Part 28 - Cotton Classing, Testing, and Standards

Subpart C – Standards

Official Cotton Standards of the United States for the Leaf Grade of American Upland Cotton

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United States Standards for Cotton

OFFICIAL COTTON STANDARDS OF THE UNITED STATES FOR THE LEAF GRADE OF AMERICAN UPLAND COTTON

AUTHORITY: Sections 28.461 to 28.482 issued under Sec. 10, 42 Stat. 1519; (7 U.S.C. 61). Section 28482 also issued under Sec. 3c, 50 Stat. 62 (7 U.S.C. 473) and 90 Stat. 1841-1846 as amended (7 U.S.C. 15b). Interpret or apply Sec. 6, 42 Stat. 1518, as amended; (7 U.S.C. 56), unless otherwise noted.

LEAF GRADES

SOURCE: 57 FR 34498, Aug. 5, 1992, unless otherwise noted.

§28.461 Leaf Grade 1.

Leaf Grade 1 is leaf which is within the range represented by a set of samples in the custody of the United States Department of Agriculture in a container marked "Original Official Cotton Standards of the United States, American Upland, Good Middling, effective July 1, 1987."

§28.462 Leaf Grade 2.

Leaf Grade 2 is leaf which is within the range represented by a set of samples in the custody of the United States Department of Agriculture in a container marked "Original Official Cotton Standards of the United States, American Upland, Strict Middling, effective July 1, 1987."

§28.463 Leaf Grade 3.

Leaf Grade 3 is leaf which is within the range represented by a set of samples in the custody of the United States Department of Agriculture in a container marked "Original Official Cotton Standards of the United States, American Upland,, Middling, effective July 1, 1987.

§28.464 Leaf Grade 4.

Leaf Grade 4 is leaf which is within the range represented by a set of samples in the custody of the United States Department of Agriculture in a container marked "Original Official Cotton Standards of the United States, American Upland, Strict Low Middling, effective July 1, 1987."

§28.465 Leaf Grade 5.

Leaf Grade 5 is leaf which is within the range represented by a set of samples in the custody of the United States Department of Agriculture in a container marked "Original Official Cotton Standards of the United States, American Upland, Low Middling, effective July 1, 1987."

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§28.466 Leaf Grade 6.
Leaf Grade 6 is leaf which is within the range represented by a set of samples in the custody of the United States Department of Agriculture in a container marked "Original Official Cotton Standards of the United States, American Upland, Strict Good Ordinary, effective July 1, 1987."

§28.467 Leaf Grade 7.
Leaf Grade 7 is leaf which is within the range represented by a set of samples in the custody of the United States Department of Agriculture in a container marked "Original Official Cotton Standards of the United States, American Upland, Good Ordinary, effective July 1, 1987."

BELOW LEAF GRADE COTTON

§28.471 Below Leaf Grade Cotton.
Below leaf grade cotton is American Upland cotton which is lower in leaf grade than Leaf Grade 7. In cotton classification, the official designation for such cotton is Below Leaf Grade. Other additional explanatory terms considered necessary to describe adequately the condition of the cotton may be entered on classification memorandums or certificates.

[57 FR 34499, Aug. 5, 1992]

GENERAL

§28.480 General.
(a) American Upland cotton which in color is within the range of the color standards established in this part shall be designated according to the color standard irrespective of the leaf content. American Upland cotton which in leaf is within the leaf standards established in this part shall be designated according to the leaf standard irrespective of the color.

(b) The term preparation is used to describe the degree of smoothness or roughness with which cotton is ginned and the relative neppiness or nappiness of the ginned lint. Normal preparation for any color grade of American Upland cotton for which there is a physical color standard shall be that found in the physical color standard. Normal preparation for any color grade of the American Upland cotton for which there is a descriptive color standard shall be that found in the physical standards for color used to define the descriptive color grade. Explanatory terms considered necessary to adequately describe the preparation of cotton may be entered on classification memorandums or certificates.

[57 FR 34499, Aug. 5, 1992]

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United States Standards for Cotton

§28.481 Alternate title for standards.

Since these standards have been agreed upon and accepted by the leading European cotton associations and exchanges, they may also be termed and referred to as the "Universal Standards for American Cotton."

[24 FR 5171, June 25, 1959]

§28.482 United States Cotton Futures Act.

The cotton standards contained in §28.301 through §28.603 of this part shall be effective for purposes of the United States Cotton Futures Act (7 U.S.C. 15b) and the regulations thereunder (7 CFR part 27).

[45 FR 46783, July 11, 1980]

§28.525 Symbols and Code Numbers.

For administrative convenience, the symbols and code numbers prescribed in this section may be used in lieu of leaf grades.

*(b) Symbols and Code Numbers used for Leaf Grades of American Upland Cotto*n.

Leaf Grade Symbol Code No.
Leaf Grade 1................................. LG1 1
Leaf Grade 2................................. LG2 2
Leaf Grade 3................................. LG3 3
Leaf Grade 4................................. LG4 4
Leaf Grade 5................................. LG5 5
Leaf Grade 6................................. LG6 6
Leaf Grade 7................................. LG7 7
Below Leaf Grade......................... BLG 8

**United States
Department of
Agriculture**

**Agricultural
Marketing
Service**

**Cotton
Division**

United States Standards for the Color Grade of American Upland Cotton

Effective August 5, 1993

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United States Standards for Cotton

CFR 7 - Part 28 - Cotton Classing, Testing, and Standards
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Official Cotton Standards of the United States for the Color Grade of American Upland Cotton

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United States Standards for Cotton

OFFICIAL COTTON STANDARDS OF THE UNITED STATES FOR THE COLOR GRADE OF AMERICAN UPLAND COTTON

AUTHORITY: Section 28.401 to 28.451 issued under Sec. 10, 42 Stat. 1519; (7 U.S.C. 61). Interpret or apply Sec. 6, 42 Stat. 1518, as amended; (7 U.S.C. 56), unless otherwise noted.

SOURCE: 57 FR 34497, Aug. 5, 1992, unless otherwise noted.

§28.401 Good Middling Color.

Good Middling Color is color which is within the range represented by a set of samples in the custody of the United States Department of Agriculture in a container marked "Original Official Cotton Standards of the United States, American Upland, Good Middling, effective July 1, 1987."

§28.402 Strict Middling Color.

Strict Middling Color is color which is within the range represented by a set of samples in the custody of the United States Department of Agriculture in a container marked "Original Official Cotton Standards of the United States, American Upland, Strict Middling, effective July 1, 1987."

§28.403 Middling Color.

Middling Color is color which is within the range represented by a set of samples in the custody of the United States Department of Agriculture in a container marked "Original Official Cotton Standards of the United States, American Upland, Middling, effective July 1, 1987."

§28.404 Strict Low Middling Color.

Strict Low Middling Color is color which is within the range represented by a set of samples in the custody of the United States Department of Agriculture in a container marked "Original Official Cotton Standards of the United States, American Upland, Strict Low Middling, effective July 1, 1987."

§28.405 Low Middling Color.

Low Middling Color is color which is within the range represented by a set of samples in the custody of the United States Department of Agriculture in a container marked, "Original Official Cotton Standards of the United States, American Upland, Low Middling, effective July 1, 1987."

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§28.406 Strict Good Ordinary Color.
Strict Good Ordinary Color is color which is within the range represented by a set of samples in the custody of the United States Department of Agriculture in a container marked "Original Official Cotton Standards of the United States, American Upland, Strict Good Ordinary, effective July 1, 1987."

§28.407 Good Ordinary Color.
Good Ordinary Color is color which is within the range represented by a set of samples in the custody of the United States Department of Agriculture in a container marked "Original Official Cotton Standards of the United States, American Upland, Good Ordinary, effective July 1, 1987."

LIGHT SPOTTED COTTON
SOURCE: 57 FR 34497, Aug. 5, 1992, unless otherwise noted.

§28.411 Good Middling Light Spotted Color.
Good Middling Light Spotted Color is color which in spot or color, or both, is between Good Middling Color and Good Middling Spotted Color.

§28.412 Strict Middling Light Spotted Color.
Strict Middling Light Spotted Color is color which in spot or color, or both, is between Strict Middling Color and Strict Middling Spotted Color.

§28.413 Middling Light Spotted Color.
Middling Light Spotted Color is color which in spot or color, or both, is between Middling Color and Middling Spotted Color.

§28.414 Strict Low Middling Light Spotted Color.
Strict Low Middling Light Spotted Color is color which in spot or color, or both, is between Strict Low Middling Color and Strict Low Middling Spotted Color.

§28.415 Low Middling Light Spotted Color.
Low Middling Light Spotted Color is color which in spot or color, or both, is between Low Middling Color and Low Middling Spotted Color.

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§28.416 Strict Good Ordinary Light Spotted Color.
Strict Good Ordinary Light Spotted Color is color which in spot or color, or both, is between Strict Good Ordinary Color and Strict Good Ordinary Spotted Color.

SPOTTED COTTON
SOURCE: 57 FR 34498, Aug. 5, 1992, unless otherwise noted.

§28.421 Good Middling Spotted Color.
Good Middling Spotted Color is color which is better than Strict Middling Spotted Color.
§28.422 Strict Middling Spotted Color.
Strict Middling Spotted Color is color which is within the range represented by a set of samples in the custody of the United States Department of Agriculture in a container marked "Original Official Cotton Standards of the United States, American Upland, Strict Middling Spotted, effective July 1, 1987."
§28.423 Middling Spotted Color.
Middling Spotted Color is color which is within the range represented by a set of samples in the custody of the United States Department of Agriculture in a container marked "Original Official Cotton Standards of the United States, American Upland, Middling Spotted, effective July 1, 1987."
§28.424 Strict Low Middling Spotted Color.
Strict Low Middling Spotted Cotton is color which is within the range represented by a set of samples in the custody of the United States Department of Agriculture in a container marked "Original Official Cotton Standards of the United States, American Upland, Strict Low Middling Spotted, effective July1, 1987."
§28.425 Low Middling Spotted Color.
Low Middling Spotted Color is color which is within the range represented by a set of samples in the custody of the United States Department of Agriculture in a container marked "Original Official Cotton Standards of the United States, American Upland, Low Middling Spotted, effective July 1, 1987."

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United States Standards for Cotton

§28.426 Strict Good Ordinary Spotted Color.
Strict Good Ordinary Spotted Color is color which is within the range represented by a set of samples in the custody of the United States Department of Agriculture in a container marked "Original Official Cotton Standards of the United States, American Upland, Strict Good Ordinary Spotted, effective July 1, 1987."

TINGED COTTON
SOURCE: 57 FR 34498, Aug. 5, 1992, unless otherwise noted.

§28.431 Strict Middling Tinged Color.
Strict Middling Tinged Color is color which is better than Middling Tinged Color.
§28.432 Middling Tinged Color.
Middling Tinged Color is color which is within the range represented by a set of samples in the custody of the United States Department of Agriculture in a container marked
"Original Official Cotton Standards of the United States, American Upland, Middling Tinged, effective July 1, 1987."
§28.433 Strict Low Middling Tinged Color.
Strict Low Middling Tinged Color is color which is within the range represented by a set of samples in the custody of the United States Department of Agriculture in a container marked "Original Official Cotton Standards of the United States, American Upland, Strict Low Middling Tinged, effective July 1, 1987."
§28.434 Low Middling Tinged Color.
Low Middling Spotted Color is color which is within the range represented by a set of samples in the custody of the United States Department of Agriculture in a container marked "Original Official Cotton Standards of the United States, American Upland, Low Middling Tinged, effective July 1, 1987."

YELLOW STAINED COTTON
§28.441 Strict Middling Yellow Stained Color.
Strict Middling Yellow Stained Color is color which is deeper than that of Strict Middling Tinged Color.
[57 FR 34498, Aug. 5, 1992]

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United States Standards for Cotton

§28.442 Middling Yellow Stained Color.

Middling Yellow Stained Color is American Upland cotton which in color is deeper than Middling Tinged Color.

[57 FR 34498, Aug. 5, 1992]

BELOW COLOR GRADE COTTON

§28.451 Below Color Grade Cotton.

Below color grade cotton is American Upland cotton which is lower in color grade than Good Ordinary, or Strict Good Ordinary Light Spotted, or Strict Good Ordinary Spotted, or Low Middling Tinged or Middling Yellow Stained. In cotton classifications, the official designation for such cotton is Below Color Grade. The term Below Good Ordinary Color, or Below Strict Good Ordinary Light Spotted Color, or Below Strict Good Ordinary Spotted Color, or Below Low Middling Tinged Color, or Below Low Middling Yellow Stained Color and other additional explanatory terms considered necessary to describe adequately the condition of the cotton may be entered on classification memorandums or certificates.

[57 FR 34498, Aug. 5, 1992]

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United States Standards for Cotton

§28.525 Symbols and Code Numbers.
For administrative convenience, the symbols and code numbers prescribed in this section may be used in lieu of the color grades.

(a) Symbols and Code numbers used for Color Grades of American Upland Cotton.
Color Grade Symbol Code No.
Good Middling.................................... GM 11
Strict Middling.................................... SM 21
Middling.. Mid 31
Strict Low Middling............................ SLM 41
Low Middling...................................... LM 51
Strict Good Ordinary........................... SGO 61
Good Ordinary..................................... GO 71
Good Middling Light Spotted.............. GM Lt SP 12
Strict Middling Light Spotted.............. SM Lt Sp 22
Middling Light Spotted....................... Mid Lt Sp 32
Strict Low Middling Light Spotted...... SLM Lt Sp 42
Low Middling Light Spotted............... LM Lt Sp 52
Strict Good Ordinary Light Spotted..... SGO Lt Sp 62
Good Middling Spotted....................... GM Sp 13
Strict Middling Spotted....................... SM Sp 23
Middling Spotted................................. Mid Sp 33
Strict Low Middling Spotted............... SLM Sp 43
Low Middling Spotted......................... LM Sp 53
Strict Good Ordinary Spotted.............. SGO Sp 63
Strict Middling Tinged........................ SM Tg 24
Middling Tinged.................................. Mid Tg 34
Strict Low Middling Tinged................ SLM Tg 44
Low Middling Tinged.......................... LM Tg 54
Strict Middling Yellow Stained........... SM YS 25
Middling Yellow Stained..................... Mid YS 35
Below Grade-(Below Good BG 81 Ordinary).
Below Grade-(Below Strict Good BG 82 Ordinary Light Spotted).
Below Grade-(Below Strict Good BG 83 Ordinary Spotted).
Below Grade-(Below Low BG 84 Middling Tinged).
Below Grade-(Below Middling Yellow BG 85 Stained).

Appendix B: Historical Causes of Loss

The data in this table was taken from Rain and Hail Insurance Service only. Although this information does not include data from all insurance services, it is a strong indicator of overall losses as Rain and Hail is the largest and one of the most widespread crop insurance companies.

Year	State	Cause	Loss ($)	% of year total	Year	State	Cause	Loss ($)	% of year total
1999	**AL**	Total	15,177,357		**1998**	**AL**	Total	21,851,632	
1999	AL	Drought	13,649,330	89.9	1998	AL	Drought	12,390,289	56.7
1999	AL	Heat	1,132,821	7.5	1998	AL	Tropical Depression	7,374,936	33.8
1999	AL	Excessive Moisture	307,338	2.0	1998	AL	Excessive Moisture	1,959,950	9.0
1999	AL	All Others	87,868	0.6	1998	AL	All Others	126,457	0.6
1999	**AZ**	Total	9,076,586		1998	**AZ**	Total	3,136,688	
1999	AZ	Cold Wet Weather	6,351,130	70.0	1998	AZ	Cold Wet Weather	1,268,625	40.4
1999	AZ	All Others	749,396	8.3	1998	AZ	Hot Wind	804,897	25.7
1999	AZ	Excessive Moisture	627,952	6.9	1998	AZ	Wind	292,974	9.3
1999	AZ	Heat	517,617	5.7	1998	AZ	Excessive Moisture	246,718	7.9
1999	AZ	Hail	502,869	5.5	1998	AZ	Hail	221,819	7.1
1999	AZ	Decline In Price	327,622	3.6	1998	AZ	Insects	183,711	5.9
1999	**CA**	Total	1,064,874		1998	AZ	Heat	117,944	3.8
1999	CA	Excessive Moisture	586,085	55.0	1998	**CA**	Total	20,441,515	
1999	CA	Cold Wet Weather	221,844	20.8	1998	CA	Excessive Moisture	9,827,067	48.1
1999	CA	Wind	156,095	14.7	1998	CA	Flood	9,177,361	44.9
1999	CA	All Others	100,850	9.5	1998	CA	Cold Wet Weather	938,314	4.6
1999	GA	Total	92,816,863		1998	CA	All Others	498,773	2.4
1999	**GA**	Drought	70,893,835	76.4	1998	**GA**	Total	48,297,030	
1999	GA	Heat	18,462,373	19.9	1998	GA	Drought	44,658,633	92.5
1999	GA	Excessive Moisture	1,907,541	2.1	1998	GA	Heat	3,034,812	6.3
1999	GA	Plant Disease	1,553,114	1.7	1998	GA	All Others	603,585	1.2
1999	**LA**	Total	8,062,013		1998	**LA**	Total	3,984,201	
1999	LA	Excessive Moisture	3,500,038	43.4	1998	LA	Drought	3,049,939	76.6
1999	LA	Drought	3,370,989	41.8	1998	LA	Heat	625,833	15.7
1999	LA	Heat	992,859	12.3	1998	LA	All Others	308,429	7.7
1999	LA	All Others	198,127	2.5	1998	**MS**	Total	6,748,623	
1999	**MS**	Total	18,124,664		1998	MS	Drought	3,524,682	52.2
1999	MS	Drought	9,169,706	50.6	1998	MS	Tropical Depression	1,076,751	16.0
1999	MS	Heat	6,232,778	34.4	1998	MS	Excessive Moisture	793,547	11.8
1999	MS	Decline In Price	1,677,653	9.3	1998	MS	Flood	792,949	11.8
1999	MS	All Others	1,044,527	5.8	1998	MS	All Others	560,694	8.3
1999	**TX**	Total	210,844,365		1998	**TX**	Total	285,187,048	
1999	TX	Hail	119,411,169	56.6	1998	TX	Drought	250,406,073	87.8
1999	TX	Drought	48,905,598	23.2	1998	TX	Heat	11,755,574	4.1
1999	TX	Excessive Moisture	24,628,833	11.7	1998	TX	Hot Wind	9,252,121	3.2
1999	TX	All Others	6,660,227	3.2	1998	TX	Hail	8,498,734	3.0
1999	TX	Heat	5,894,976	2.8	1998	TX	Wind	3,811,801	1.3
1999	TX	Wind	5,343,562	2.5	1998	TX	All Others	1,462,745	0.5

Year	State	Cause	Loss ($)	% of year total	Year	State	Cause	Loss ($)	% of year total
1997	**AL**	Total	39,771,396		**1996**	**AL**	Total	6,430,316	
1997	AL	Cold Wet Weather	22,185,181	55.8	1996	AL	Drought	4,772,097	74.2
1997	AL	Drought	8,599,367	21.6	1996	AL	Excessive Moisture	1,397,397	21.7
1997	AL	Excessive Moisture	5,013,201	12.6	1996	AL	All Others	260,822	4.1
1997	AL	Plant Disease	3,638,796	9.2	1996	**AZ**	Total	3,654,170	
1997	AL	All Others	334,851	0.8	1996	AZ	Wind	915,798	25.1
1997	**AZ**	Total	5,441,663		1996	AZ	Insects	875,194	24.0
1997	AZ	Excessive Moisture	1,845,454	33.9	1996	AZ	Heat	712,398	19.5
1997	AZ	Insects	1,547,452	28.4	1996	AZ	Freeze	568,231	15.6
1997	AZ	Heat	1,113,551	20.5	1996	AZ	Hail	513,697	14.1
1997	AZ	Wind	692,979	12.7	1996	AZ	All Others	68,852	1.8
1997	AZ	All Others	242,227	4.5	1996	**CA**	Total	729,945	
1997	**CA**	Total	6,833,203		1996	CA	Heat	425,539	58.3
1997	CA	Flood	5,914,948	86.6	1996	CA	Excessive Moisture	173,424	23.8
1997	CA	Excessive Moisture	530,569	7.8	1996	CA	Insects	94,832	13.0
1997	CA	All Others	387,686	5.7	1996	CA	All Others	36,150	5.0
1997	**GA**	Total	24,308,172		1996	**GA**	Total	10,055,621	
1997	GA	Drought	18,274,830	75.2	1996	GA	Drought	8,418,336	83.7
1997	GA	Excessive Moisture	4,867,257	20.0	1996	GA	Excessive Moisture	1,130,605	11.2
1997	GA	All Others	1,166,085	4.8	1996	GA	All Others	506,680	5.0
1997	**LA**	Total	976,304		1996	**LA**	Total	2,201,521	
1997	LA	Excessive Moisture	766,856	78.6	1996	LA	Excessive Moisture	1,533,836	69.7
1997	LA	Drought	113,459	11.6	1996	LA	Drought	171,812	7.8
1997	LA	All Others	95,989	9.8	1996	LA	Flood	164,312	7.5
1997	**MS**	Total	3,198,265		1996	LA	Insects	114,672	5.2
1997	MS	Excessive Moisture	1,641,728	51.3	1996	LA	Heat	111,817	5.1
1997	MS	Drought	1,022,470	32.0	1996	LA	All Others	105,072	4.8
1997	MS	Flood	436,123	13.6	1996	**MS**	Total	4,758,069	
1997	MS	All Others	97,944	3.1	1996	MS	Drought	2,341,554	49.2
1997	**TX**	Total	77,334,813		1996	MS	Flood	1,276,417	26.8
1997	TX	Hail	36,536,245	47.2	1996	MS	Excessive Moisture	557,530	11.7
1997	TX	Excessive Moisture	21,173,010	27.4	1996	MS	Hail	399,615	8.4
1997	TX	Wind	8,519,079	11.0	1996	MS	All Others	182,953	3.8
1997	TX	Drought	7,913,037	10.2	1996	**TX**	Total	240,814,764	
1997	TX	All Others	3,193,442	4.1	1996	TX	Drought	182,498,548	75.8
					1996	TX	Hail	30,908,787	12.8
					1996	TX	Wind	9,502,702	4.0
					1996	TX	Excessive Moisture	4,939,751	2.1
					1996	TX	Hot Wind	3,692,945	1.5
					1996	TX	Heat	3,337,022	1.4
					1996	TX	Freeze	3,078,797	1.3
					1996	TX	All Others	2,856,212	1.2

Year	State	Cause	Loss ($)	% of year total	Year	State	Cause	Loss ($)	% of year total
1995	**AL**	Total	28,652,534		**1995**	**LA**	Total	5,297,855	
1995	AL	Insects	13,468,812	47.0	1995	LA	Heat	1,464,972	27.7
1995	AL	Tropical Depression	11,528,815	40.2	1995	LA	Lightning	1,028,223	19.4
1995	AL	Drought	3,096,480	10.8	1995	LA	Wildlife	836,016	15.8
1995	AL	All Others	558,427	1.9	1995	LA	Drought	530,910	10.0
1995	**AZ**	Total	5,097,093		1995	LA	Flood	498,790	9.4
1995	AZ	Insects	3,135,304	61.5	1995	LA	Excessive Moisture	474,314	9.0
1995	AZ	Wildlife	1,513,631	29.7	1995	LA	Insects	464,630	8.8
1995	AZ	Cold Wet Weather	406,292	8.0	1995	**MS**	Total	17,025,677	
1995	AZ	Wind	41,866	0.8	1995	MS	Insects	11,918,403	70.0
1995	**CA**	Total	3,280,997		1995	MS	Flood	2,505,969	14.7
1995	CA	Cold Wet Weather	1,334,439	52.3	1995	MS	Drought	2,468,678	14.5
1995	CA	Insects	838,480	32.9	1995	MS	All Others	132,627	0.8
1995	CA	Hail	378,133	14.8	1995	**TX**	Total	185,202,331	
1995	GA	Total	18,348,844		1995	TX	Insects	85,599,099	46.2
1995	**GA**	Heat	5,318,207	29.0	1995	TX	Wind	24,948,250	13.5
1995	GA	Tropical Depression	5,029,731	27.4	1995	TX	Erosion	24,847,409	13.4
1995	GA	Wind	3,518,746	19.2	1995	TX	Hot Wind	15,834,720	8.6
1995	GA	Excessive Moisture	2,537,442	13.8	1995	TX	Plant Disease	9,901,597	5.4
1995	GA	Drought	1,512,229	8.2	1995	TX	Cold Wet Weather	9,571,293	5.2
1995	GA	All Others	432,489	2.4	1995	TX	Excessive Moisture	9,452,746	5.1
					1995	TX	All Others	2,910,706	1.6
					1995	TX	Drought	2,136,511	1.2

(Rain and Hail Insurance Service, 2001.)

Appendix C: Potential Losses

Northern Alabama									
Base (no standard deviations)									
	1991	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Yields - lbs	618	800	559	875	365	870	520	747	514
Adjusted Yield (Base)	618	800	559	875	365	870	520	747	514
Price - $	0.57	0.56	0.57	0.69	0.73	0.71	0.67	0.61	0.48
Cost - $	296.16	302.30	308.56	314.96	321.48	328.15	334.94	341.89	348.97
Insurance Coverage - $	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Potential Indemnity - $	0.00	0.00	0.00	0.00	-23.01	0.00	0.00	0.00	-68.22
Minus one standard deviation									
	1991	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Yields - lbs	618	800	559	875	365	870	520	747	514
Adjusted Yield (-1 STDEV)	448.78	630.78	389.11	705.78	195.78	700.78	350.44	577.11	344.78
Price - $	0.57	0.56	0.57	0.69	0.73	0.71	0.67	0.61	0.48
Cost - $	296.16	302.30	308.56	314.96	321.48	328.15	334.94	341.89	348.97
Insurance Coverage - $	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Potential Indemnity - $	-12.54	0.00	-55.53	0.00	-146.61	0.00	-65.60	0.00	-149.27
Minus two standard deviations									
	1991	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Yields - lbs	618	800	559	875	365	870	520	747	514
Adjusted Yield (-2 STDEV)	279.22	461.22	219.55	536.22	26.22	531.22	180.89	407.55	175.22
Price - $	0.57	0.56	0.57	0.69	0.73	0.71	0.67	0.61	0.48
Cost - $	296.16	302.30	308.56	314.96	321.48	328.15	334.94	341.89	348.97
Insurance Coverage - $	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Potential Indemnity - $	-108.51	-12.86	-152.34	0.00	-270.22	0.00	-179.71	-60.72	-230.32
Plus one standard deviations									
	1991	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Yields - lbs	618	800	559	875	365	870	520	747	514
Adjusted Yield (+1 STDEV)	787.89	969.89	728.22	1,044.89	534.89	1,039.89	689.56	916.22	683.89
Price - $	0.57	0.56	0.57	0.69	0.73	0.71	0.67	0.61	0.48
Cost - $	296.16	302.30	308.56	314.96	321.48	328.15	334.94	341.89	348.97
Insurance Coverage - $	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Potential Indemnity - $	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plus two standard deviations									
	1991	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Yields - lbs	618	800	559	875	365	870	520	747	514
Adjusted Yield (+2 STDEV)	957.45	1,139.45	897.78	1,214.45	704.45	1,209.45	859.11	1,085.78	853.45
Price - $	0.57	0.56	0.57	0.69	0.73	0.71	0.67	0.61	0.48
Cost - $	296.16	302.30	308.56	314.96	321.48	328.15	334.94	341.89	348.97
Insurance Coverage - $	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Potential Indemnity - $	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Payout for Each Year	-121.05	-12.86	-207.87	0.00	-439.84	0.00	-245.32	-60.72	-447.81
Weighted Average per year	(1,346,878.66)	(109,203.10)	(3,178,563.45)	-	(9,225,136.19)	-	(3,753,029.07)	(515,425.31)	(12,814,552.75)
Average Payout per acre per year	(7.93)	(0.64)	(18.72)	-	(54.34)	-	(22.11)	(3.04)	(75.48)
Average payout for 1991-2000	**(20.76)**								
Total Liability per Acre	**266.55**	**272.07**	**277.71**	**283.46**	**289.34**	**295.33**	**301.45**	**307.70**	**314.07**
10 Yr Average Liability per Acre	**292.83**								
Insured Acreage	169,774.00								
County Payout For Insured Acreage	(3,524,919.05)								

Appendix D: Production Budgets

Variable Expenses*	
Chemicals	
Fertilizer	
Seed or Plants	
Fuel, Lube, and Utilities	
Repairs and Maintenance	
Hired Labor	
Other Labor	
Custom Operations	
Harvesting	
Irrigation	
Crop Specific Post-Harvest Expenses	
Operating Loan Interest	
Other Variable Costs	
Variable Cost Sub-Total	
Fixed Costs	
Capital Replacement	
Term Loan Interest	
Other Fixed Costs	
Owner Labor	
Fixed Cost Sub-Total	
Land Fee	
Total Expenses	

Representative Budget Expenditures for the Proposed Cotton Pilot States					
State	**Statistic**	**Variable Costs**	**Fixed Costs**	**Land Cost**	**Total Costs**
AL	**Average**	$288.02	$59.98	$33.45	$381.45
	St. Dev.	$70.42	$37.75	$14.04	$68.62
AZ	**Average**	$710.84	$223.50	$77.46	$1,011.79
	St. Dev.	$159.29	$123.91	$29.99	$218.61
CA	**Average**	$784.91	$138.86	$173.41	$1,097.18
	St. Dev.	$190.08	$82.90	$83.61	$236.67
GA	**Average**	$404.12	$144.46	$55.83	$604.41
	St. Dev.	$50.53	$71.49	$22.68	$98.41
LA	**Average**	$387.23	$101.69	$89.92	$578.83
	St. Dev.	$55.18	$47.20	$27.23	$97.60
MS	**Average**	$332.29	$78.61	$68.16	$479.07
	St. Dev.	$67.17	$33.01	$30.06	$85.67
NC	**Average**	$272.43	$24.29	$49.52	$346.24
	St. Dev.	$91.05	$42.07	$0.83	$49.81
TX	**Average**	$330.35	$45.56	$64.84	$440.75
	St. Dev.	$153.84	$44.63	$31.81	$169.21

Appendix E: Participation and Loss for Upland Cotton

The information contained in these tables covers all participation within the state and not solely the recommended pilot area. This data is provided by the Risk Management Agency.

Alabama

Year	State	Insurance Plan	Policies Sold	Liabilities ($)	Total Premium	Indemnity ($)	Loss Ratio
2000	AL	CRC	326	17,162,872	2,231,756	3,548,492	1.59
2000	AL	MPCI	3,148	110,595,606	13,229,650	28,576,045	2.16
2000	AL	CAT	490	6,782,652	520,479	369,540	0.71
1999	AL	CRC	156	8,402,928	935,193	1,292,465	1.38
1999	AL	MPCI	3,095	117,320,244	13,092,466	14,044,125	1.07
1999	AL	CAT	529	8,378,275	624,057	86,971	0.14
1999	AL	IP	1	22,500	0	0	0.00
1998	AL	CRC	23	923,219	126,909	48,488	0.38
1998	AL	MPCI	2,949	102,946,434	10,561,339	21,468,436	2.03
1998	AL	CAT	694	13,414,882	981,571	355,132	0.36
1998	AL	IP	3	25,208	0	0	0.00
1997	AL	CAT	964	14,874,856	1,051,273	697,571	0.66
1997	AL	IP	7	972,633	98,589	390,058	3.96
1997	AL	MPCI	2,700	109,718,018	10,786,417	38,807,810	3.60
1996	AL	CAT	1000	13,927,243	1,012,688	60,925	0.06
1996	AL	MPCI	2,661	96,365,409	10,128,942	6,391,916	0.63
1995	AL	CAT	1,683	28,368,995	1,860,303	4,217,637	2.27
1995	AL	MPCI	2,337	100,566,901	8,938,323	25,157,316	2.81
1994	AL	MPCI	1,487	56,113,381	5,055,705	3,072,871	0.61
1993	AL	MPCI	930	44,062,802	3,807,607	4,069,912	1.07
1992	AL	MPCI	976	42,756,074	3,793,546	1,675,495	0.44
1991	AL	MPCI	1,151	40,546,056	3,392,092	2,233,598	0.66

Arizona

Year	State	Insurance Plan	Policies Sold	Liabilities ($)	Total Premium	Indemnity ($)	Loss Ratio
2000	AZ	CAT	345	23,814,342	618,641	63,356	0.10
2000	AZ	CRC	27	13,713,601	1,330,667	1,583,436	1.19
2000	AZ	MPCI	325	69,046,759	4,238,979	6,650,011	1.57
1999	AZ	CAT	384	24,294,200	756,383	20,641	0.03
1999	AZ	CRC	26	15,720,691	1,104,304	5,789,764	5.24
1999	AZ	MPCI	278	51,060,385	2,766,831	3,190,223	1.15
1998	AZ	CAT	447	35,453,870	1,043,692	16,944	0.02
1998	AZ	CRC	5	1,030,405	91,597	42,365	0.46
1998	AZ	MPCI	225	38,390,083	1,855,476	3,054,526	1.65
1997	AZ	CAT	497	47,831,438	1,495,875	10,687	0.01
1997	AZ	CRC	9	2,663,002	237,527	818,481	3.45
1997	AZ	MPCI	207	41,708,341	2,314,598	4,564,890	1.97
1996	AZ	CAT	678	28,138,146	879,388	6,798	0.01
1996	AZ	MPCI	223	41,577,739	2,326,048	3,647,371	1.57
1995	AZ	CAT	700	62,119,882	1,818,776	47,286	0.03
1995	AZ	MPCI	216	45,925,168	2,348,778	5,750,579	2.45
1994	AZ	MPCI	239	37,310,460	2,017,353	635,314	0.31
1993	AZ	MPCI	328	55,914,548	2,682,422	4,642,939	1.73
1992	AZ	MPCI	74	13,340,011	678,955	3,024,820	4.46
1991	AZ	MPCI	71	11,005,244	463,794	714,079	1.54

California

Year	State	Insurance Plan	Policies Sold	Liabilities ($)	Total Premium	Indemnity ($)	Loss Ratio
2000	CA	CRC	30	4,497,986	296,944	303,678	1.02
2000	CA	MPCI	1,676	176,254,116	6,028,716	1,623,788	0.27
1999	CA	CAT	1,344	90,788,060	2,519,267	27,644	0.01
1999	CA	CRC	14	1,813,720	112,256	78,496	0.70
1999	CA	MPCI	250	44,583,580	1,911,459	1,002,227	0.52
1998	CA	CAT	1,473	110,067,475	2,887,975	2,196,697	0.76
1998	CA	CRC	1	1,142,093	52,137	66,504	1.28
1998	CA	MPCI	157	52,406,163	3,370,636	18,691,058	5.55
1997	CA	CAT	2,225	115,486,703	2,981,923	39,115	0.01
1997	CA	MPCI	107	57,977,542	2,558,468	6,842,503	2.67
1996	CA	CAT	2,221	159,937,059	4,099,816	142,979	0.03
1996	CA	MPCI	132	22,627,849	1,047,632	464,789	0.44
1995	CA	CAT	2,957	241,078,129	6,103,373	1,330,198	0.22
1995	CA	MPCI	56	8,846,161	347,341	1,577,911	4.54
1994	CA	MPCI	80	9,959,812	365,774	536,782	1.47
1993	CA	MPCI	132	14,724,901	532,170	695,270	1.31
1992	CA	MPCI	67	5,352,186	189,369	74,659	0.39
1991	CA	MPCI	80	8,956,357	353,006	164,189	0.47

Georgia

Year	State	Insurance Plan	Policies Sold	Liabilities ($)	Total Premium	Indemnity ($)	Loss Ratio
2000	GA	CAT	2,050	45,128,788	3,543,685	498,064	0.14
2000	GA	CRC	825	52,353,922	8,767,219	14,459,695	1.65
2000	GA	IP	16	1,398,957	101,080	534,663	5.29
2000	GA	MPCI	5,054	243,627,835	33,901,671	62,085,396	1.83
1999	GA	CAT	2,423	59,426,082	4,720,232	1,396,713	0.30
1999	GA	CRC	628	36,252,506	5,358,954	10,647,989	1.99
1999	GA	IP	10	1,507,921	146,230	1,011,257	6.92
1999	GA	MPCI	4,373	229,476,939	30,433,129	82,231,221	2.70
1998	GA	CAT	3,040	90,796,051	7,888,285	1,908,648	0.24
1998	GA	CRC	136	6,684,641	1,029,507	2,688,665	2.61
1998	GA	IP	6	591,723	88,978	259,510	2.92
1998	GA	MPCI	3,595	167,306,641	20,520,920	43,180,617	2.10
1997	GA	CAT	3,372	84,973,239	7,824,051	726,147	0.09
1997	GA	CRC	134	9,647,901	1,501,700	2,536,333	1.69
1997	GA	IP	15	2,555,861	318,045	912,872	2.87
1997	GA	MPCI	3,358	161,503,690	20,516,466	20,554,938	1.00
1996	GA	CAT	3,556	75,243,045	7,025,898	200,643	0.03
1996	GA	MPCI	3,510	152,963,794	20,015,522	9,854,979	0.49
1995	GA	CAT	4,282	100,386,641	8,877,706	964,374	0.11
1995	GA	MPCI	3,215	167,645,794	20,160,300	17,824,178	0.88
1994	GA	MPCI	1,796	47,932,219	7,547,870	1,506,901	0.20
1993	GA	MPCI	1,112	35,489,985	5,803,300	7,909,419	1.36
1992	GA	MPCI	1,177	30,291,498	4,987,111	846,449	0.17
1991	GA	MPCI	1,233	27,437,153	3,894,487	1,012,748	0.26

Louisiana

Year	State	Insurance Plan	Policies Sold	Liabilities ($)	Total Premium	Indemnity ($)	Loss Ratio
2000	LA	CAT	2,760	39,710,133	2,227,475	554,761	0.25
2000	LA	CRC	97	4,220,408	558,658	1,321,668	2.37
2000	LA	MPCI	1,634	111,977,630	9,160,922	19,928,049	2.18
1999	LA	CAT	3,282	67,879,743	7,186,359	581,376	0.08
1999	LA	CRC	179	10,136,262	1,491,596	2,181,418	1.46
1999	LA	MPCI	554	23,724,839	3,416,489	5,393,490	1.58
1998	LA	CAT	3,410	70,512,022	7,679,702	2,171,612	0.28
1998	LA	CRC	2	107,062	13,633	36,217	2.66
1998	LA	MPCI	426	4,818,055	712,268	1,858,683	2.61
1997	LA	CAT	3,778	72,750,231	8,581,342	244,676	0.03
1997	LA	MPCI	437	8,102,975	1,298,258	749,830	0.58
1996	LA	CAT	4,639	88,496,261	11,044,405	335,933	0.03
1996	LA	MPCI	576	17,666,601	2,702,049	1,865,569	0.69
1995	LA	CAT	6,212	120,845,628	13,786,480	721,039	0.05
1995	LA	MPCI	807	36,380,205	5,431,895	4,601,736	0.85
1994	LA	MPCI	1,293	32,027,509	4,771,263	4,120,506	0.86
1993	LA	MPCI	997	32,235,905	4,294,352	6,315,194	1.47
1992	LA	MPCI	1,140	38,566,072	5,105,708	9,378,615	1.84
1991	LA	MPCI	1,447	50,197,540	5,849,056	16,669,581	2.85

Mississippi

Year	State	Insurance Plan	Policies Sold	Liabilities ($)	Total Premium	Indemnity ($)	Loss Ratio
2000	MS	CAT	2,365	83,984,619	3,413,025	276,885	0.08
2000	MS	CRC	166	23,610,650	4,131,983	6,262,458	1.52
2000	MS	MPCI	1,438	250,080,394	23,396,021	60,744,528	2.60
1999	MS	CAT	2,743	122,687,279	8,421,490	279,531	0.03
1999	MS	CRC	207	39,133,571	4,668,633	10,373,949	2.22
1999	MS	GRP	1	1,082,711	32,481	141,835	4.37
1999	MS	MPCI	730	60,661,434	6,246,385	7,575,629	1.21
1998	MS	CAT	3,085	129,756,841	8,714,519	451,568	0.05
1998	MS	CRC	6	1,026,063	93,427	133,356	1.43
1998	MS	MPCI	812	38,721,516	3,847,319	6,177,358	1.61
1997	MS	CAT	3,366	128,580,387	8,913,713	309,766	0.03
1997	MS	MPCI	777	44,512,010	4,554,275	3,262,016	0.72
1996	MS	CAT	3,873	146,960,774	11,347,987	932,051	0.08
1996	MS	MPCI	976	49,833,670	5,210,549	3,826,017	0.73
1995	MS	CAT	4,932	191,866,744	12,965,198	5,939,768	0.46
1995	MS	MPCI	804	51,986,914	5,092,180	11,397,941	2.24
1994	MS	MPCI	1,201	38,247,925	3,552,507	4,045,958	1.14
1993	MS	MPCI	634	28,257,703	2,613,823	6,894,226	2.64
1992	MS	MPCI	563	29,639,008	2,903,703	4,315,248	1.49
1991	MS	MPCI	1040	33,535,077	2,850,846	4,605,882	1.62

North Carolina

Year	State	Insurance Plan	Policies Sold	Liabilities ($)	Total Premium	Indemnity ($)	Loss Ratio
2000	NC	CAT	1,623	32,633,465	2,182,064	29,593	0.01
2000	NC	CRC	309	20,032,453	2,632,221	1,490,562	0.57
2000	NC	MPCI	2,247	108,678,697	12,295,532	4,652,011	0.38
1999	NC	CAT	1,685	38,870,805	2,814,025	648,214	0.23
1999	NC	CRC	192	15,503,250	1,983,721	4,975,390	2.51
1999	NC	MPCI	1,738	84,558,266	9,307,196	27,794,080	2.99
1998	NC	CAT	1,990	41,747,572	2,994,466	65,333	0.02
1998	NC	CRC	5	483,235	0	0	0.00
1998	NC	MPCI	1,371	58,583,475	5,550,879	5,698,080	1.03
1997	NC	CAT	2,157	40,081,689	3,018,708	84,557	0.03
1997	NC	MPCI	1,349	51,155,358	5,106,198	3,578,171	0.70
1996	NC	CAT	2,946	40,202,633	3,042,388	240,730	0.08
1996	NC	MPCI	1,345	51,669,177	5,270,852	5,076,164	0.96
1995	NC	CAT	3,849	61,580,541	4,902,332	1,780,975	0.36
1995	NC	MPCI	1,020	42,887,003	4,093,002	8,857,669	2.16
1994	NC	MPCI	640	14,598,068	1,532,596	432,334	0.28
1993	NC	MPCI	344	9,287,177	881,374	1,185,511	1.35
1992	NC	MPCI	367	8,290,265	888,034	1,085,981	1.22
1991	NC	MPCI	396	7,924,725	916,636	583,482	0.64

Texas

Year	State	Insurance Plan	Policies Sold	Liabilities ($)	Total Premium	Indemnity ($)	Loss Ratio
2000	TX	CAT	5,089	22,676,646	2,766,766	2,156,382	0.78
2000	TX	CRC	2,461	55,372,202	11,292,139	28,497,555	2.52
2000	TX	GRP	151	14,825,971	1,532,562	4,856,328	3.17
2000	TX	MPCI	38,659	898,052,052	177,475,621	251,223,669	1.42
1999	TX	CAT	5,848	30,001,355	3,983,571	2,103,861	0.53
1999	TX	CRC	2,183	65,345,745	10,737,317	15,757,843	1.47
1999	TX	GRP	50	7,613,811	780,103	342,265	0.44
1999	TX	MPCI	36,228	911,547,315	172,933,421	197,541,329	1.14
1998	TX	CAT	9,687	70,301,052	9,858,050	18,223,716	1.85
1998	TX	CRC	549	15,503,936	2,678,579	6,204,765	2.32
1998	TX	MPCI	33,168	812,469,657	135,229,700	261,382,306	1.93
1997	TX	CAT	11,752	67,227,248	9,372,826	1,843,524	0.20
1997	TX	CRC	879	29,314,421	5,265,977	3,907,279	0.74
1997	TX	MPCI	32,979	768,448,650	130,377,785	73,238,252	0.56
1996	TX	CAT	13,170	71,598,025	9,225,953	8,895,908	0.96
1996	TX	MPCI	34,629	813,720,509	141,482,144	231,974,780	1.64
1995	TX	CAT	15,966	115,693,927	13,205,101	15,712,517	1.19
1995	TX	MPCI	33,385	810,195,295	134,676,209	171,357,987	1.27
1994	TX	MPCI	35,439	603,380,959	96,819,872	62,021,361	0.64
1993	TX	MPCI	30,247	583,207,129	79,397,285	68,360,442	0.86
1992	TX	MPCI	25,761	516,172,665	66,003,159	251,420,739	3.81
1991	TX	MPCI	26,105	571,182,443	66,306,811	138,719,345	2.09

Appendix F: Cotton Ginning

Cotton Ginnings, 2000

County	Bales (480 lbs.)	County	Bales (480 lbs.)
Northern Alabama		**North Carolina**	
Autauga	*	Halifax	98,028
Dallas	*	Martin	*
Elmore	*	Northampton	96,532
Southern Alabama		**Texas Brazos Valley**	
Lawrence	*	Brazos	*
Limestone	88,873	Burleson	*
Madison	46,119	Milam	*
		Robertson	22,666
Arizona		Williamson	27,497
Maricopa	289,527		
Pinal	276,012	**Texas Coastal Bend**	
		Nueces	158,813
California		San Patricio	257,596
Fresno	887,870		
Kern	460,402	**Texas Plains**	
Kings	533,324	Bailey	76,528
Madera	*	Castro	89,532
Merced	192,210	Cochran	*
Tulare	293,398	Hale	318,911
		Hockley	166,111
Georgia		Lamb	242,588
Colquitt	201,665	Lubbock	211,699
Mitchell	*	Parmer	131,214
Worth	*	Swisher	75,141
Louisiana		**Texas Rolling Plains**	
		Fisher	*
Concordia	71,484	Haskell	*
East Carroll	101,345	Jones	1,131
Franklin	140,383	Knox	*
		Mitchell	*
Tensas	115,135	Scurry	*
		South Texas	
Mississippi		Cameron	58,026
Coahoma	134,952	Hidalgo	82,285
Leflore	153,890	Willacy	140,002
Yazoo	193,393		

*Not published to avoid disclosing individual gins.

(Cotton Incorporated, 2001.)

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