IMPROVEMENTS IN US STRIPPER-HARVESTED COTTON VARIETIES, 1947-1997

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Abstract

The improvements that have been made in cotton varieties grown in the US stripper-harvested areas over the past fifty years are documented. The improvements have been a result of public and private research resulting in the development of improved varieties supplemented by improved agronomic practices. Yields in Texas, the primary state producing stripper-harvested cotton, have increased from approximately 200 lbs/acre to almost 500 lbs/acre during the last fifty years. Fiber length and strength have increased dramatically since 1980, the time that USDA introduced HVI instrumentation. Varieties that have occupied at least ten percent of the stripper-harvested area at some time during the last fifty years include: Macha, Gregg, Northern Star, Stripper 31, Von Roeder, Lockett, Growers Seed Association (GSA), Lankart, Tamcot, and Paymaster.

Introduction

The US stripper-harvested cotton growing area is unique among cotton growing areas of the world. Lower input practices are used because yields are often limited by the length of the growing season and/or inadequate soil moisture. These climatic limitations, coupled with usually dry harvest periods has made the stripper harvest method the most efficient for the area. The area is large, covering more than 4.5 million acres located mostly in Texas but with smaller acreage in Oklahoma and Eastern New Mexico. The region has long had the reputation of producing poor quality cotton, partly because of the harvest method and partly because the first identified cotton varieties adapted to the region were those with short, weak fiber.

Fiber data presented in this paper has been summarized by combining data published by the USDA Classing Offices (Anonymous, 1980) that process samples from bales produced in the stripper-harvested areas. The currently operating offices of Lubbock, Lamesa and Abilene, Texas class essentially all of these bales; however, earlier there were several other classing offices in the region. Data relating to varieties planted are summarized in a similar manner, using information from the USDA, AMS-Cotton Division, Memphis Tennessee (Anonymous, 1952).

Discussion

Statewide cotton yields as reported by the Texas Agricultural Statistics Service (Anonymous, 1997) for the years 1947-1997 are shown in Figure 1. A small percentage of the acreage represented in the graph is planted to picker-harvested cotton; however, most of the state acreage is stripper harvested so we may imply that the increase in yield represented here is mostly a result of the increase in yield of stripper-harvested cotton. Although yields vary greatly from year to year, the trend is distinctly upward with yields moving from approximately 200 lbs/acre to near 500 lbs/acre over the fifty year period. This increase is due to more than variety effect alone, as agronomic practices, including the increased use of irrigation and fertilizer have improved over the same period. Nevertheless, varieties with added yield potential have clearly been developed. It should also be noted that these yield increases came with little, if any, reduction of seed size or seed coat integrity.

Changes in fiber length of the bales of cotton produced in the stripper-harvested area are shown in Figure 2. The changes are tracked only after 1980 since High Volume Instrument (HVI) systems were not routinely used prior to that time. As seen in the figure, in 1980 approximately 75 percent of the bales classed had fiber 1 inch long or shorter with more than 25 percent being 15/16 inch or less. During the three five-year periods after 1980, the percentage of bales with longer fiber increased dramatically with more than 85 percent of the bales being classed in 1995 having fiber longer than one inch with 35 percent being longer than 35/32 inch.

Changes in fiber strength of the bales of cotton produced from 1980 to 1995 in the stripper-harvested area are shown in Figure 3. Again we see a dramatic improvement. In 1980 most of the cotton produced had fiber with a strength of 23 g/tex or less, but by 1995 over seventy percent of the cotton had a fiber strength of 28 g/tex with essentially all of the bales having strengths above 24 g/tex.

Probably the most important influence on the positive changes in the fiber quality of stripper-harvested cotton was the development, release and adoption of two cotton varieties, Paymaster HS26 and Paymaster HS200. The data shown in Figure 4 has been modified from a chart originally developed by D&PL's Paymaster staff. It charts the USDA data on these two varieties from the "cotton varieties planted" bulletins against the increase in fiber strength as measured at the USDA classing offices serving the stripper-harvested areas. The influence of these varieties on fiber strength seems clear. The increased demand in the market place for higher strength cotton coupled with the availability of varieties capable of producing higher strength fiber without sacrificing yield, made this transition possible. Special mention should be made of The American Cotton Growers organization for initiating a program in 1982 for

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paying their customers a premium for high strength fiber (Lichtenstein, 1990).

The major cotton varieties planted in the US stripper-harvested area from 1952 through 1997 are shown in Table 1. Only the varieties that have been planted on ten percent or more of the stripper-harvested area are included and in most cases the percentages represent multiple varieties from a particular breeder or cotton seed company. Numerous other varieties have been developed and in some instances were important in local areas. The percentages were calculated from data published in USDA "cotton varieties planted" bulletins with the numbers shown being weighted averages from classing offices serving the stripper-harvested area. Each variety or groups of varieties will be discussed briefly below.

The Macha variety occupied 25 percent of the stripper-harvested area in 1952 but quickly disappeared, having been replaced completely by 1957. The variety was stormproof and was developed by a farmer, Mr. Macha, near Tahoka, Texas from a selection of the variety Half and Half which had been grown as early as 1905 (Calhoun et.al., 1994; Niles and Feaster, 1984). The variety was important as a parent for plant breeders as it was a good source of stormproofness.

The Gregg varieties quickly became important in the late fifties but covered significant acreage for only a few years having essentially disappeared by the late sixties. The Gregg varieties were selected from the Macha variety near Plainview, Texas by Herman and Weldon Gregg. Another similar variety, Rilcot, also selected from Macha, was developed by Ray Joe Riley near Hart, Texas and was popular in the northern part of the Texas High Plains for several years but was never planted on as much as ten percent of the entire stripper-harvested area.

Northern Star varieties occupied a significant acreage for almost two decades prior to 1970. The initial variety was developed from a selection of the first Lankart variety (Calhoun, et.al., 1994) by a Mr. O'Brian near Knox City, Texas. Northern Star varieties were particularly important in Central Texas and the Texas Rolling Plains.

The Stripper 31 variety was bred in Arkansas by Carl Moosberg and was widely grown in the stripper-harvested areas primarily because of its earliness and coarse fiber that usually gave producers a satisfactory micronaire value during a time that micronaire discounts at the market place were severe. The variety was important from the late 1960s until the early 1980s.

The Western Prolific and Western Stormproof varieties, developed and marketed by Von Roeder Seed Farms of Snyder, Texas, were very popular in the Texas Rolling Plains and were widely grown for more than thirty years. Western Prolific, first grown about 1930, was developed from a selection of Mebane Triumph and was later crossed to Macha to give rise to Western Stormproof (Calhoun, et.al., 1994). Individuals responsible for the early breeding as well as the management of the company were Clements and Nolan Von Roeder.

The Lockett varieties were grown over a period of more than 35 years. The earlier-developed varieties were bred by the late Aubrey Lockett, who was for many years the owner and manager of Lockett Seed Company, located at Vernon, Texas. Like Western Prolific, the first Lockett variety, Lockett 140, was developed as a selection from Mebane Triumph. Other varieties were developed using Lockett 140 as a parent; however, one of the most popular varieties, Lockett 4789, was developed from a selection of Lone Star (Calhoun et.al, 1994).

The cooperative, Growers Seed Association, with its home office in Lubbock, Texas marketed cotton varieties from the early seventies until the early nineties. The most widely grown variety from this group was GSA 71 which was very popular on the High Plains for several years. This variety was bred by Carl Moosberg and has a very complex pedigree involving Nucala, AHA, Rowden, Hopi, Stormproof 120, etc.(Calhoun et. al., 1994).

Lankart varieties, developed mostly if not entirely by C. S. Lankart, were the most widely grown varieties in the stripper-harvested area from the mid-fifties until the mid-seventies, occupying nearly fifty percent of the area during many of those years. The original Lankart variety resulted from a selection made prior to 1917 from the variety Texas Stormproof, which was grown as early as 1865. The varieties Lankart 57 and Lankart 611 were developed by further selection of the Lankart variety and were the two cultivars accounting for most of the acreage planted to Lankart over the extended period of time.

Public research in the state of Texas has played a significant role in the increased cotton production of the stripper-harvested area for a hundred years or more; however, in the early seventies the state initiated a program to release varieties developed by Texas A&M University. The varieties were released using the name Tamcot and were developed largely by Dr. Luther Bird at College Station, Texas. Tamcot varieties were planted on as much as 16 percent of the stripper-harvested area at one time and continue to be popular in some areas, with new varieties still being released. Other state breeding programs in Texas, Oklahoma, and Arkansas have contributed significantly to variety improvement for the stripper-harvested area, releasing germplasm, and in some instances varieties, for the region. The public breeders, Dr. Levon Ray, Dr. Alva Niles, Dr. John Gannaway, and Dr. L.M. Verhalen have all made significant contributions.

Paymaster varieties have been planted in the stripper-harvested area over the entire period, 1952-1997 with as

much as seventy five percent of the area planted to them in recent years. The first Paymaster varieties were developed by Anderson, Clayton & Co. in an attempt to move the cotton growing area North as the company was involved in agricultural finance, marketing of lint and in processing cotton seed. Paymaster 54 was the first important variety and was developed from a selection made by Bob Stuart from Kekchi germplasm which was introduced from Guatemala in 1904 (Niles and Feaster, 1984). Other varieties that occupied significant acreage over this period were Paymaster 101, Paymaster 202, Paymaster 111, Paymaster 303, Paymaster 145, and more recently Paymaster HS26 and Paymaster HS200. The popularity of the varieties in recent years was enhanced by the numerous associate growers that produced and marketed seed of the varieties. The research or breeding program has been continuous for more than 50 years and has had names such as Bob Stuart, Quentin Adams, Harold Loden, Delbert Hess, Jerry Rice, and Richard Sheets associated with it.

As was indicated above, only the varieties that occupied ten percent or more of the stripper-harvested area are included in Table 1. However, several other varieties deserve mention as they were important in local areas. These include Dunn, Alltex, Cascot, Rilcot, Seedco, and Lambright.

Summary

The yield and quality of cotton produced in the stripper-harvested area of the US have improved significantly during the last fifty years. Yields have increased from approximately 200 to 500 lbs/acre; fiber lengths have increased from approximately 15/16 inch to more than 1 1/32 inch; and fiber strength has increased from less than 23 g/tex to over 28 g/tex. Numerous public and private cotton breeders and other scientists have worked together to produce these impressive results.

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Table 1.Cotton varieties planted in the US stripper-harvested area, 1952-97

Year	Gregg	GSA	Lankart	Lockett	Macha	Nor. Star	Paymstr	Str 31	TAES	Von Rdr
					PERCENT					
1952			9	10	25	9	5			
1953			13	20	16	7	11			
1954			26	10	7	15	7			2
1955			31	8	3	11	14			3
1956			47	5	1	14	6			6
1957			46	4		9	12			5
1958	1		48	2		12	6			9
1959	6		48	1		5	8			11
1960	12		49	2		7	3			11
1961	13		44	1		7	3			12
1962	23		36	3		2	7			11
1963	27		32	1		4	17			7
1964	18		43	2		4	10			9
1965	12		47	2		2	12			8
1966	7		48	4		2	16			10
1967	4		44	4		1	13			5
1968			23	8		1	21			1
1969			34	6			19	2		4
1970			36	3			17	4		4
1971			34	5			15	9		4
1972			38	7			14	8		3
1973			34	4			17	12		3
1974			29	7			14	11	2	2
1975		1	30	7			16	11	2	2
1976		7	25	4			15	7	8	4
1977		11	21	3			19	7	7	3
1978		13	22	3			18	5	7	2
1979		12	21	2			13	4	11	2
1980		11	20	4			12	3	11	1
1981		12	13	2			18	3	10	0
1982		7	13	1			15	2	16	1
1983		6	20	1			12		13	1
1984		11	12	1			17		11	
1985		10	10				26		10	
1986		8	14				21		13	
1987		7	10				27		8	
1988		6	9				31		8	
1989		3	6				29		11	
1990		1	6				41		5	
1991			7				36		4	
1992			2				60		4	
1993			1				64		3	
1994			1				78		1	
1995			0				70		1	
1996			1				68		1	
1997							69		2	

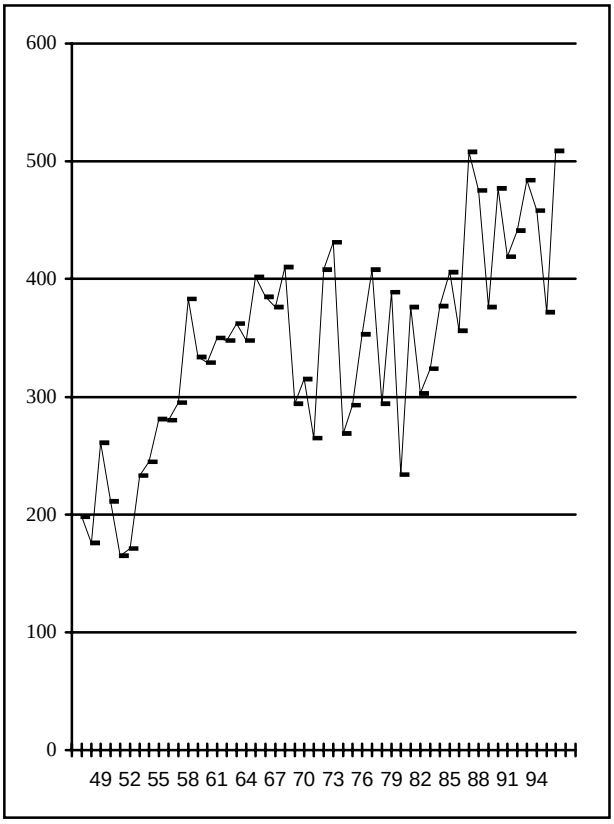

Figure 1. Cotton Yields in Texas, 1947-1996, lbs lint/acre. Data from Texas Agricultural Statistics Service.

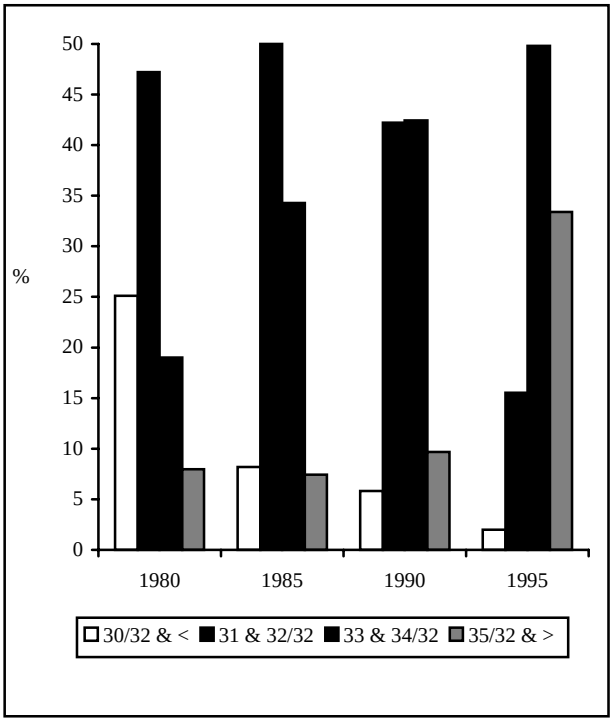

Figure 2. Fiber length (inches) classification of cotton bales produced in the US stripper-harvested area, 1980-1995

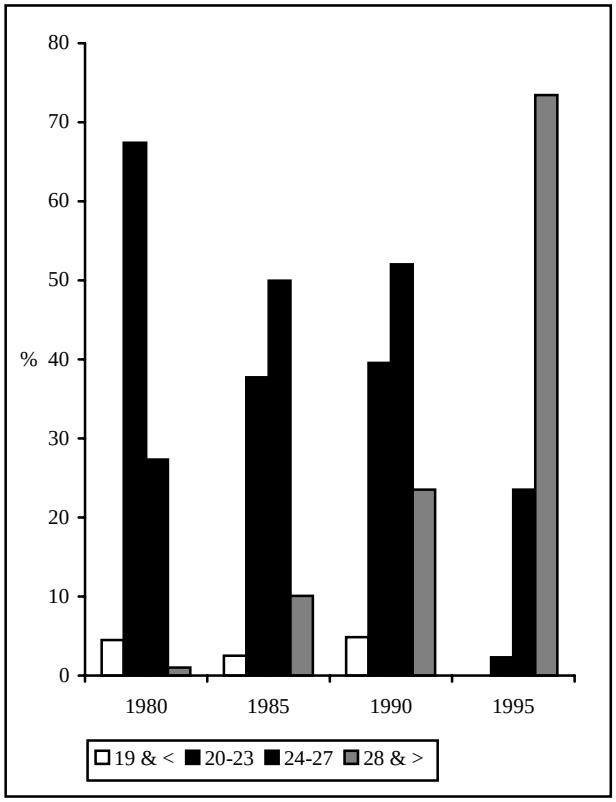

Figure 3. Fiber strength (g/tex) classification of cotton bales produced in the US stripper-harvested area, 1980-1995.

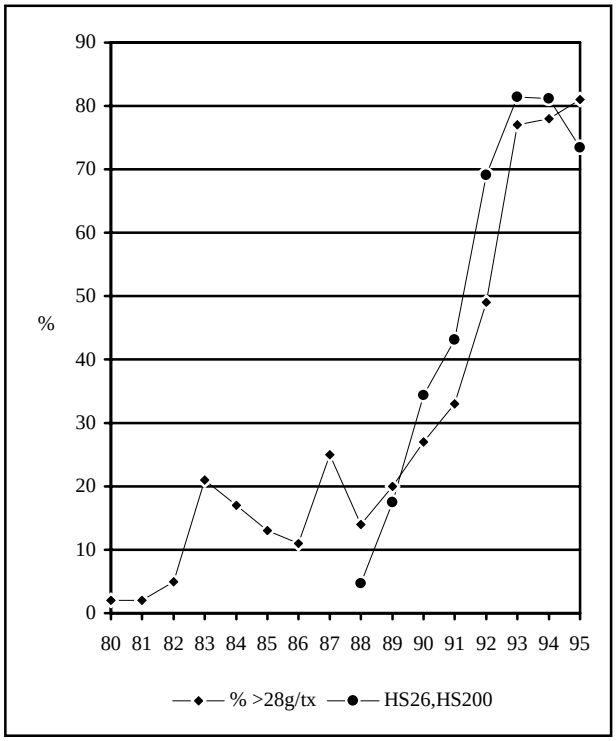

Figure 4. Variety influence on cotton fiber strength, Texas High Plains, 1980-1995.