Improving the Market For Arizona Cotton

Bulletin A-52

COOPERATIVE EXTENSION SERVICE AND
AGRICULTURAL EXPERIMENT STATION
THE UNIVERSITY OF ARIZONA

Contents

Issued in furtherance of cooperative extension work in agriculture and home economics, Acts of May 8 and June 30, 1914, in cooperation with the U. S. Department of Agriculture George E. Hull, Director of Extension Service, The University of Arizona College of Agriculture, Tucson, Arizona.

6M — October 1967 — Bulletin A-52

Improving the Market For Arizona Cotton

By

C. Curtis Cable, Jr.
Extension Agriculture Marketing Specialist
The University of Arizona

Vital Statistics of the Past

Cotton growers in Arizona and other cotton growing areas in the United States are facing tough competition for markets, both at home and abroad. Competition in the United States is with the manufacturers of man-made fibers. In markets abroad, competition is from two sources — foreign cotton producers and foreign producers of man-made fibers.

The Market at Home

Fiber competition in the United States actually began more than fifty years ago. But, in the beginning, the U. S. cotton industry had such a large share of the domestic textile market that it was hardly aware that it had a competitor.

For example, in 1920, cotton accounted for 88 percent of the total fibers used by U. S. mills, and rayon for less than one percent. Twenty years later, in 1940, cotton still had 80 percent of the market, and rayon and acetate accounted for 10 percent. But, by the early 1950's, it was clearly evident that significant quantities of man-made fibers were being substituted for cotton. Cotton's share of the U. S. fiber market had declined to slightly less than 70 percent by 1950, while makers of man-made fibers had in-

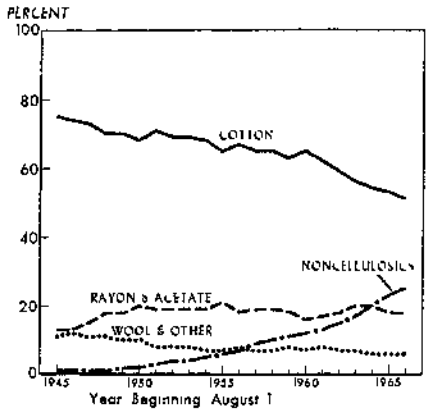

Figure 1. Percentage Distribution of Fibers Consumed by U. S. Mills, 1945-66.

creased their share to 22 percent (Figure 1).

In addition to rayon and acetate, the makers of man-made fibers introduced noncellulosic fibers in the early 1940's. Like rayon and acetate, acceptance of this new fiber was slow for the first few years. However, by the early 1950's it began to make its move.

Realizing that it was definitely in a competitive race, the cotton industry "applied the whip," and as late as 1960 cotton still accounted for about two-thirds of the total fibers consumed by U.S. mills. Rayon and acetate accounted for 16 percent and noncellulosics for 12 percent.

Although the consumption of rayon and acetate was stabilized in the 1950's, the use of noncellulosics continued to increase. By 1966, noncellulosic's share of the U. S. fiber market had increased to 25 percent, and cotton's share had dropped to 51 percent. Rayon and acetate accounted for 18 percent, and wool for 6 percent.

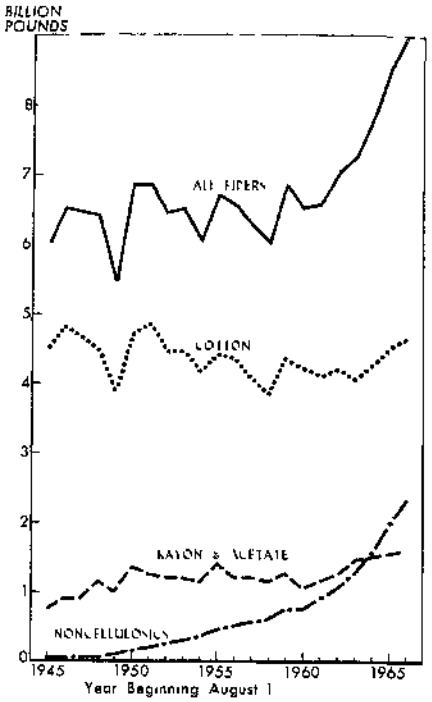

Figure 2. Total Mill Consumption of Fibers, United States, 1945-1966.

In terms of its proportionate share of the U. S. market, cotton losses have been more pronounced since 1960 than during any previous period. If changes in relative shares of the U. S. fiber market continue at their present rate, man-made fibers will overtake cotton in the fiber race by the early 1970's.

Cotton's relative losses have not been due to a decline in domestic mill demand for all fibers. In absolute terms, total mill consumption of all fibers in the United States increased from 6.5 billion pounds in 1960 to 9.0 billion pounds in 1966 (Figure 2). Cotton, as well as man-made fibers, contributed

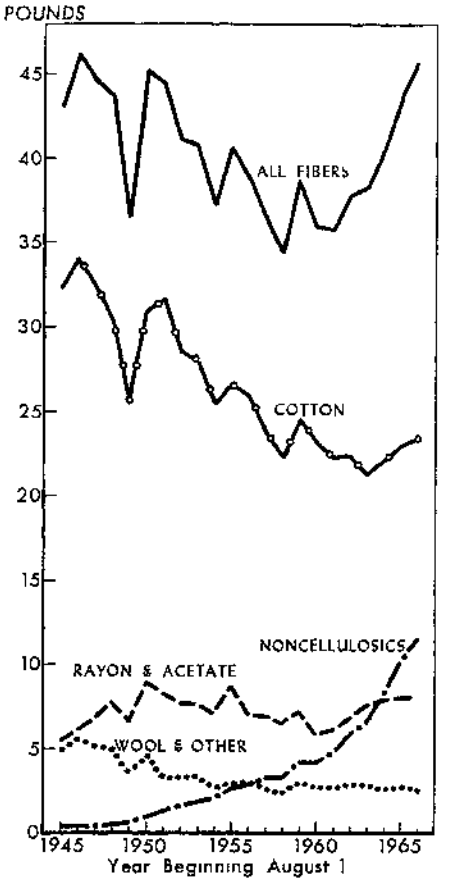

Figure 3. Per Capita Mill Consumption of Fibers, U. S., 1945-1966.

to this 2.5 billion pound increase. However, the noncellulosic fibers contributed slightly more than 1.5 billion pounds of the total increase, and rayon and acetate slightly more than 0.5 billion pounds.

The large increase in consumption of all fibers during the 1960's is due partially to the ever-growing increase in population. However, the large increase in per capita mill consumption also has been a major contributor to the recent growth of total fiber consumption in the United States. In 1960, annual mill consumption of all fibers in the U. S. approximated almost 36 pounds per person (Figure 3). By 1966, it had increased to 46 pounds per individual.

Of this 10 pound increase, noncellulosic fibers accounted for almost 7.5 pounds, and the other man-mades for slightly more than 2 pounds. In comparison to the steady increase in per capita consumption of man-made fibers during this seven year period, the per capita mill consumption of cotton fluctuated between 21.3 and 23.5 pounds, and the overall net increase from 1960 to 1966 was only 0.3 pound per person.

Since noncellulosic fibers entered the picture in the early 1950's, the per capita consumption of rayon and acetate has fluctuated between 6 and 8 pounds. In contrast, the per capita mill consumption of cotton declined from 31.6 pounds in 1951 to 21.3 pounds in 1963. The per capita consumption of cotton in 1963 was the lowest since the depression years of the early 1930's.

Since 1963, the per capita mill consumption of cotton has risen slowly but steadily to 23.5 pounds in 1966. This upturn suggests that there are still many uses for which cotton is the preferred fiber. However, cotton producers must remember that the downward trend in the per capita mill consumption of cotton in the United States during the past 20 to 25 years has been characterized by periods of a small increase followed by longer periods of larger decreases.

Thus, although the uptrend in

per capita mill consumption of cotton during the past three years is encouraging, it is still not of sufficient magnitude or length to justify a victory celebration. Rather than celebrating and relaxing, now is the time for cotton producers to analyze the market potential for their product, and to work harder than ever before to take advantage of the potential market for fiber in the United States.

The Foreign Market

During the past two decades, U. S. exports of cotton have ranged from a low of 2.1 million bales in 1947 to a high of 7.9 million bales in 1956 (Figure 4). There is no pronounced upward or downward trend in U. S. cotton exports for this 20-year period. However, during the most recent decade, from 1956 to the present, the trend in U. S. exports has been decidedly downward, and there have been violent fluctuations from year to year.

In contrast, the trend in the combined exports from other cotton-producing countries has been definitely upward, at a fairly steady rate, from 5.3 million bales in 1945 to 13.7 million bales in 1965. Although the United States is still one of the largest exporters of cotton, the exports of all other cotton producing countries combined are accounting for an increasingly larger share of the foreign market for cotton.

While consumption of cotton in the United States has remained fairly stable at about 8 to 10 million bales annually during the past twenty years, foreign consumption expanded from 15.5 million bales in 1945 to 41.5 million in 1965 (Figure 5).

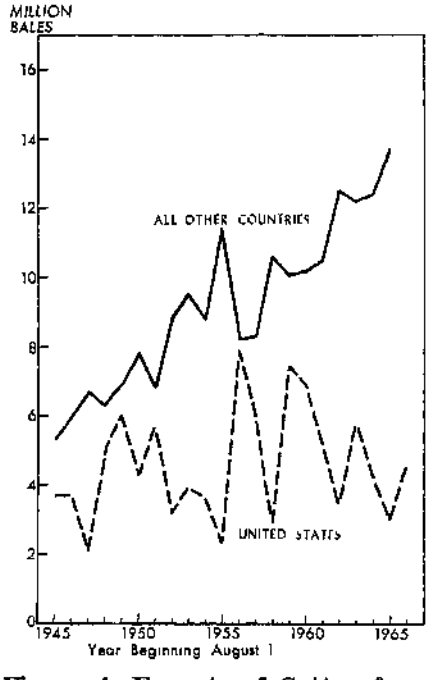

Figure 4. Exports of Cotton from U. S., and from All Other Producing Countries Combined, 1945-1966.

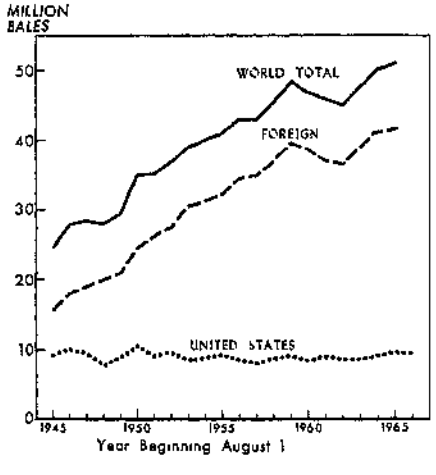

Figure 5. Consumption of Cotton, U. S., Foreign, and World Total, 1945-1966.

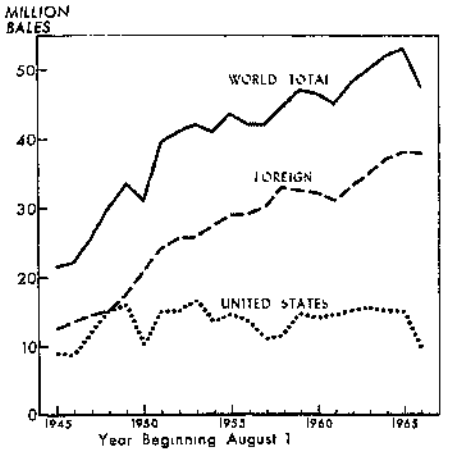

Figure 6. Production of Cotton, U. S., Foreign, and World Total, 1945-1966.

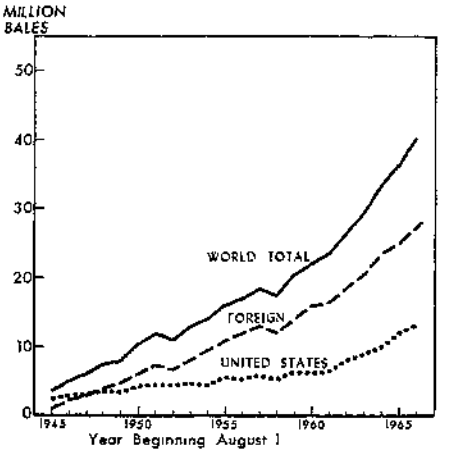

Figure 7. Production of Man-made Fibers, in Cotton Equivalents, U. S., Foreign, and World Total, 1945-1966.

Obviously, United States cotton producers have not shared in this growth. As a result, foreign production of cotton more than tripled from 1945 to 1965, while U. S. production remained fairly stable at about 12 to 15 million bales annually during the same span of years (Figure 6).

In addition to this strong competition in the world market for cotton, both U. S. and foreign cotton-producing countries are confronted with strong competition from manufacturers of man-made fibers in cotton-importing countries. Production of man-made fibers in foreign countries increased from the cotton equivalent of one million bales in 1945 to 27.5 million bales in 1966 (Figure 7).

The production of man-made fibers has been increasing at a much faster rate in foreign countries than in the United States, and foreign manufacturers of man-made fibers are capturing an increasingly larger share of the expanding foreign markets for textiles. As this occurs, the U. S. cotton producer's share continues to shrink, both percentage-wise and in total volume exported.

The Present Situation

As of August 1, 1967, the U. S. cotton carryover will approximate 12.5 million bales. This is about 4.5 million bales less than the carryover on August 1, 1966. In some respects, this reduction in the surplus of U. S. cotton stocks is a notable accomplishment. However, almost all of this inventory adjustment resulted from **decreased production,** rather than from **increased sales.**

It is estimated that U. S. mills will use about 9.4 million bales during the 1966-67 season, and that exports will total approximately 4.7 million bales. Thus, the total sales offtake of cotton in 1966-67 will total about 14.1 million bales. Although this sales volume is an improvement over the past two years, it is still just about equal to the average annual offtake for the past decade.

Production for the 1966-67 season totaled 9.6 million bales from a planted acreage of 10.4 million. This production was approximately 5 million bales less than the average production from the seven previous crops. And, planted acreage for the 1967-68 season is expected to total 9.7 million acres, slightly less than in 1966-67. Thus, for at least two years in a row, U. S. cotton producers are diverting an average of about one-third of their allotted cotton acreage.

Will this means of adjusting the U. S. cotton inventory have to be continued beyond the 1967-68 season? And, once the carryover is reduced to a more desirable level, what will be the maximum acreage that can be planted and still prevent another burdensome buildup in the carryover?

No positive answer to these two critical questions can be given at this time. Basically, the answers are dependent upon the direction that the sales curve for U. S. cotton takes during the remainder of the 1960's and early 1970's. If there is a definite upward trend in **total sales** during this period, or even if they are maintained at the present level, an increase in production will eventually be justified to maintain inventory stocks at the desired level. This could be brought about by an increase in acreage, higher yields, or a combination of both.

If total sales of U. S. cotton trend downward, will production be geared to total sales? Surely the large carryover problem in the mid 1960's has demonstrated once and forever the folly of producing more than the market will take. To avoid the need for another major and painful inventory adjustment, U. S. cotton growers, as a group, must initiate and support whatever steps are necessary to match production and sales.

Today's cotton growers have recognized the fact that man-made fibers are gaining in the race to the mill door. In an effort to counteract this competition, U. S. cotton growers voted in 1966 to assess themselves one dollar a bale to create a fund to be used for research and promotion of U. S. cotton. This program is viewed by many as another notable achievement of the 1966-67 season. However, the actual process of collecting the one dollar per bale does not in itself assure the success of the program. This is only the first step.

A second and equally important step is for the administrators of this fund to use it effectively. That is, the monetary gains to producers resulting from this program must average more than one dollar per bale. To measure the effectiveness may be a very difficult if not an impossible task. However, if total sales of cotton can be increased and the inroads of man-made fiber checked or slowed down during the next few years, at least part of the credit may be attributable to this producer-financed program.

In addition to the expected forthcoming increase in funds for research and promotion, U. S. cotton is now selling at competitive world prices, both at home and abroad. Thus, the economic climate for the U. S. cotton industry to make appreciable progress is more favorable now than it has been for several years.

Cotton growers must remember, however, that when an industry promotes its product, it must have a product that is worthy of promotion. Money spent for promoting cotton of a quality which mills cannot profitably use at its present price is a questionable expenditure. A large proportion of the cotton in current stocks falls in this category. In addition to promotion, a substantial reduction in price may be necessary to induce mills to use this low-quality cotton.

Thus, U. S. cotton growers must strive to produce a fiber that textile manufacturers can and will use as a raw material in their modern, automated, high-speed mills. This is perhaps **the most essential step** for improving the market for U. S. cotton.

What Do Textile Mills Want?

First and foremost, textile manufacturers are in business to make a monetary profit. To achieve this goal, they emphasize (1) producing a quality product for which there is a large consumer demand, and (2) operating their plants efficiently and at a low cost.

Like many other manufacturers, textile firms have available several alternative raw materials which they may use in the production of yarns and fabrics. They will use the raw fiber which they believe will yield the greatest net profit at the end of their fiscal year. For some end products, man-made fibers are the best raw materials available. For others, cotton fiber is the best raw material to use.

For many products, however, cotton and man-made fibers may be substituted for one another. For these uses, the choice of alternative fibers depends upon the (1) comparative cost of the fibers, (2) cost of processing, (3) management's projections with respect to consumer acceptance and demand for the finished product, and (4) price that can be obtained for it.

A successful manufacturer of textiles must look at total dollar sales, and total cost of manufacturing including the cost of raw material — and from these two totals decide which raw material will yield the greatest net profit. In the final analysis, textile manufacturers want a raw material

which they can process at a low cost and from which they can produce an end-product of the desired quality.

Textile firms are just as interested in increasing their sales of yarns and fabrics as cotton growers are in increasing their sales of cotton. However, there is **one significant difference** between textile firms and cotton producers. Cotton growers must sell their cotton — there is no on-farm use for it. However, for many end-products, textile firms do not have to use cotton. They will use cotton if it possesses the **desired fiber properties**, and if it can be purchased at a **favorable price.**

Fiber Properties Desired by Textile Mills

From the standpoint of U. S. mills, the general price level for cotton is more attractive now than it was for several years prior to the passage of the Food and Agricultural Act of 1965. U. S. cotton is selling both at home and abroad at competitive world prices. Thus, since the price to U. S. mills is at a favorable level, Arizona producers should concentrate on producing cotton which possesses all of the fiber properties **desired by mills.**

Based on the results of a study by Calkins and Spurlock,[1] cotton fiber properties which are of primary importance to mills at the present are fiber strength, fiber length, length uniformity, and micronaire. Although textile firms put less emphasis on grade than they have in the past, they are still concerned with color and preparation. For most end-uses, the mill mix must be satisfactory with respect to the **entire bundle** of quality characteristics. For example, length alone does not assure the mill that the cotton will run efficiently.

The study by Calkins and Spurlock was a report on the results of a survey of 98 textile manufacturers. These firms used approximately 5.2 million bales of cotton, which is about 58 percent of the total U. S. cotton consumed annually. Of the total cotton consumed by these mills, almost 4.6 million bales were used in mixes containing no other fiber but raw cotton. In general it was found that the shortest, cheapest, and lowest quality cotton fibers were used in the coarsest yarns, while the quality requirements were higher for the finer yarns.

Fiber Strength

Fiber strength is one of the most important quality factors that mills consider today in purchasing and using cotton. In recent years, many textile firms have installed new, higher-speed equipment which puts more stress on the raw material being processed. Thus, strength of fiber is necessary to re-

[1] Calkins, E W S and Spurlock, H C "Factors Affecting Use of Southeastern Cotton and Competing Fibers", Dept of Agric Econ, Clemson University, and Mktg Econ Div, Econ Res Ser, U S Dept Agric, So Car Agric Expt Sta Bul 532, February, 1967.

duce the number of ends-down in spinning, and thereby hold down operating costs. For many end-uses, fiber strength is so important to some mills that they refuse to buy certain cottons even at substantial discounts.

Calkins and Spurlock found that minimum fiber strength was specified for mixes totaling about 3.1 million bales, or 75 percent of the cotton used by the 98 mills in the survey. Fiber strength below 75,000 pounds per square inch was acceptable for only about 6 percent of the cotton used by these mills. To be generally acceptable, cotton needed an average fiber strength of about 82,000 pounds, and preferably 85,000 pounds per square inch.

For years, the strength of irrigated cotton grown in the San Joaquin Valley of California and in the El Paso Territory[2] has been superior to the strength of cotton grown in most of the other producing areas. Thus, it is sometimes necessary for mills to blend a small percentage of this high strength cotton with cotton from other areas to achieve the desired mix. To achieve a higher average strength for the mix, however, increases the average cost of the mix, because the high strength cotton usually demands a premium price.

Although Arizona cotton growers usually rank first or second in the nation in terms of yield per acre, the average strength of Arizona cotton during the last six years has been from 5,000 to 10,000 pounds below the strength of cotton produced in California (Table 1). The strength of most Arizona cotton is comparable to that produced in the South Central area of the Cotton Belt.[3] Superior strength has been one of the major factors contributing to the large premiums that California growers have received for their cotton.

Fiber Length

Fiber length is another cotton quality characteristic of major importance to most textile mills. Generally speaking, cotton with a short staple length is used for manufacturing the coarser yarns, while the longer staple cottons are utilized for making the finer yarns. Cotton varieties grown in the El Paso Territory usually have the longest staple length of any upland cotton produced in the United States. The average staple length of cotton produced in California is a close second.

The average staple length of upland cotton produced in Arizona in the last six years has usually been slightly shorter than cotton produced in the South Central states. In most years, it more closely approximates the average staple length of cotton produced in the Southeastern cotton-growing states.

Length Uniformity Ratio

The length uniformity ratio is a measure of the variation of staple length in a sample. The higher the ratio, the more uniform the staple

[2] Includes producing areas in Eastern Arizona, Southern New Mexico, and District 6 of Texas.

[3] See Table 1 for states included in the four major producing areas of the United States.

length and the more desirable for spinning. Although the staple length differs appreciably among major cotton-growing areas in the United States, in most years the average uniformity ratio is approximately the same in each of the four major cotton-growing areas. This indicates that regardless of the differences in staple length produced in individual areas, the areas are about equal in the production of fiber that is uniform in length.

Although there are small numerical differences in length uniformity among major areas, these differences may be very significant. For example, as pointed out for the 1964 crop by Calkins and Spurlock, cotton with a uniformity ratio of 44 or lower was in the lower 17 percent of the U. S. medium staple crop, and a ratio of 47 or higher was in the upper 24 percent of the crop.

Cotton grown in California in 1966, and in many of the other cotton-growing states in the Southwest, South Central, and Southeastern growing areas had a uniformity ratio of 45 or 46. In comparison, the uniformity ratio for Arizona cotton was only 43. This indicates that there was considerably more variation in the length of cotton produced in Arizona than in California, or in most of the other cotton-growing states. The low length uniformity ratio of Arizona cotton may be more difficult for mills to use profitably than cottons with a larger length uniformity ratio. The 1964 crop in Arizona compared very favorably with cottons grown in other states in terms of length uniformity. However, in 1963 and 1965, as well as in 1966, the staple length of Arizona cotton was not as uniform as cottons grown in many other areas.

In many years, the uniformity ratio of California cotton is the highest of any cotton produced in the United States. This characteristic is another major contributor to the high premiums California growers have received in the last few years.

Micronaire

Micronaire, a measure of fiber fineness and fiber maturity, is another cotton quality characteristic which mills have emphasized in buying cotton in recent years. Calkins and Spurlock found that mills which were using a total of 3 million bales of cotton specified upper and lower micronaire readings. Individual bales which did not fall in this range were not acceptable.

Mills using 2.7 million bales had limits within which they tried to control the average micronaire of their mixes. Some of the mills had upper and lower limits for both individual bales and mix averages, while others specified only a lower limit or only an upper limit. Others indicated that they must accept the average of the crop, and some bought in areas where they found micronaire satisfactory and **avoided areas** where it was **too high** or **too low.**

For those mills for which micronaire was an important fiber characteristic, 68 percent did not want individual bales with a reading below 3.5, and 83 percent did not want bales with a reading above 5.0. Of those reporting upper and lower limits for mix averages, 81 percent did not let the average fall below 4.0, and the

same percentage did not let it run higher than 4.5. The average micronaire of Arizona cotton has been near this upper limit or exceeded 4.5 for five of the last six crop years. In comparison, the average micronaire of California cotton has varied from 4.1 to 4.3 during the past six years.

Color and Preparation

In the survey of the 98 mills, grade was not emphasized as an important quality factor by the mills. In recent years, most mills have added new cleaning equipment which has greatly increased their efficiency in removing foreign matter from cotton. Thus, although grade is still an important factor from the standpoint of pricing and government programs, mills apparently are not as concerned with this quality characteristic as they were even five years ago.

Color and preparation, of course, are still important quality characteristics. However, as color grade declines during the latter part of the season, there is also a general deterioration with respect to fiber strength, fiber length, and micronaire.

A Challenge to Arizona Producers

Although Arizona cotton growers have demonstrated their proficiency in attaining high yields per acre, the data summarized in Table 1 (page 15) revealed that for the past six years Arizona producers as a whole have not produced the quality of cotton for which mills are willing to pay a premium. If Arizona cotton growers are interested in increasing their total dollar sales from cotton, they must put as much emphasis on **quality** as they have on **yield** per acre.

Price per pound is determined by **quality,** and it takes **both price** and **quantity sold** to produce the most **net dollars per acre.** And, it must be remembered, quality includes the whole bundle of fiber properties. **Premiums are not paid** for just strength, or length, or micronaire alone. Cotton must possess the desirable range for each and all fiber properties if it is to command a high premium price.

In addition to putting more emphasis on quality, continued efforts must be devoted to doing a more efficient job of producing and harvesting cotton to keep **cost at a minimum.** Finally, it is also the cotton growers' responsibility to insist that their cotton is ginned properly so as to preserve the inherent qualities of the fiber that they produce.

Cotton producers in Arizona are cooperating with producers in other states in the competitive struggle with man-made fibers. However, Arizona cotton producers are, as a group, competitors with cotton growers in other areas of the Cotton Belt. Producer groups across the Belt from South

Carolina to California are making new efforts to grow the varieties and produce the qualities of cotton that mills demand.

Arizona cotton growers should emphasize **group** action, as well as **individual** action, to **improve the quality of cotton that they produce.** Failure to take action now could put many Arizona cotton growers at a greater disadvantage in the competitive struggle for markets than they have experienced during the past four to six years.

Table 1. Average Fiber Strength, Staple Length, Length Uniformity, and Micronaire of Upland Cotton, by Major Producing Areas and Selected States, 1961-1966.[1]

Fiber Property and Year	Major Producing Areas				Selected States	
	Southeast[2]	South-Central[3]	Southwest[4]	West[5]	Arizona	California
Strength	(1,000 pounds per square inch)					
1966	82	82	78	91	86	95
1965	78	82	81	87	84	89
1964	74	82	81	87	81	92
1963	79	81	81	86	83	90
1962	81	83	80	89	84	93
1961	76	80	76	87	82	91
Staple Length	(32nds of an inch)					
1966	33.8	34.4	31.2	34.8	33.8	34.6
1965	33.7	34.0	31.1	34.9	34.1	34.6
1964	33.6	34.0	30.7	34.7	33.8	34.6
1963	33.3	34.1	30.6	34.6	33.6	34.3
1962	33.5	34.1	31.0	34.8	33.8	34.6
1961	33.9	34.4	31.3	34.8	34.0	34.1
Length Uniformity	(Ratio)					
1966	46	45	45	45	43	46
1965	46	46	46	45	44	46
1964	44	46	46	46	46	47
1963	45	45	45	45	44	46
1962	45	44	45	45	44	46
1961	45	43	44	44	43	45
Micronaire	(Micronaire Reading)					
1966	4.7	4.4	3.9	4.1	4.3	4.3
1965	4.4	4.6	4.0	4.0	4.5	4.1
1964	4.1	4.6	4.2	4.1	4.5	4.2
1963	4.2	4.4	4.1	4.2	4.5	4.3
1962	4.3	4.4	4.1	4.3	4.7	4.3
1961	4.2	4.1	3.9	4.2	4.6	4.3

[1] Data from "Annual Cotton Quality Survey", Agricultural Information Bulletins, 273, 284, 294, 309 and 318, U. S. Department of Agriculture, Consumer and Marketing Service.

[2] Virginia, N. Carolina, S. Carolina, Georgia, Florida and Alabama.

[3] Tennessee, Missouri, Mississippi, Arkansas, and Louisiana.

[4] Oklahoma and Texas, except District 6 of Texas (west of Pecos River).

[5] California, Arizona, Nevada, New Mexico, and District 6 of Texas.

This publication is issued by the Cooperative Extension Service and the Agricultural Experiment Station of The University of Arizona. See your local County Extension Agent for additional information.

Other College of Agriculture publications are available at the local Extension Office in your county. Phone, write, or ask at the office for a list of those of current interest.