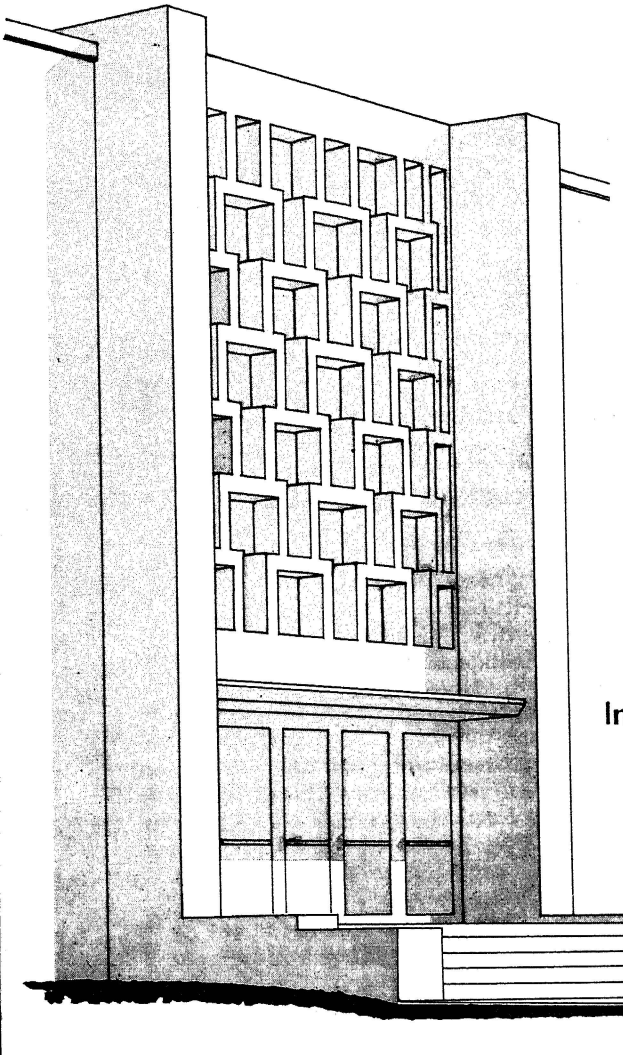

Store Cotton Before Ginning?

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SPECIAL REPORT 20 SEPTEMBER, 1962

ACKNOWLEDGEMENTS

This report is a progress report on Research Project 462, a contributing project to SM-24. V. Alonzo Metcalf is an Instructor in Agricultural Economics.

In addition to the great assistance and cooperation contributed by Mr. Homer L'Hote, Mr. Norman Brown and their staff at the Southeast Missouri Research Center, appreciation is expressed to the following individuals and organizations, alphabetically listed:

Anderson-Clayton and Company, Houston, Texas;
Arkansas-Missouri Cotton Ginners Association, West Memphis, Arkansas;
Mr. W. C. Bryant, Spillway Gin Company, Dorena, Missouri;
Mr. E. P. Coleman, E. P. Coleman Land Company, Sikeston, Missouri;
Hudson Cotton Manufacturing Co., Lenoir, North Carolina;
Samuel Jackson Manufacutring Co., Lubbock, Texas;
Killion-Rone-Wilson Gin, Portageville, Missouri;
Mr. Bill Sikes, Sikeston Gin Co., Sikeston, Missouri;
USDA Cotton Classing Office, Hayti, Missouri;
USDA Ginning Laboratory, Stoneville, Mississippi.

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In 1950, less than 0.5 of one percent of the cotton crop in Missouri was mechanically harvested. By 1960, 56 percent of the Missouri crop was picked with mechanical pickers. This rapid increase in the use of mechanical pickers has resulted in a marked decrease in the length of the ginning period. The latter situation brought with it many problems for owners of cotton gins. If the entire cotton crop was to be ginned in a greatly reduced period, we would need new procedures and/or techniques. Manufacturers of gin equipment reacted by producing new lines of equipment that have increased the capacity (ginning rate) of gins. Newly developed gin stands are capable of handling 4 bales per hour as compared to $1\frac{1}{4}$ bales per hour for older stands. Gin owners, then, have been faced with the necessity to replace, often near new, gin equipment, with new higher capacity equipment or to consider other alternatives. Major considerations are twofold: 1, to process the cotton crop with as little effect on the quality of the lint as possible; 2, to lower the costs of ginning cotton. It is the latter consideration that the data reported here are directed toward.

Considerations for lowering the ginning costs of cotton include storing seed cotton to lengthen the ginning season and therefore allow more cotton to be ginned per gin. Previous data indicate that the lowest ginning cost per bale are obtained when the annual volume ginned is 1,000 bales per gin stand.[1] These data may or may not stand when the high speed ginning equipment is under consideration. It has been indicated in the past that mechanically harvested cotton cannot be stored prior to ginning without quality deterioration. Data available seem incomplete and inconsistent as to the effects of storage on the quality of cotton lint. Recent data indicate that there were no harmful effects on the quality of the cotton lint stored for short periods. Thus, it seemed that there was some need for considering seed cotton storage on a long-term basis. This would mean considering seed cotton storage for periods of time sufficient to allow the ginning season to be extended past the climax of the harvest season in any given year.

The fall of 1961 was the first year for collecting data on seed cotton storage. Mechanically picked cotton was stored for periods of time up to four months prior to ginning. Twenty-five bales of cotton representing five different varieties were stored at harvest time. Ten bales were stored in existing cotton houses and 15 bales were stored in trailers and placed under sheds.

At harvest time, the moisture level of the seed cotton, as well as the temperature, and relative humidity were recorded. A twenty pound representative sample of seed cotton was then collected from each bale. The sample was ginned and the lint was submitted for grade and staple length determinations, fiber

[1] B. K. Doyle and R. W. Shaw, Mississippi Cooperative Gins, Agricultural Experiment Station Bulletin 479 (State College, Mississippi: Mississippi State College, January, 1951), p. 29.

property tests, and some spinning tests. The USDA classing office in Hayti, Missouri assigned the grade and staple length, and the fiber property tests were made by a commercial organization and the USDA Ginning Laboratory in Stoneville, Mississippi. In addition, samples of the cotton lint were processed by the fiber testing laboratory of a large cotton shipper firm.

The cotton was stored loose--one bale in a three bale trailer; packed--two and three bales in a three bale trailer. The cotton stored in houses was likewise both packed and loose.

At storage time, the moisture content of the 25 bales of seed cotton ranged from 10.25 to 14.01 percent. During the entire period of storage little or no change occurred in the moisture level of the cotton. The moisture levels indicate that most of the cotton stored could be considered "dry". Earlier studies have indicated that seed cotton with moisture levels of 14 percent or less could be stored effectively.[2] A recent study indicated that cotton stored with moisture levels of up to 24 percent had no significant deterioration.[3] This would indicate that while the moisture level of cotton stored during the fall of 1961 had relatively low moisture levels, this would in no way invalidate the results from this study.

The cotton was classed at time of storage and each month thereafter. As the samples of cotton were small, they were ginned on a 20 saw experimental gin stand. There being no lint cleaner on this gin stand, the grade of the cotton ginned thereon would be lower than if the samples had been ginned on a regular gin stand equipped with lint cleaners. All bales of cotton stored, when ginned commercially were classed one grade higher than samples from the same lots of cotton which were collected and ginned on the small gin stand the previous day.

Three determinations of the grade and staple length were made for each sample. The variations between the 3 determinations from the same sample were greater than the variation between storage periods. When average grade and staple determinations were used for each lot, there were only slight variations with length of time stored. Or, the cotton lint was classed as having essentially the same grade and staple length when taken out of storage as it did when put into storage some 120 days earlier, Figures 1 and 2.

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[2] Zolon M. Looney and Charles C. Speakes, Condition and Storage of Seed Cotton with Special Reference to Mechanically Harvested Cotton, USDA, PMA (Washington: U. S. Department of Agriculture, March, 1952.)

[3] Fred B. Anderson and B. A. Waddle, unpublished data, Arkansas Agricultural Experiment Station, Fayetteville, Arkansas. Some samples showed 24 percent moisture and various lots of seed cotton averaged 20 percent moisture at storage time.

FIGURE 1-A STUDY OF THE EFFECTS OF PROLONGED SEED-COTTON STORAGE ON GRADE INDEX

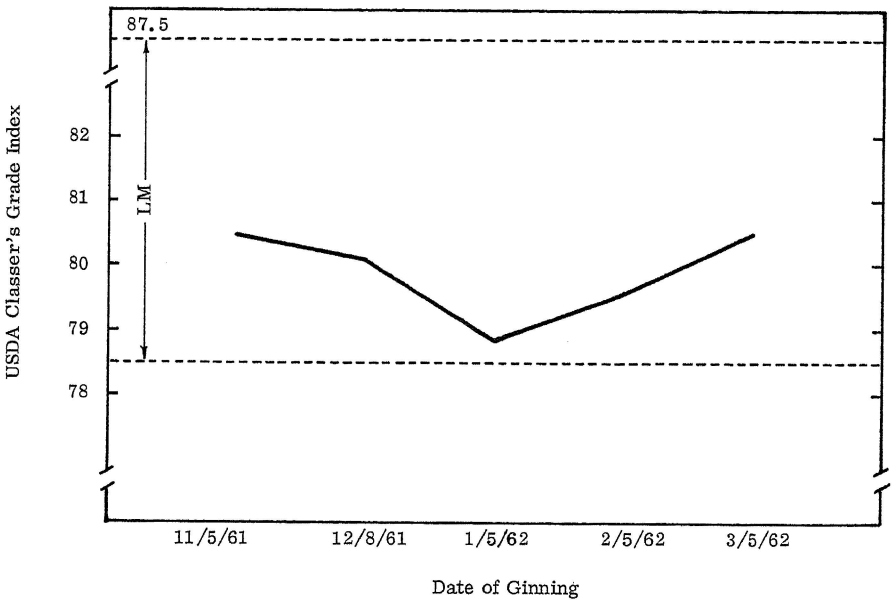
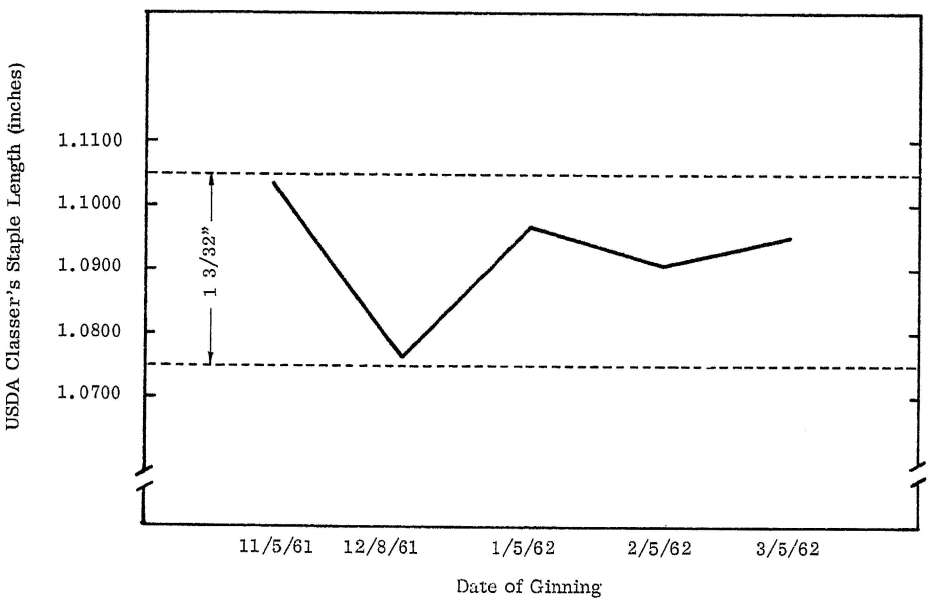
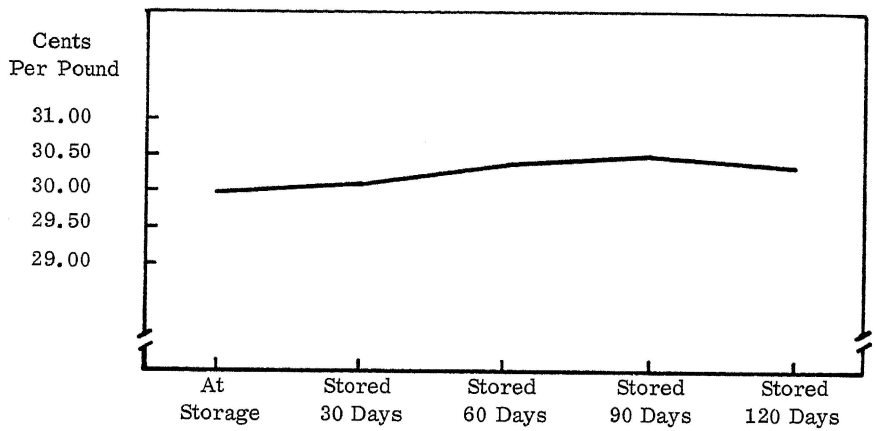


FIGURE 2-A STUDY OF THE EFFECTS OF PROLONGED SEED-COTTON STORAGE ON FIBER STAPLE LENGTH



In terms of value, the average price per pound of cotton changed very little with length and type of storage, Figure 3. The changes in price by month were not significantly different for the two types of storage, trailers, and houses. The average price changes for the entire 25 bales seemed slight and when converted to gains and losses per 500 pound bale the data showed a $.45 per bale gain on cotton stored 30 days, and a $.65 gain when stored 60 days. Cotton stored for 90 days had a net gain of $1.15 per bale and a gain of $.35 per bale when stored for 120 days. These gains were based on the loan price at the time of harvest. Therefore, price changes indicate quality changes removed from price variations that might have occurred during the storage period. The variations were slight and insignificant.

FIGURE 3-VALUE OF COTTON STORED AND CHANGES IN VALUE BY STORAGE PERIOD AND TYPE OF STORAGE, MISSOURI, 1961-62*



*Value expressed is based on the CCC support price for middling 1 inch cotton with appropriate corrections for average grade and staple length of cotton samples.

The fiber properties: fiber fineness, strength, elongation, upper half mean, mean length, uniformity ratio, and color as well as trash content were determined. There was no significant variation in the fiber properties measured for the entire storage period.

Fiber fineness index as measured by the Micronaire instrument was 3.52, 3.48, 3.58, 3.52 and 3.40 for the entire storage period by 30 day periods respectively, Figure 4. The average fiber strength varied from 82.5 at storage to 81.0, 81.6, 80.2 and 82.2 for the 30, 60, 90 and 120 day storage period respectively, Figure 5.

FIGURE 4-A STUDY OF THE EFFECTS OF PROLONGED SEED-COTTON STORAGE ON FIBER FINENESS

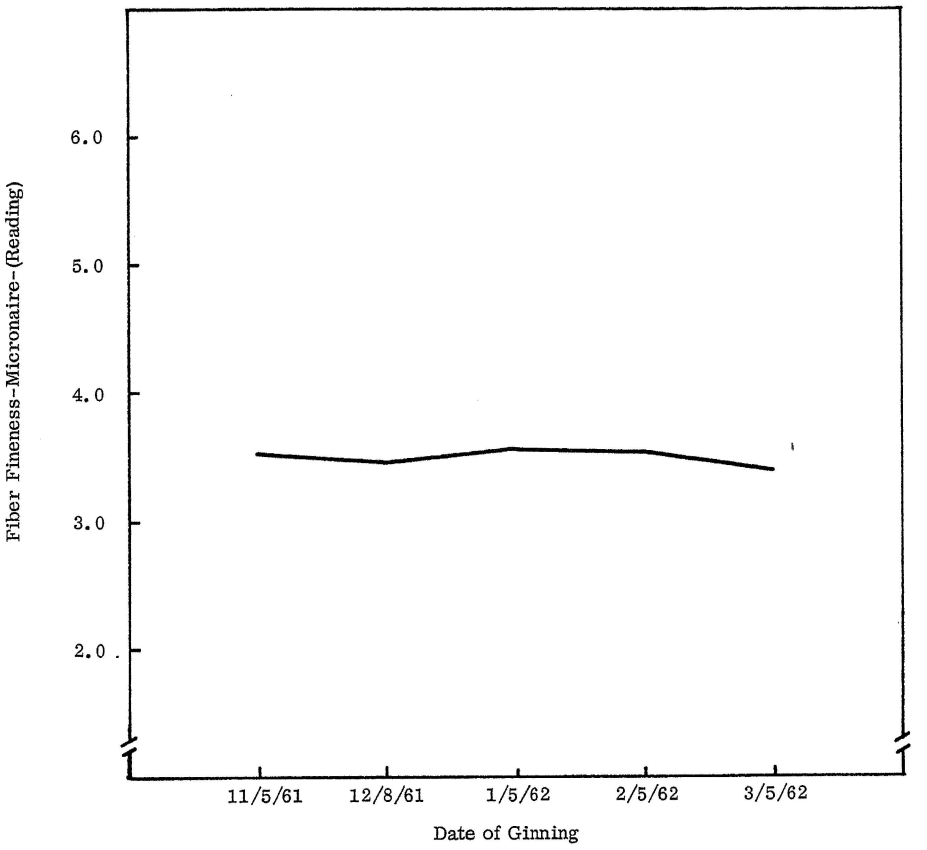
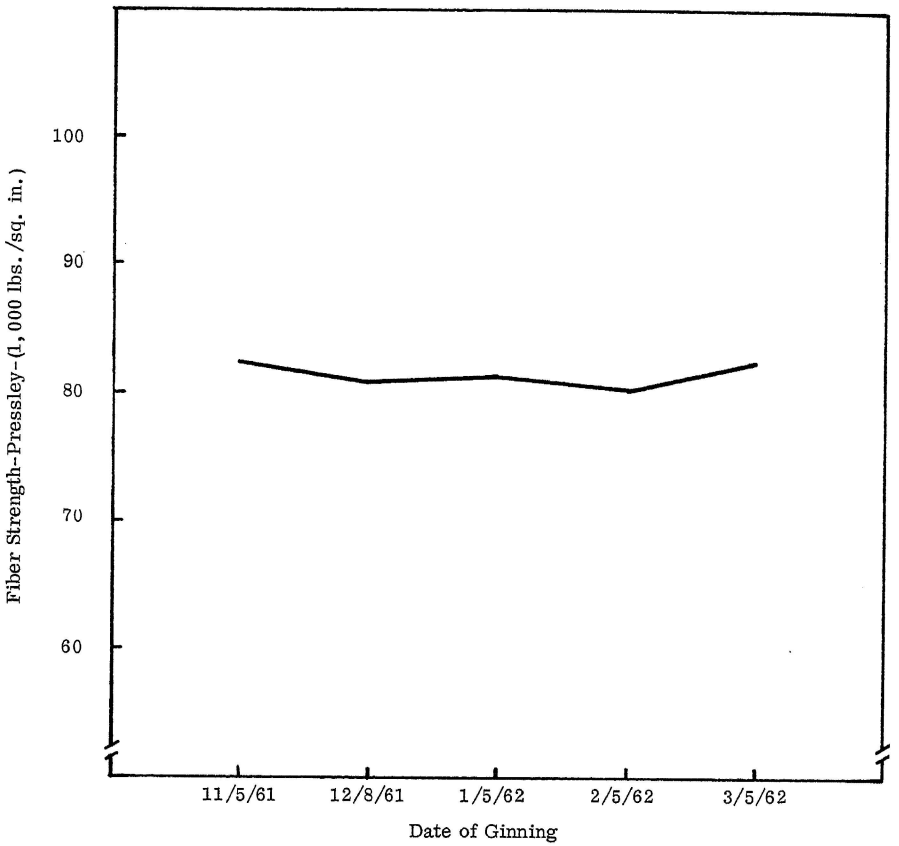


FIGURE 5-A STUDY OF THE EFFECTS OF PROLONGED SEED-COTTON STORAGE ON FIBER STRENGTH



The Fibrograph instrument was used to measure the Upper Half Mean length of the fiber and averages for the storage periods were 1.080, 1.101, 1.140, 1.086 and 1.079 respectively, Figure 6. The Colorimeter readings indicated both the reflectance and yellowness of the fiber. The average reflectance index changed from 66.69 at storage to 66.82, 66.15, 65.55 and 66.32 for 30, 60, 90 and 120 day storage periods, respectively, Figure 7. The respective yellowness index for the storage periods changed from 8.02 at storage to 7.80, 7.68, 7.74 and 7.77, Figure 8.

FIGURE 6-A STUDY OF THE EFFECTS OF PROLONGED SEED-COTTON STORAGE ON FIBER UPPER HALF MEAN LENGTH

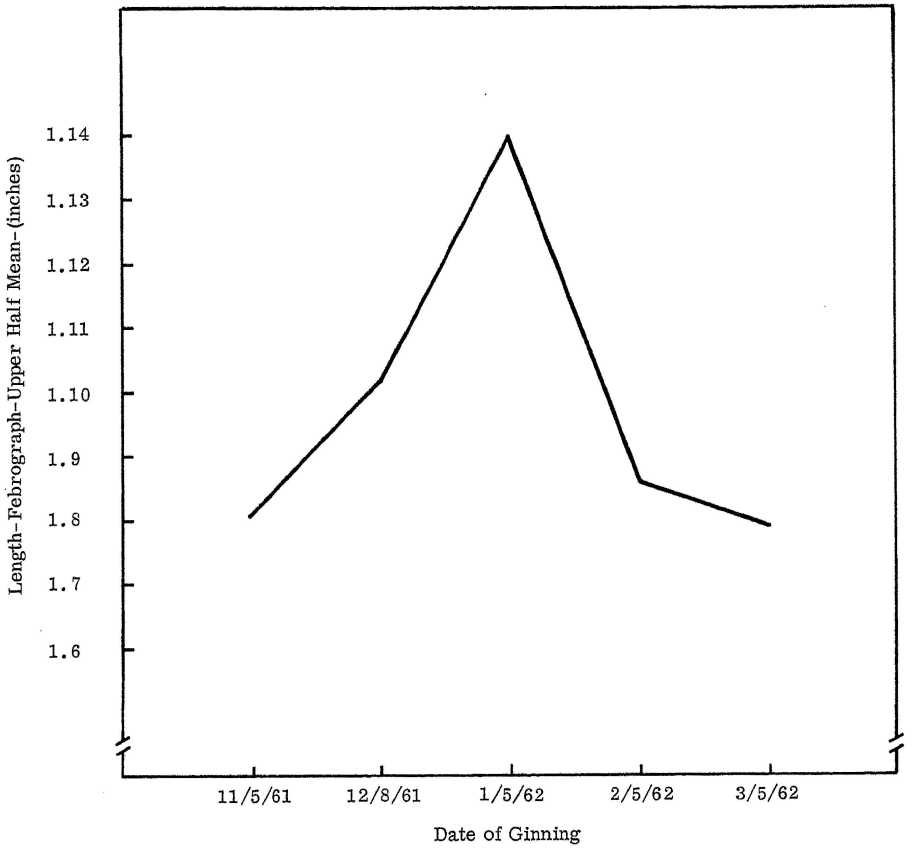


FIGURE 7-A STUDY OF THE EFFECTS OF PROLONGED SEED-COTTON STORAGE OF FIBER COLOR (REFLECTANCE)

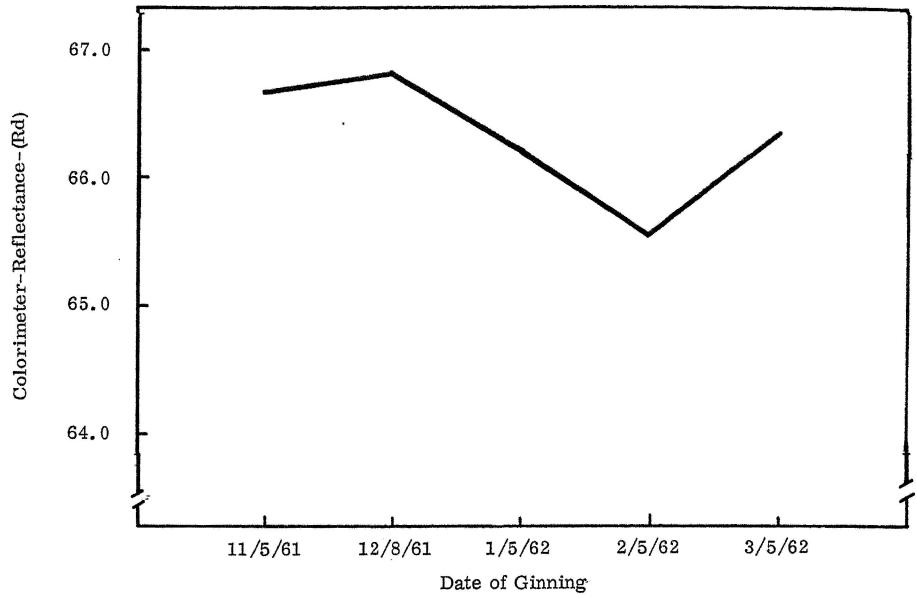
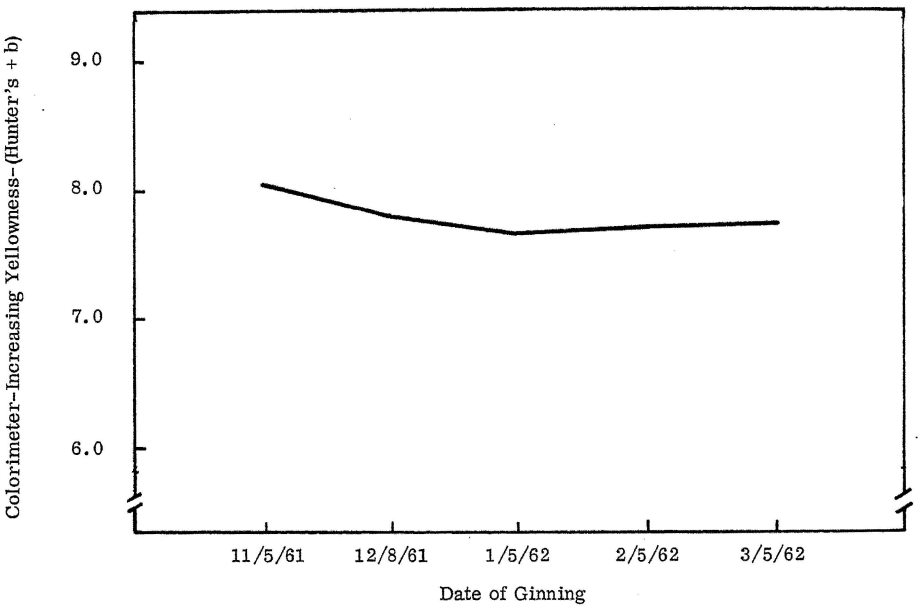


FIGURE 8-A STUDY OF THE EFFECTS OF PROLONGED SEED-COTTON STORAGE ON FIBER COLOR (YELLOWNESS)



All changes that occurred in the fiber properties measured were slight and insignificant in so far as changes by length of storage periods were evident.

The fiber properties for the stored cotton were, in many instances, better than the average for Missouri, Table 1. This would indicate that there were no detrimental effects of storing the cotton prior to ginning in so far as the visible and determinable cotton fiber properties, are useful as indicators. It will be noted however, that the grade index was lower for the cotton stored than the average for Missouri. This indicates that the cotton stored was approximately one full grade below the average for the 1961 Missouri crop. This factor alone, tends to explain the lower Micronaire reading and the higher trash content for the stored cotton. The stored cotton had a higher fiber strength reading than the average for the Missouri crop. The staple length of the stored cotton was longer for the stored cotton than the average for all Missouri cotton.

TABLE 1-FIBER PROPERTY MEASUREMENTS FOR SEED COTTON STORED FOUR MONTHS COMPARED WITH AVERAGES FOR THE MISSOURI CROP- 1961-62

Item	Average for Missouri Crop*	Stored Cotton at Time of Storage	Per Cent Difference Stored From Missouri Average
Classification			
Grade (Index)	97	90.18	- 7.03
Staple (32d in.)	34.20	35.12	+ 2.70
Fiber Length (in.)	1.06	1.13	+ 6.00
Fiber Fineness (Micronaire Rdg.)	3.8	3.65	- 3.90
Fiber Strength (1/8" gauge G/Tex)	22.4	23.11	+ 3.20
Elongation (1/8") (Pct)	6.2	5.41	-12.70
Shirley Analyzer (Pct)	2.7	3.40	+25.92

*Data taken from USDA, AMS, Agriculture Information Bulletin No. 258. Annual Cotton Quality Survey, Crop of 1961, Feb. 1962.

Some of the cotton stored in trailers and in houses was submitted to a commercial spinning mill for test determinations. The average break factor, a measure of yarn strength, ranged from 1954 to 2056 for the stored cotton as compared to 2752 to 2144 for all Missouri cotton, Table 2. A large portion of the differences in the average break factor is attributable to the grade difference (and trash content) in the stored cotton and the average for the Missouri crop. The yarn appearance index assigned to the stored cotton ranged from 100 to 110 as compared to 60 and 100 for all Missouri cotton. It would not be normally expected that the lower grade and higher trash content cotton would yield a yarn with a higher yarn appearance index than the higher grade cotton. The significant increase in yarn appearance may indicate that the trash was more completely removed from the stored cotton when compared to the non-stored cotton.

TABLE 2-RESULTS FOR YARN STRENGTH AND APPEARANCE COMPARED FOR STORED COTTON AND AVERAGE FOR MISSOURI COTTON 1961-62.

Item	Yarn Strength Avg. Break Factor Pounds-Range	Yarn Appearance Index Index-Range
Stored Cotton	1954-2056	100-110
Missouri Average*	2072-2144	60-100

*Data taken from USDA, AMS, Annual Cotton Quality Survey, Agricultural Information Bulletin No. 258, (Washington, D. C.) February 1961.

The costs associated with storing seed cotton are the subject for present research. Some consideration is given to the costs here only to point out the relationship with location of storage facility and ownership of the cotton. On the average, the cotton stored for four months during 1961 and 1962 was valued at 30.20 cents per pound when taken out of storage as compared with 29.93 cents per pound when put into storage. Or, the selling price of the cotton increased by only 35 cents per bale. This increase was insignificant and benefits from storage of seed cotton prior to ginning might need to result from lower costs of ginning as opposed to price increases. Thus, for the person holding ownership of the seed cotton while in storage much, if not all, costs would need to be offset by decreased costs of ginning.

Summary

The data presented in this report are the results of only one harvest season. With more varied climatic conditions more varied data might result. However, indications are that the data reported here can be useful in considering seed cotton storage prior to ginning. Additional data will be available at the conclusion of the work following the 1962-63 harvest season.