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A. B. CONNER, DIRECTOR
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Gearing TEXAS COTTON TO WAR NEEDS

AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS
T. O. WALTON, President

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The job of gearing Texas cotton to war needs involves at least three important considerations. First, Texas has the capacity to increase substantially its good spinning varieties without loss in yield. Second, quality according to spinning performance must be given full recognition in the farmer's market through price differentials. Third, full advantage should be taken of the opportunity of producing cotton at the relatively low labor costs in Texas.

With the desire of assisting the cotton industry in gearing Texas Cotton to war needs a body of related facts resulting from years of research are presented in this bulletin. The more outstanding of these facts are:

Grade and staple length alone do not adequately indicate spinning utility. Recent spinning tests show that the staple length in a given variety varied as much as 5/32 inch with no significant difference in the breaking strength of the yarn. Spinning tests show that a given variety for a given year produces yarns of consistent strength regardless of the place grown. Yarns spun from different varieties but having the same staple length varied from 107 to 77 pounds in breaking strength. A comparison of the breaking strength of yarns of the best Texas grown cottons with several of the best southeastern grown cottons shows the Texas cottons to be slightly stronger, even though they are somewhat shorter.

To meet adequately our war needs for cottons with good spinning performance we should greatly increase the production of varieties that have high spinning utility and that produce cotton with staple lengths 15/16 inch and longer. Fortunately, it is not necessary to sacrifice yield in order to obtain good spinning performance. Recent variety tests conducted by the Texas Agricultural Experiment Station at Lubbock and other points throughout the State show that certain varieties produce lint 15/16 inch and longer and yield, with few exceptions, as much or more than varieties having a staple length of 7/8 inch and shorter. The safest and surest way of improving Texas cotton is to plant only those varieties which have high yields and high spinning performance.

The paying of an indiscriminate price under "hog round" buying in the farmers' market is the prime factor in the production of an inferior cotton. Group action by growers in a single variety gin community is a positive cure for "hog round," or point buying.

Texas has resources peculiarly adapted to the production of cotton at a minimum labor cost. Assuming the most common size and type of farm equipment, labor requirements range as low as 20 hours per acre. A mechanical harvester has been developed which gathers in the plains area 95 to 98 per cent of the cotton, reduces harvesting labor about 75 per cent, the total labor about 50 per cent, and lowers the quality about ½ grade.

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GEARING TEXAS COTTON TO WAR NEEDS[1]

The role of cotton in the present war effort is most important and essential. Someone has said that cotton is more essential in the present emergency than rubber. Be this as it may, our present needs for cotton amount to more than two and one-half million tons per year and that for rubber less than one million tons. Hundreds of cotton products are essential to the war effort. We are told on good authority that the average soldier consumes ten times more cotton than the average civilian. It is conservatively estimated that 250 pounds of cotton per soldier are necessary to equip an army.

We are fortunate to have an ample supply of cotton. But mere quantity is not sufficient. It is quantity plus quality that will get the job done. The high requirements of the U. S. Army and Navy are responsible for an unusually heavy demand for high grade and medium to long staple cotton. Recent estimates based on supply, disappearance, and probable requirements indicate that by August 1, 1943, we will have on hand three years' supply of cotton shorter than 7/8 inch in length, two years' supply of 7/8 and 29/32 inch, and about 2/3 of a year's supply and less for the staple lengths 15/16 inch and over. According to this estimate it is highly probable that we will face a serious shortage in the higher quality cottons by the end of another year. Texas and the southwest are credited with having grown a large part of this short cotton for which there is little demand.

Regardless of the kind of cotton Texas has grown in the past and regardless of the reasons for producing this kind of cotton, the challenge to Texas is to produce more cotton of the kind most needed in the war effort. Can the challenge be met? Can Texas produce cotton at relatively low costs in comparison with the remainder of the cotton belt? Can Texas grow the medium to long staple varieties without sacrificing in yield? How do these varieties grown in Texas spin as compared with the same varieties grown at different locations throughout the cotton belt? Are groups of cotton growers by gin communities ready to cooperate in growing and marketing proven cotton varieties of high yield and high spinning performance? These are some of the questions which must be faced and answered if the above challenge is accepted and met.

Finally, in all the effort to improve the quality of Texas cotton the fundamental question is raised as to what constitutes quality or desired

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[1]Manuscript prepared by a committee composed of:
C. A. Bonnen, Farm Management Specialist, Texas Agricultural Experiment Station.
D. T. Killough, Agronomist, Texas Agricultural Experiment Station.
George W. Pfeiffenberger, Associate Cotton Technologist, Agricultural Marketing Administration, United States Department of Agriculture.
W. E. Paulson, Marketing Research Specialist, Texas Agricultural Experiment Station.
M. C. Jaynes, Cotton Work Specialist, Texas Agricultural Extension Service.
L. P. Gabbard, Chief, Division of Farm and Ranch Economics, Texas Agricultural Experiment Station.

utility in cotton and what is an adequate measure of such characteristics? For many years, arbitrary grade and staple classifications have served as a measure of quality, but recent research shows these accepted standards of quality to be fraught with many myths. Spinning performance as related to a given variety of cotton has been found to be a more reliable measure of its utility than grade and staple. The full meaning of grade and staple can only be realized when confined to a given variety. It is strange how arbitrary, conventional, and traditional usage comes to be accepted for the truth, when in reality it may be largely or wholly fictitious. As an example, recall if you can the number of times you have heard the innocent ostrich slandered by reference to his alleged habit of burying his head in the sand when confronted with danger. How ridiculous! A bird as large and conspicuous would have been extinct long ago were the "head in the sand" story true. Thus, in our efforts to improve the quality of Texas cotton the first big task is to free ourselves of the myth and fiction which enshroud the question of quality in cotton. The old injunction, "know the truth and the truth shall make you free" applies with all its inherent force. Let us examine the facts for guidance in the job of gearing Texas cotton to war needs.

VARIETY IS THE MOST IMPORTANT FACTOR DETERMINING SPINNING PERFORMANCE

The standards of quality of cotton have been developed over a period of more than 125 years. Grade and staple length have emerged as the measures of quality. The final answer to the question of quality in cotton is to be found in the quality of the finished product. Manufacturers are most concerned about spinnability and strength in the finished product. The question is raised as to the adequacy of grade and staple length as measures of spinnability and strength. Recent spinning research has revealed that variety is an added factor supplementing grade and staple length as measures of quality.

Hundreds of tests made in the cotton fiber and spinning laboratories of the United States Department of Agriculture in cooperation with the Texas Agricultural Experiment Station show rather conclusively that variety is the most important single factor in determining spinning performance as reflected chiefly in yarn strength. Among these tests was a very comprehensive one known as the Regional Variety Study. This involved three-year tests on sixteen well known varieties of cotton grown in duplicate at each of eight locations throughout the cotton belt, from Florence, South Carolina to Lubbock, Texas. The tensile strengths of 22s carded warp yarns spun from these cottons are shown in Figure 1 for each variety during the three years and the average of the three years. All eight stations are averaged. This chart indicates definitely that yarn strength is very significantly affected by both seasonal and varietal differences. It is to be noted that there was a wide difference between the strengths of the 1935 cottons and those of the 1937 crop. It

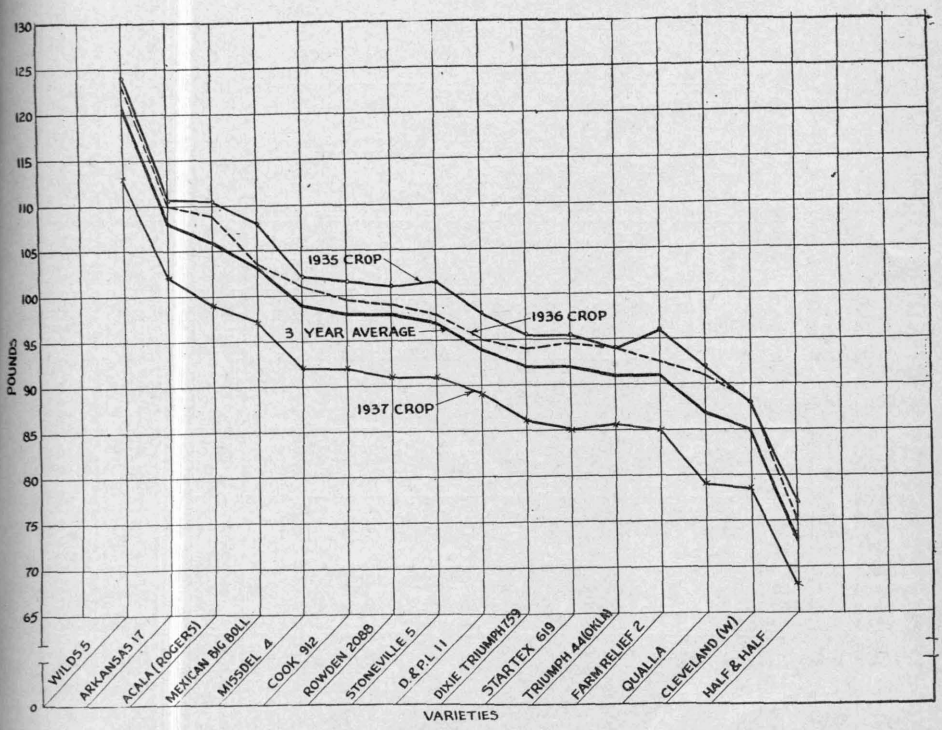

Figure 1. Breaking strength in pounds per skein of 22s yarn spun from 16 varieties of cotton grown at 8 stations throughout the Cotton Belt, indicating seasonal and varietal effects. Crops of 1935, 1936 and 1937.

should also be noted that from year to year the varieties assumed practically fixed position in the order of strength. This is true even though the cottons were grown at widely separated points and under widely different climatic conditions. Yarn strength is the most widely used single index of spinning quality and manufacturing efficiency.

In addition to the Regional Variety Study, other more localized variety tests have been made. Yarn strengths and yarn appearance grades of some of the outstanding tests of Texas cottons are presented in Tables 1 and 2. In a series of tests made on a number of southeastern cottons and on Texas varieties for the 1940 crop, it was again found that certain of them produced yarns of higher strength and generally superior spinning performance than others. This was also true regardless of place grown, the weather condition prevailing, or the staple length produced. A typical example of this is illustrated in Figure 2. In this chart are shown the yarn strengths for the Stoneville 2B variety grown at such widely separated points as Statesville, North Carolina; Tifton, Georgia; Florence, South Carolina; Stoneville, Mississippi; College Station, Texas;

Table 1. Skein Breaking Strength of 22s Yarn Spun From a Number of Texas Grown Cottons

(Crops of 1940 and 1941)

Variety	Stations and Crop Years											
	College Station		Temple		Greenville		Chillicothe		Lubbock		Victoria	
	1940	1941	1940	1941	1940	1941	1940	1941	1940	1941	1940	1941
Rogers Acala 111	115	---	113	110	---	111	125	---	---	---	122	---
Shafter Acala	105	---	102	---	105	99	111	---	---	92	113	---
Nucala	---	---	---	---	104	100	---	92	---	---	---	---
Acala Cody Lentz	---	---	---	---	---	---	---	---	---	---	115	---
Acala Hasselfield	---	---	---	---	---	---	---	---	---	---	117	---
Texacala	---	---	---	106	---	101	---	---	---	---	118	---
Acala 1517	---	---	---	---	---	123	---	---	---	---	---	---
Acala 8-3-2	---	105	---	---	---	---	---	---	---	---	---	---
Stoneville 2-B	109	105	---	---	111	---	---	92	---	---	---	---
Stoneville 5	---	95	---	92	---	96	---	96	---	96	---	---
Deltapine 11-A	96	---	100	---	---	---	---	---	---	---	---	---
Deltapine 14	---	100	---	---	---	---	---	106	---	---	---	---
Delfos 719-821	---	106	---	---	---	---	---	---	---	---	---	---
Washington (Delfos 719)	106	100	---	---	116	---	---	---	---	---	---	---
Roldo Rowden	91	---	92	---	---	---	---	---	---	---	---	---
Rowden Malone	---	---	---	---	93	---	---	---	---	---	---	---
Rowden 41B	---	83	---	---	---	88	---	---	---	---	---	---
Dortch's Rowden	---	---	---	---	---	89	---	---	---	---	---	---
Buckellew Mebane	---	---	97	---	---	---	---	---	---	---	---	---
Mebane (A.D. Estate)	96	---	98	---	---	---	98	---	---	---	---	---
Bryant Mebane	---	---	97	83	---	84	---	---	---	---	---	---
Mebane 140	---	---	---	---	---	---	103	---	---	---	---	---
Mebane 804-50	---	---	---	---	---	86	---	---	---	---	---	---
Western Mebane 140	---	---	---	---	---	---	---	82	---	---	---	---
Watson Mebane	---	---	---	---	---	---	---	76	---	---	---	---
Qualla	---	---	---	---	96	---	98	---	---	---	---	---
Lankart	102	---	104	98	---	100	---	---	---	---	---	---
Lankart x Mebane 153	---	---	---	---	---	86	---	78	---	---	---	---
Hi-Bred	---	---	---	---	---	84	---	---	---	85	---	---
Half & Half	---	---	---	---	---	---	---	77	---	---	---	---

Table 2. Appearance Grade of 22s Yarn Spun From a Number of Texas Grown Cottons

(Crops of 1940 and 1941)

Variety	Stations and Crop Years											
	College Station		Temple		Greenville		Chillicothe		Lubbock		Victoria	
	1940	1941	1940	1941	1940	1941	1940	1941	1940	1941	1940	1941
Rogers Acala 111	B	--	B	C+	--	B	A—	--	--	--	A—	--
Shafter Acala	B—	--	B	--	B	B—	B+	--	--	B—	A—	--
Nucala	--	--	--	--	B+	B+	--	B+	--	--	--	--
Acala Cody Lentz	--	--	--	--	--	--	--	--	--	--	B+	--
Acala Hasselfield	--	--	--	--	--	--	--	--	--	--	B+	--
Texacala	--	--	--	B—	--	B	--	--	--	--	A—	--
Acala 1517	--	--	--	--	--	B—	--	--	--	--	--	--
Acala 8-3-2	--	B+	--	--	--	--	--	--	--	--	--	--
Stoneville 2-B	B	B—	--	--	B	--	--	B	--	--	--	--
Stoneville 5	--	B—	--	B—	--	B	--	B+	--	B	--	--
Deltapine 11-A	B	--	B	--	--	--	--	--	--	--	--	--
Deltapine 14	--	B	--	--	--	--	--	B+	--	--	--	--
Delfos 719-821	--	B	--	--	--	--	--	--	--	--	--	--
Washington (Delfos 719)	B	B—	--	--	B+	--	--	--	--	--	--	--
Roldo Rowden	B+	--	B	--	--	--	--	--	--	--	--	--
Rowden Malone	--	--	--	--	A—	--	--	--	--	--	--	--
Rowden 41B	--	B+	--	--	--	B+	--	--	--	--	--	--
Dortch's Rowden	--	--	--	--	--	B	--	--	--	--	--	--
Buckellew Mebane	--	--	A—	--	--	--	--	--	--	--	--	--
Mebane (A.D. Estate)	B+	--	A—	--	--	--	A—	--	--	--	--	--
Bryant Mebane	--	--	B+	B	--	B+	--	--	--	--	--	--
Mebane 140	--	--	--	--	--	--	A	--	--	--	--	--
Mebane 804-50	--	--	--	--	--	A—	--	--	--	--	--	--
Western Mebane 140	--	--	--	--	--	--	--	B+	--	--	--	--
Watson Mebane	--	--	--	--	--	--	--	B+	--	--	--	--
Qualla	--	--	--	--	A—	--	B+	--	--	--	--	--
Lankart	A—	--	B	B	--	B	--	--	--	--	--	--
Lankart x Mebane 153	--	--	--	--	--	B	--	--	--	--	--	--
Hi-Bred	--	--	--	--	--	B	--	--	--	B+	--	--
Half & Half	--	--	--	--	--	--	--	B+	--	--	--	--

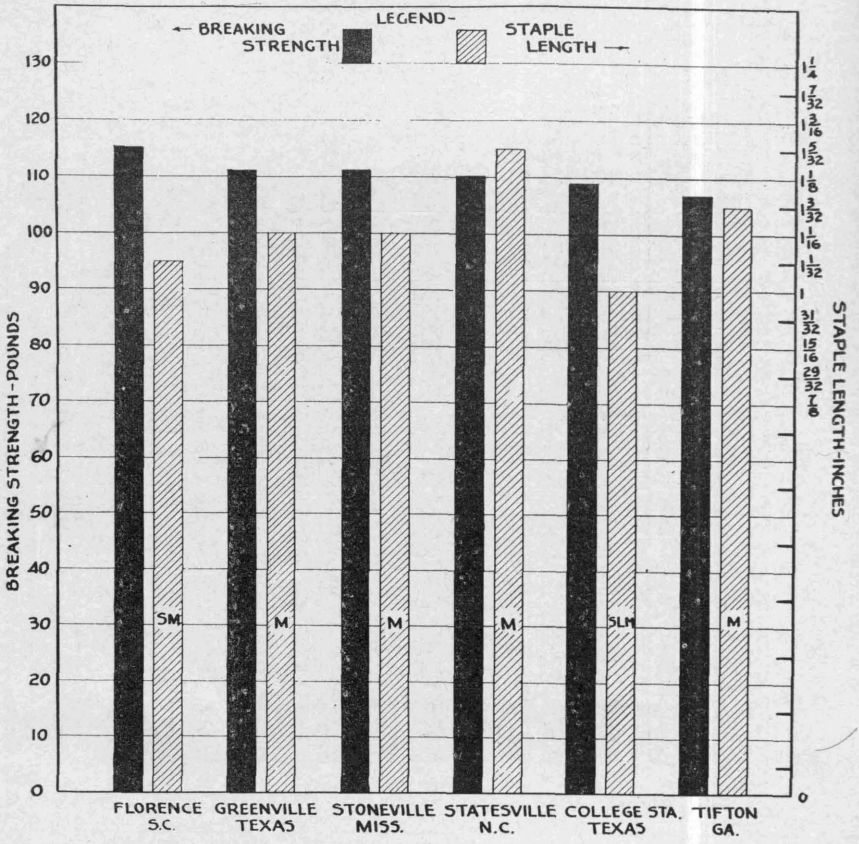

Figure 2. Breaking strength in pounds per skein of 22s yarn and staple length a single variety of cotton, Stoneville 2B, grown ot six widely separated locations in the crop of 1940.

and Greenville, Texas. It is significant that, although the staple lengths ranged from 1 inch at College Station, Texas to 1-5/32 inches at Statesville, North Carolina, the greatest range in strength was only six pounds; and in fact, for the two extremes in staple quoted above, the yarn strengths were 109 pounds and 110 pounds. This is certainly not a significant difference in strength. It must be borne in mind, however, in making comparisons such as this, that such differences in staple length would probably be highly significant when comparing two or more varieties. There is an over-all relationship between staple length and yarn strength when variety is not considered.

Other significant conclusions can be drawn from the data shown in Figure 3. On this chart are grouped all the cottons classed as 31/32 inch and tested in the Texas-Oklahoma Variety Test of 1941. It will be noted that, although the staple length was constant, the range in yarn

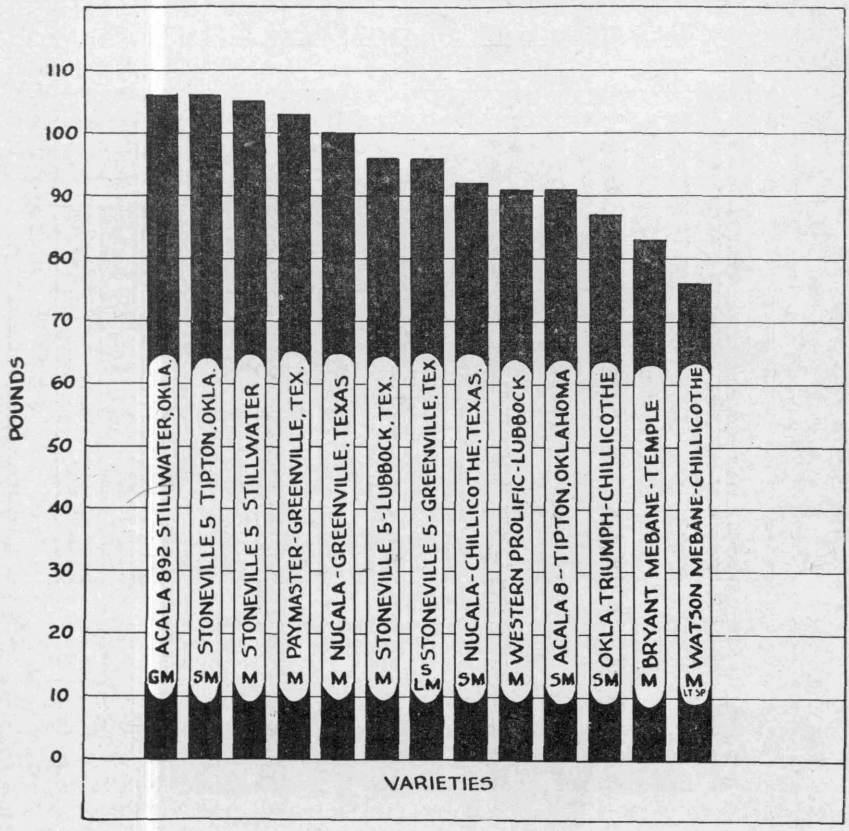

Figure 3. Breaking strength in pounds per skein of 22s yarn spun from several varieties of cotton all of a single staple length, 31/32 inch, crop of 1941.

strengths was very great, the strongest yarn being 107 pounds and the weakest 77 pounds. In looking for the cause of this wide range in strength, the question may arise as to whether these differences are due to variety or to the location where the cotton is grown. There is no doubt that location has some effect on strength, particularly when very adverse weather conditions might deteriorate the fiber. Figure 2 indicates, however, that in these tests this effect was small, since the yarn strength of Stoneville 2B remained nearly constant from the Carolinas to Texas. The importance of variety is further shown in Figure 4 which illustrates the ranking in strength of several varieties all grown at the same location. The strength ranges from 123 pounds for Acala 1517 to 84 pounds for Bryant Mebane and Hi-Bred.

It should be clear that the selection of cottons and the judging of their spinning performance solely on the basis of grade and staple have

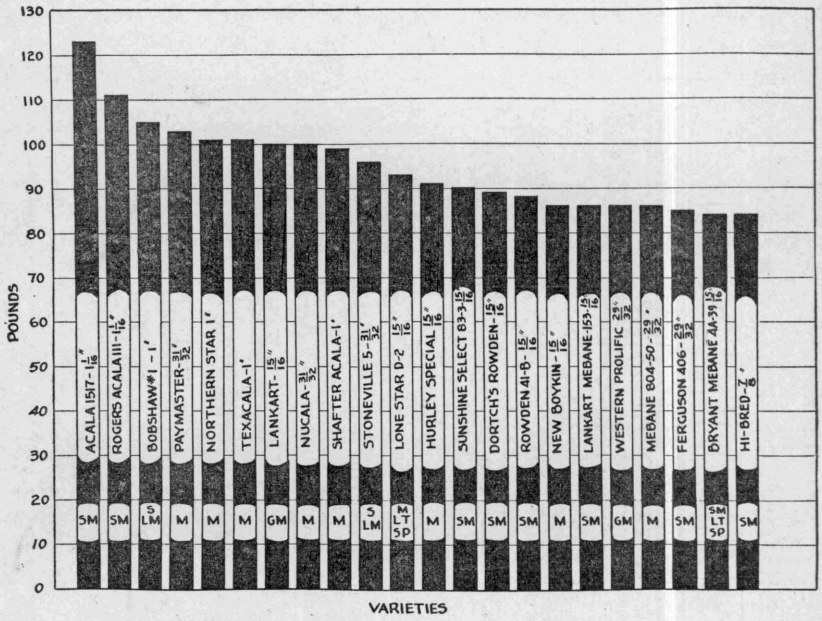

Figure 4. Breaking strength in pounds per skein of 22s yarn spun from a number of varieties of cotton all grown at a single location, Greenville, Texas, crop of 1941.

serious shortcomings. As shown in Figure 3, a group of cottons all classed the same staple length varied as much as 33 per cent in breaking strength of yarn. With only a commercial classification as a guide, it would be impossible to assemble bales in even running lots in such a manner as to obtain the optimum spinning performance. If the classer's designations were supplemented with a knowledge of varieties and of their spinning performance, selection of cottons for particular uses could be made much more intelligently and with more reliable results. Instead of reducing the general strength level of an even running lot to that of the average of the mixture of good and poor varieties, the poorer cottons could be eliminated at the start, thus bringing up the strength level to that of the better varieties.

It is recognized, of course, that certain existing trade and marketing practices present difficulties. However, proper control of seed stocks and reliable certification would be of great assistance. Several of the larger mills have recently recognized the importance of variety and are now investigating the possibility of applying this knowledge to the selection of their cottons.

The domestic mills are not using Texas cottons to a degree proportionate to the size of the Texas crop. When Texas had its large foreign markets, comparatively little consideration was given to this situation, but since the State must now look to domestic outlets for its large

cotton crops, the problem is acute. A comparison of the spinning performance of the highest quality Texas and southeastern varieties is illustrated in Figure 5. In preparing this chart, only those cottons attaining a breaking strength of 110 pounds or better for 22s yarn were used. On the left are shown the Texas grown Acala cottons which averaged 116 pounds in yarn strength and 1 inch in staple length. In the center is a similar arrangement of the southeastern grown varieties which averaged 113 pounds in strength and 1-1/16 inch in staple. Mississippi Delta cottons grown in Texas are shown on the right. They

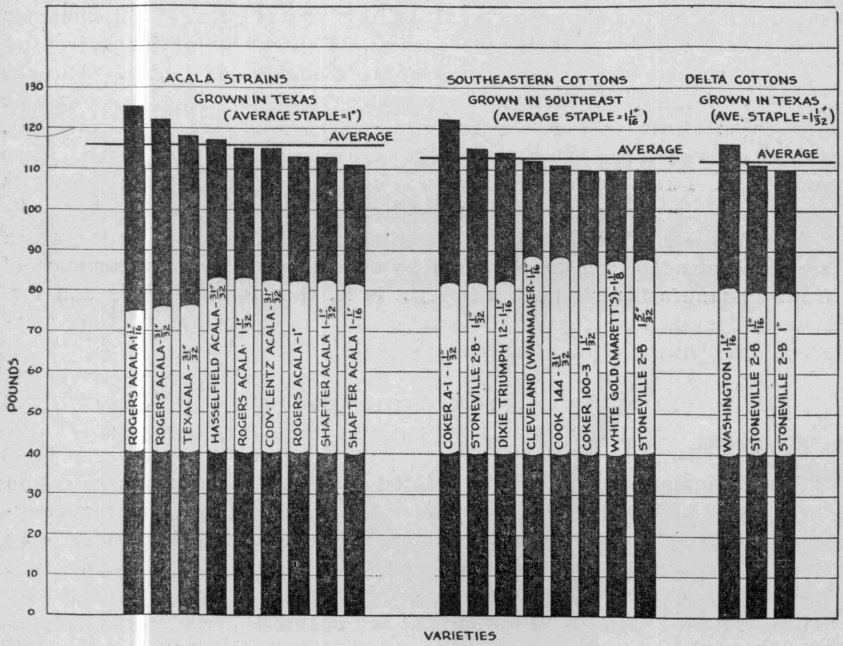

Figure 5. Breaking strength in pounds per skein of 22s yarn spun from a number of Acala strains as compared to several Southeastern and Mississippi Delta cottons, crop of 1940

averaged 112 pounds in strength and 1-1/32 inch in staple. It is significant that although the two groups of Texas grown cottons averaged from 1/32 to 1/16 inch shorter than the southeastern cottons, the yarn strengths were essentially equal. All these cottons are from the 1940 variety tests.

The discussion thus far has been primarily on those cottons producing high yarn strength. As can be seen in Table 1, the several strains of Acala, Stoneville 2B, Deltapine 14, and Delfos generally led the list. On the other hand, a number of other varieties produced yarns of intermediate strength and still other varieties consistently trailed in yarn strength. Among the varieties in this middle group are several Row-

dens. The group producing the weakest yarns is comprised mainly of certain Mebane strains, Half and Half, and Hi-bred. Although the low yarn strengths of these varieties are due in some measure to their shorter staple lengths, it should be borne in mind that even though they have average yarn strength for their staple length, they do not produce the high strength yarns required for many military purposes. It is like saying that a man is strong for his size, but is his size adequate for the needs?

The strengths of 22s yarns only have been considered in this discussion for two reasons. First, this size yarn was spun on all tests, and second, if a cotton shows up weak on this coarse yarn, it will not spin fine yarns with any degree of success. Practically all of these low strength cottons are coarse fibered and are very much limited as to the fineness of the yarn that can be spun from them. The longer staple cottons as a rule produce a slightly lower grade in yarn appearance but, as can be seen from Table 2, the differences are slight and by no means consistent. Furthermore, in most war needs high strength in fabrics is much more important than yarn appearance.

It is apparent from the data presented that the same varieties which are recommended from an agronomic viewpoint can also be recommended from a manufacturer's point of view. It is, therefore, a happy and fortunate circumstance that it is possible to produce cottons of good spinning performance without sacrificing yield.

TEXAS PRODUCES COTTON VARIETIES OF HIGH SPINNING PERFORMANCE WITHOUT SACRIFICING YIELDS

The foregoing discussion has pointed out that Texas produces cotton varieties of high spinning performance. A further important consideration is the matter of producing high quality cotton without sacrificing yield. The urgent need for high quality cotton for the war purposes, makes it imperative that farmers give special attention to the selection of the best varieties. A recent survey shows that there is an over-supply of cotton of the lower grades, below 15/16 inch in staple length, and a serious shortage of the higher grades and staple lengths 15/16 inch and above.

In order to correct this situation and supply the mills with the desired types of cotton used in manufacturing the great assortment of materials essential to the conduct of the war, the varieties of cotton with high strength and good spinning performance must be grown.

For many years the state and federal experiment stations have been conducting variety tests of cotton to determine the varieties and strains best suited to the different agricultural sections of Texas. For purposes of this discussion, the state has been divided into four sections: Gulf Coast, East Texas, Black Prairie, and West Texas. The results of these tests showing the yield and length of lint of representative varieties for the five years, 1937-1941, are given in Tables 3 and 4.

Table 3. Yield of Lint Per Acre of Representative Varieties of Cotton Tested in Texas for the 5 Years, 1937-41[1]

Variety	Gulf Coast		East Texas			Black Prairie		West Texas		
	Robstown	Angleton	Tyler	College Station	Brazos Valley	Temple	Greenville	Spur	Lubbock	Chillicothe
Acala 111 (Rogers)	298	373	300	184	421	256	371	162	341	272
Acala (Lentz)	240	---	---	189	357	253	345	---	306	---
Acala (Shafter, Calif.)	260	---	---	194	325	212	321	---	249	285
Bagley	225	---	---	145	---	240	---	157	232	289
Cliett	---	---	---	190	---	255	333	157	215	278
Deltapine 11A	288	440	280	251	406	240	398	182	383	287
Deltapine 12	---	---	301	239	483	---	---	---	---	---
Deltapine 14	---	---	---	---	473	---	---	---	---	---
Ferguson 406	---	---	---	239	---	273	373	179	265	282
Half and Half	---	---	318	---	342	---	353	185	335	313
Harper (U Strain)	---	---	---	154	---	---	---	---	---	232
Hi-Bred	242	422	328	230	445	244	---	171	336	291
Hurley Special Rowden	---	---	220	190	294	280	374	---	213	255
Kasch	209	295	191	149	---	234	---	---	192	270
Lankart	245	---	218	204	245	258	340	176	211	303
Lone Star (Gorham)	---	333	---	197	261	251	---	163	240	256
Mebane 140	---	---	---	---	---	---	---	---	255	352
Mebane 141	---	---	---	---	---	---	---	195	306	301
Mebane (A. D. Estate)	217	284	227	193	213	250	342	177	206	279
Mebane (Buckellew)	---	---	---	214	---	311	393	---	295	---
Mebane (Bryant)	---	---	263	188	---	279	367	176	---	270
Mebane (Watson)	252	332	269	200	281	277	360	195	306	289
New Boykin	---	352	226	206	289	279	372	174	273	300
Northern Star	---	---	---	---	---	---	---	141	273	258
Paymaster	---	---	---	198	---	234	322	180	279	263
Qualla	221	---	167	168	257	250	327	166	244	264
Quick (Bennett)	273	---	---	---	314	---	---	---	---	262
Roldo Rowden	---	---	---	214	387	286	356	---	---	---
Rowden	---	---	---	---	---	---	---	---	---	---
Stoneville 2B	284	426	---	232	414	---	371	---	340	---
Sunshine	---	317	199	235	265	245	357	171	209	246
Texacala (Rogers)	---	---	---	222	315	---	---	---	300	---
Texas Special	---	---	---	178	---	225	---	---	190	266
Washington (Delfos 719)	289	391	---	235	366	---	368	---	---	---
Western Prolific	---	---	---	---	---	---	---	185	280	292

[1]A complete report of all varieties tested will be published at an early date.

Table 4. Length of Lint in Inches of Representative Varieties of Cotton Tested in Texas for the 5 Years, 1937-41

Variety	Gulf Coast		East Texas			Black Prairie		West Texas		
	Robstown	Angleton	Tyler	College Station	Brazos Valley	Temple	Greenville	Spur	Lubbock	Chillicothe
Acala 111 (Rogers)	1 1-16	1 3-32	1	1 1-32	1 1-16	1 1-32	1 1-32	15-16	1	1 1-16
Acala (Lentz)	1 1-32	------	------	1 1-32	1 1-16	1 1-32	1 1-32	------	1	------
Acala (Shafter, Calif.)	1 3-32	------	------	1 1-16	1 1-16	1 1-32	1 1-32	------	1 1-32	1 3-32
Bagley	1 1-32	------	------	31-32	------	31-32	------	15-16	15-16	31-32
Cliett	------	------	------	31-32	------	31-32	15-16	29-32	29-32	31-32
Deltapine 11A	1 1-32	1 1-16	31-32	1	1 1-32	1 1-32	31-32	15-16	15-16	1 1-32
Deltapine 12	------	------	1	1 1-32	1	------	------	------	------	------
Deltapine 14	------	------	------	------	1 1-32	------	------	------	------	------
Ferguson 406	------	------	------	15-16	------	15-16	15-16	15-16	29-32	15-16
Half and Half	------	------	27-32	------	27-32	------	13-16	13-16	27-32	27-32
Harper (U Strain)	------	------	------	31-32	------	------	------	------	------	31-32
Hi-Bred	29-32	29-32	27-32	7-8	29-32	27-32	------	7-8	7-8	7-8
Hurley Special Rowden	------	------	31-32	1	1	31-32	1	------	15-16	1
Kasch	1	1	15-16	31-32	------	31-32	------	------	31-32	1
Lankart	1 1-32	------	31-32	1	1	1	1 1-32	15-16	31-32	1
Lone Star (Gorham)	------	1	------	15-16	31-32	15-16	------	15-16	15-16	31-32
Mebane 140	------	------	------	------	------	------	------	------	29-32	15-16
Mebane 141	------	------	------	------	------	------	------	29-32	29-32	15-16
Mebane (A. D. Est.)	31-32	1	15-16	31-32	31-32	31-32	1	15-16	15-16	31-32
Mebane (Buckellew)	------	------	------	15-16	------	31-32	15-16	------	15-16	------
Mebane (Bryant)	------	------	15-16	31-32	------	31-32	15-16	15-16	------	31-32
Mebane (Watson)	31-32	1	15-16	31-32	1	31-32	15-16	29-32	15-16	31-32
New Boykin	------	15-16	29-32	15-16	31-32	15-16	15-16	15-16	29-32	15-16
Northern Star	------	------	------	------	------	------	------	15-16	15-16	31-32
Paymaster	------	------	------	1	------	1	15-16	15-16	31-32	1 1-32
Qualla	1	------	31-32	15-16	1	31-32	31-32	15-16	15-16	31-32
Quick (Bennett)	1 1-32	------	------	------	1 1-32	------	------	------	------	1
Roldo Rowden	------	------	------	1	1	31-32	1	------	------	------
Rowden	------	------	------	------	------	------	------	------	------	------
Stoneville 2B	1 1-16	1 1-16	------	1 1-16	1 1-32	------	1 1-32	31-32	------	------
Sunshine	------	1	31-32	31-32	31-32	15-16	31-32	31-32	15-16	31-32
Texacala (Rogers)	------	------	------	1 1-32	1 1-32	------	------	------	1	------
Texas Special	------	------	------	15-16	------	31-32	------	------	15-16	1
Washington (Delfos 719)	1 1-32	1 3-32	------	1 1-32	1 1-16	------	1	------	------	------
Western Prolific	------	------	------	------	------	------	------	15-16	7-8	31-32

The yield of the longer staple, higher yielding varieties at Robstown, in the western part of the Gulf Coast Prairie, ranged from 298 pounds for Rogers Acala 111 to 240 pounds for Lentz Acala. Nine varieties at Robstown had a staple 1-1/32 inch or longer. At Angleton, in the eastern part of the Gulf Coast Prairie, the yields varied from 440 pounds for Deltapine 11A to 284 pounds for Mebane (A. D. Estate). In this test four varieties produced lint 1-1/16 inch or longer, while the lint of Hi-bred, although a high yielding variety, measured only 29/32 inch.

In the eastern part of the state, at Tyler, Deltapine 12 and Rogers Acala 111 were the highest yielding of the longer staple varieties, both producing lint averaging one inch in length for the five years, 1937-41. At College Station the high yielding varieties which included two strains of Deltapine, Washington (Delfos 719) and Stoneville 2B, produced lint ranging from 1 to 1-1/16 inch.

It will be observed in Table 3 that the highest yields were produced in the Brazos River Valley, near College Station. At this location, the higher yielding, longer staple varieties included the three Deltapine strains, Rogers Acala 111 and Stoneville 2B. The staple length of these varieties ranged from 1 inch to 1-1/16 inch. It will be noted in Table 3 that Hi-Bred and Half and Half made relatively high yields but produced staples only 29/32 and 27/32 inch in length.

The higher yielding, longer staple varieties at Temple, in the Black Prairie, included Rogers Acala 111, Lentz Acala, and Deltapine 11A. These varieties produced staple of 1-1/32 inch. At Greenville, in the northern part of the Black Prairie, Deltapine 11A, Hurley Special Rowden, Stoneville 2B, and Rogers Acala 111 produced high yields of lint, 3-1/32 to 1-1/32 inches in length. Certain of the Mebane and Triumph type strains as well as the Rowden strains produced high yields in the Black Prairie, but the staple was shorter than the Acala and Stoneville types.

In the western part of the state, particularly at Lubbock, it is significant that some of the longer staple varieties, such as Deltapine 11A. Rogers Acala 111, and Stoneville 2B, compared favorably in yield with the short staple varieties, Half and Half and Hi-Bred.

At Spur and Chillicothe, however, the highest yields were produced by the medium staple varieties, such as Mebane 140 and 141, Watson Mebane, Western Prolific, New Boykin, and Ferguson 406 and by the short staple varieties Half and Half and Hi-Bred. While these varieties exceeded somewhat the yields of the longer staple varieties, Deltapine 11A, Rogers Acala 111, and Stoneville 2B, their spinning performance was considerably lower than the longer staple varieties as shown previously.

It should be pointed out, however, that greater care must be exercised in the harvesting and ginning of these longer staple varieties in order to avoid damage to the grade and staple of the cotton. The High Plains Cotton Area is one of the most important cotton producing sections in

the state and has the lowest cost of production. Here the opportunity to produce large quantities of desirable types of cotton at the lowest possible cost should not be overlooked.

Considering the state as a whole, it will be noted that the varieties having a staple length 15/16 inch and longer with good spinning performance can be grown profitably in nearly all sections. These varieties are better suited to meet most war requirements than are the shorter staple cottons.

GROUP ACTION IS NECESSARY IN GROWING AND MARKETING HIGH QUALITY VARIETIES

The importance of variety in the production of cotton both from the standpoint of lint yield and of spinning performance has been established. The disproportionate supply of varieties of short lint and of poor spinning performance in the current carryover of Texas cotton is concrete evidence that growers are not now producing an adequate supply of the more desirable varieties. The reasons for the failure of producers to match demand as to quality are several. The more important of these are: (1) the full significance of variety has only recently been revealed through research; (2) the marketing system as now organized, especially in the farmers' market, has definitely discouraged production of the longer staple cottons; and (3) the present cotton loan schedules operate to subsidize short staple and low grade cotton. The responsibility of shifting to the more desirable varieties rests with the grower. The results of research should point the way. Growers have within their power the control of the quality of their cotton to the extent that choice of variety, cultural practices, and harvesting methods are quality determining factors.

It would seem that the question of quality may be solved by growers and manufacturers of cotton products getting together. If the manufacturer could make known to the grower the qualities in raw cotton suited to his needs, such information should serve to guide the grower in his production program. The whole matter, however, is not as simple as that. Growers and manufacturers are separated both as to the time of production and the time of demand and as to the place of production and the place of demand. This situation explains the origin and the continued operation of the cotton merchants.

The position of the cotton merchants as the middlemen between growers and manufacturers presents some complications in the quality problem. The interests of merchants in quality may be quite different from those of the growers and those of the manufacturers. The merchants' stock in trade is that of knowing the quality of cotton produced in the various areas of the cotton belt and that of knowing the quality of cotton demanded by the various mills. Merchants are vitally interested in maintaining a margin between buying and selling prices that will yield a profit over their operating costs. It does not follow that the merchants are particularly concerned about the maintenance of a price system in

the farmers' market recognizing in full the quality demands of the mills. The prevalence of "point buying" throughout the cotton belt is evidence to the contrary.

"Point buying" fails in large measure to take care of differences in the quality of specific bales, as represented by grade and staple length. Producers of high quality cotton are underpaid; producers of low quality cotton are overpaid. This failure of the local market to recognize quality is most discouraging to the grower who might wish to improve the quality of his cotton.

"Point buying" succeeds in taking care of differences in average quality among the different local markets. This behavior of the market discourages individual effort to improve quality. A grower who may produce a high quality cotton in a market of low average quality and who thus helps to raise the average quality is severely penalized for his positive contribution; a grower who may produce a low quality cotton in a market of high average quality and who thus pulls down the average quality is richly rewarded for his negative contribution.

Recent results of research on varieties of cotton relative to quality as measured through spinning tests are most significant. It seems clear that the long accepted standard of grade and staple length as the measures of quality needs to be supplemented by information on variety. As shown in Figure 3, cottons of different varieties but of the same staple length may produce yarns varying as much as 33 percent in strength as among the varieties. On the other hand, as shown in Figure 2, cotton of a given variety varying as much as 5/32 inch in staple length may produce yarns with insignificant differences in strength regardless of the location in which the cotton was grown.

Cotton growers of Texas are called upon today to improve the quality of their crop as a vital contribution to the war effort. If no steps be taken to reorganize the local market, the chances are that such appeal will be quite ineffective. If, however, steps be taken to reorganize the local market so that quality as to grade, staple length, and spinning utility is fully reflected in the price, the farmer can be depended upon to grow the best variety.

A well-rounded program of cotton improvement awaits group action of growers. The individual grower standing alone is rather helpless. The variety of cotton as the controlling influence of spinning utility makes the selection of the kind of cotton to grow a crucial matter. The one-variety community approach greatly simplifies the quality problem in marketing. The assembling of cotton into even running lots as to staple length and spinning utility is greatly facilitated. The one-variety community facilitates good ginning.

Significantly, cotton mills are beginning to manifest an interest in the variety of cotton as an important aspect of quality. Some of the mills have now taken definite steps to investigate the relation between variety

and quality. Other mills are displaying a keen interest in the same direction.

The growers of a one-variety community with their opportunity of selecting the most suitable variety from the standpoint of yield, staple length, and spinning utility and with the services of classing and market news furnished by the United States Department of Agriculture under the Smith-Doxey Act are in position to grow the best cotton and to know the quality and market value of this cotton. The volume produced by a single one-variety community may not be large enough to attract cotton merchants. If a number of one-variety communities would join forces, an attractive volume might be assembled. Large volumes will also be a great help to growers in establishing spinning utility as a quality factor.

The Victoria Cotton Improvement Area is an example of what may be done in this connection. It serves as the central selling agency for 15 one-variety communities in the vicinity of Victoria, Texas. The volume in 1940 was large enough to attract six buyers. During the ginning season sales are conducted each day. Samples of each bale of the ginnings the previous day are displayed. The cotton is offered in lots of one bale or more. Even though the bales have been classed before being offered for sale no effort is made to induce the buyers to bid on the basis of the Smith-Doxey classifications. Instead bids are made on the basis of the samples. Only one price is bid for a lot even though different qualities may be represented. Settlement with the growers selling the cotton, however, is made on the quality of each specific bale in the lot.

During the season 1940, growers patronizing the Victoria Cotton Improvement Area received an average price 27 points below the average price of comparable quality on the Houston spot market. This difference is about equal to the freight charge from Victoria to Houston and the cost of compressing. Thus growers received the full market value of their cotton not only on the average but on each bale.

It would seem that the experiences of the Victoria Cotton Improvement Area point the way to a happy solution of the critical problem in organizing the local market to recognize quality fully and adequately. The Victoria organization makes it possible for the local market to SAY IT WITH PRICES in the all important campaign calling upon the cotton growers of Texas to improve the quality of their cotton.

TEXAS PRODUCES COTTON AT LOW COST

It has been shown that the cotton industry of Texas can contribute materially to the war effort by increasing the production of cottons of high spinning performance. The acute shortage of man power needed in the production of vital war materials emphasizes the importance of economy in the use of man power in the production of cotton. Texas has resources peculiarly adapted to the production of cotton at a minimum labor cost.

Cotton is produced at relatively low cost on the plains and prairies of Texas. This is possible because of a combination of soils, climate, and topography which is conducive to the use of large scale methods of production to an extent not possible in the timbered areas of the state and in the greater portion of the cotton belt.

In a recent study of the cost of producing cotton in five areas of Texas, the estimated cost per pound of lint ranged from five cents in the High Plains to 13 cents in the Northeast Sandy Lands, assuming the use to optimum capacity of the size of power and equipment unit most common to each area. The costs were based on prices prevailing during the period 1933-1938. Methods of producing cotton in the Northeast Sandy Lands are similar to methods used in the upland portions of the cotton belt to the east.

These differences in costs, as between areas within the state, are largely accounted for by differences in the amounts of labor used. The usual amounts of labor required for the production of cotton in four of the principal cotton producing areas of Texas are shown in Table 5. Again the most common type and size of power and equipment units are assumed. For convenience in discussion, the data are presented in two parts; the preharvesting requirements, and the harvesting requirements. Preharvest labor amounted to 5.5 hours per acre in the High Plains and 8.8, 25, and 50 hours in the Rolling Plains, the Black Prairie, and the Northeast Sandy Lands.

Generally speaking, these differences relate closely to differences in the physical characteristics of the areas, and particularly to differences in rainfall. The physical characteristics of the areas, including soils, topography, climate, and natural cover, have greatly influenced the size and type of power and equipment used, while climatic conditions, particularly rainfall, have largely determined the amount of hoeing and cultivating necessary to weed control. In other words, the relatively small amounts of labor used in the plains areas are the result of rapid performance of machine operations through the use of large sized power and equipment units, and of the small amount of hoeing and cultivating needed for the spacing of cotton and for weed control.

In the High Plains, where the average annual rainfall is approximately 20 inches, and two-row tractor equipment most common, cotton is usually cultivated from 3 to 4 times, and approximately 3 hours of labor per acre is spent in hoeing out large weeds missed during cultivation. The chief difference between the High Plains and the Rolling Plains in this respect is that about ¾ of the cotton is spaced in the row, or chopped in the Rolling Plains. The number of cultivations and the amount of time spent in hoeing is approximately the same in both areas.

In the Black Prairie, the annual rainfall averages 35 inches, and one-row horse-drawn equipment is most common. Here cotton is cultivated from 4 to 6 times and hoed twice, in addition to chopping.

The Northeast Sandy Lands Area is naturally wooded, fields are small and irregular in shape, the annual rainfall averages 45 inches, and one-

Table 5. Labor Requirements Per Acre in the Production of Cotton

Area[2]	Most common size or type of power unit	Hours of Labor per Acre							Approx. average annual rainfall in inches	Normal[1] yield pounds lint
		Seed-bed preparation	Planting	Cultivating	Hoeing and chopping	Total preharvest labor	Harvesting	Total all labor		
(a)	2-Row Tractor	.7	.5	1.4	2.9	5.5	14.7	20.2	20	185
(b)	2-Row Tractor	1.3	.7	1.3	5.4	8.8	16.2	25.0	25	135
(c)	1-Row Horse	5.8	1.8	6.8	10.4	25.0	24.0	49.0	35	170
(d)	1-Row & Part Row Horse	10.0	3.5	18.0	18.5	50.0	26.5	76.5	45	150

[1]Five year average as determined by Agricultural Adjustment Administration.
[2](a) High Plains Cotton, (b) Rolling Plains, (c) Black Prairie, (d) Northeast Texas Sandy Lands.

row and part-row horse-drawn equipment is common. Cotton receives from 6 to 8 cultivations, is chopped or spaced, and receives from 2 to 3 additional hoeings. Because of greater rainfall and of the more persistent nature of the weed growth, more time is spent on each hoeing in this area than in the other areas.

Harvesting requires about 60 per cent as much labor per acre in the two plains areas as in the two areas in the eastern part of the state. This difference is owing almost entirely to differences in harvesting methods which in turn relate to climate conditions. Practically all cotton is picked in the Black Prairie and in Northeast Texas, while 85 to 100 per cent of the cotton is snapped in the two plains areas.

The significance of these differences in labor requirements as between areas may be more clearly seen in terms of the amount of labor per 500-pound bale. Such a comparison is shown in Table 6.

Table 6. Labor Requirements Per Bale in the Production of Cotton

Area	Hours of Labor required per 500-lb. bale	
	Preharvest labor	Total labor
High Plains Cotton	14.2	52.1
Rolling Plains	31.1	88.4
Black Prairie	70.2	137.7
N.E. Texas Sandy Lands	159.6	244.0

It will be noted that preharvest labor per bale in Northeast Texas is eleven times, and total labor is four to five times, the preharvest labor and total labor in the High Plains.

The differences in preharvest labor are most significant, since the amount of labor required previous to harvest largely determines the

acreage of cotton that a family can handle. Seasonal workers are used in all areas for harvesting cotton over and above the amount that can be gathered by the family, or the regular labor force. The extent to which this is done ranges from 30 per cent, on the average, in Northeast Texas, to 95 per cent in the High Plains. In the Black Prairie about two-thirds of the cotton is picked with hired labor, while in the Rolling Plains, 85 per cent of the cotton is harvested with seasonal labor.

These differences in labor requirements take on additional significance when the effects on the scale of operation are considered. A family using one set of two-row tractor equipment in the High Plains can handle almost 200 acres of cotton, which at average yields will produce 75 bales. (See Figure 6.) Comparable figures for the other three areas are: the Rolling Plains, 130 acres and 37 bales; the Black Prairie, 44 acres and 16 bales; and the Northeast Sandy Lands, 28 acres and 9 bales. These differences further reflect themselves in net farm incomes. At the above scale of operations, and with cotton prices at present levels, the average income in the High Plains would be seven to

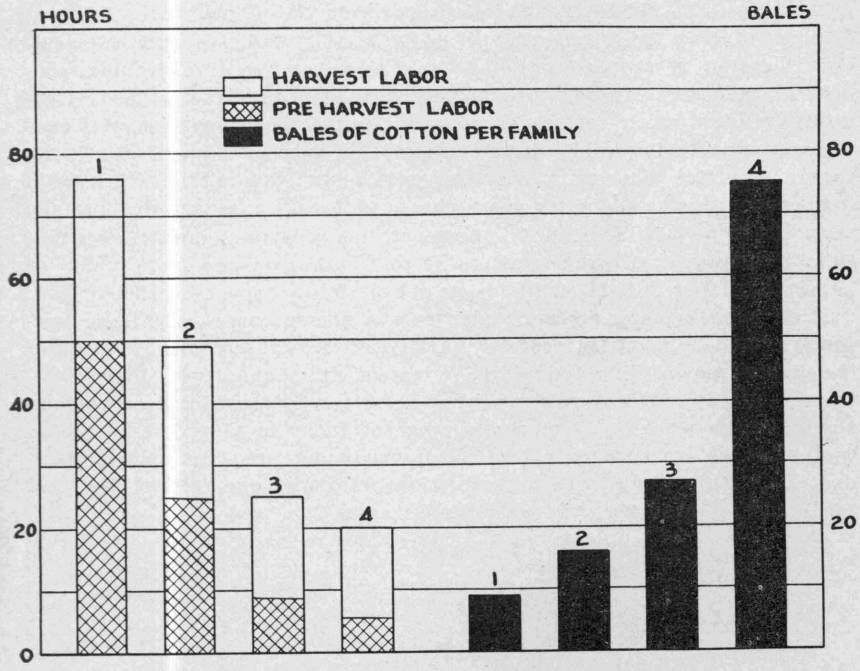

Figure 6. Hours of labor required to grow and harvest an acre of cotton and the number of bales produced per family assuming optimum use of one set of most common size and type of power and equipment used in:
(1) The Northeast Sandy lands area
(2) The Black Prairie
(3) The Rolling Plains
(4) The High Plains cotton area

eight times the average income in Northeast Texas, about twice the average income in the Rolling Plains, and three to four times the average income in the Black Prairie.

All the previous discussion is based on the assumption that the most common size and type of power and equipment unit is in use in each area. The trend toward larger power units, however, continues. Although retarded by wartime restrictions, the rise of two-row tractor equipment is increasing rapidly and may soon be the most common equipment in the Black Prairie. Similarly, the use of four-row tractor equipment has been increasing in the plains areas. There are indications that four-row equipment is used on 30 per cent or more of the cropland in the High Plains. The optimum acreage of cotton that can be cultivated by one family with one set of four-row equipment is 350 acres in that area.

We must look to mechanical harvesting for further reduction in harvesting labor. In this connection the Texas Agricultural Experiment Station has developed a harvester of the stripper type with a bur extractor unit attached which harvests four to five acres per day and gathers 95 to 98 per cent of the seed cotton on the plant. Tests made at Lubbock during the three-year period 1938-1940 indicate that the quality of cotton is reduced only one grade as compared to picking, and a half grade as compared to snapping when this machine is used. Conditions under which cotton is produced in the plains portion of Texas are particularly favorable to the use of this type of harvester. Owing to the plentiful labor supply of the past several years, there has been little encouragement for its use. The need for man power to meet the demands of a wartime economy, however, has greatly changed this situation. There is a growing question as to whether an adequate supply of harvesting labor will be available as the nation approaches capacity production of war materials and enlarges the armed forces. If these harvesters could be manufactured in quantity, all dry-land cotton produced in the plains areas of Texas could be harvested with them at very little sacrifice of quality. A two-row machine of this type operated by two men would do the work of 12 men snapping cotton by hand and thus release thousands of workers to other cotton-producing areas or to other industries. This would mean a reduction of almost one-half in the total labor cost of producing cotton in those areas.