Some Economic Considerations in Storing Seed Cotton at Gins

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SUMMARY

The practice of harvesting cotton by mechanical means has increased rapidly in recent years. This practice is causing cotton in many parts of the Belt to move to the gins at rates greatly in excess of the existing ginning capacity, even though the gins operate on a 24-hour basis at greater than optimum rates. Since delays at the gin yards are costly to farmers in man-hours and equipment, this situation results in considerable pressure for additional gins or for more seed cotton storage. If additional gins are built solely to meet this accelerated rate of harvesting the reduced volume would decrease operating efficiency and increase ginning costs, particularly in years of reduced production. In the more mechanized areas, this creates a vital need for greater use of seed cotton storage either on farms or at gins. A big question has been how to provide such storage in a safe and economical manner.

Laboratory and field tests have indicated that machine-picked seed cotton normally can be stored without quality loss if the moisture content is less than 14 percent. Relatively moist seed cotton, however, will heat while in storage. Moisture-removing treatments, such as passing hot air through the cotton, were costly, in most cases prohibitively so; and the use of atmospheric air had little or no effect. Extended storage, therefore, should be limited to dry seed cotton, and any suspiciously damp seed cotton should be ginned as soon as possible. Such precautions are imperative, because moisture and foreign-matter content of machine-picked cotton arriving at gins varies widely because of differences in defoliation, weed and grass control, climatic conditions at times of harvesting, and application of moisture to the pickers' spindles.

In meeting this problem, some gins have erected permanent large-scale seed cotton storage facilities. Cost studies of the seasonal operation of selected types of such gin facilities were carried out in the San Joaquin Valley of California and in the Yazoo-Mississippi Delta of Mississippi. One of the three California gins studied employed concrete houses, the second used all-steel houses, and the third had a movable-rack system. The total investment costs were $72,484, $33,450, and $21,406; and the average capacities were 1,200, 750, and 400 bales, respectively. Total estimated seasonal operating costs ranged from $6,100 to $10,598 per facility, with per-bale costs averaging $8.35, $6.27, and $6.10 for the concrete, all-steel, and movable-rack types, respectively. Labor costs, including the costs per bale, were $2.08, $1.95, and 39 cents, respectively.

Insurance on buildings and equipment and on stored seed cotton are important cost items in seed cotton storage. At volumes handled and on the basis of insuring facilities at 90 percent of full value, building and equipment insurance costs ranged from 54 to 58 cents per bale. On the basis of 60-day storage, seed cotton insurance was 86, 38, and 56 cents per bale for the concrete, all-steel, and movable-rack installations, respectively.

In the Yazoo-Mississippi Delta the study covered one gin with a 415-bale capacity concrete-block house and another gin with 4 wooden storage houses and an aggregate capacity of 420 bales. The total investment costs for these facilities are estimated at $45,279 and $21,200, respectively. With 1,500 and 420 bales actually being handled at the concrete-block and wooden houses, respectively, the estimated seasonal per bale costs averaged $5.87 and $9.03. Labor costs were only 66 cents and 38 cents. However, the overall bale costs for the wooden storage facilities would have been appreciably less than for the concrete-block house if equal turnover had been achieved.

In Mississippi seed cotton insurance was a major cost item, since basic annual rates provided a minimum of $3.50 per $100 valuation. This rate resulted in a seed cotton insurance cost of $1.89 per bale at each gin for an assumed storage period of 60 days.

In terms of the actual utilization of such storage space, this limited study indicated a high per-bale cost of seed cotton storage for the several types of large-scale permanent facilities available for appraisal. The fact that relatively few gins have met this recent problem by erecting elaborate large-volume storage structures bears out this conclusion. At many gins, growers' vehicles and trailers pile up and serve as a medium of temporary storage. Obviously, however, growers need a reasonable turnaround of their equipment.

One promising and comparatively new alternative in both seed cotton transportation and temporary storage is the carrier-basket combination developed in California and Mississippi. Carriers in use consist of several designs of low-bed trailers which can be towed by tractor or truck. Baskets are none-wheeled, large containers of approximately 1,000 cubic feet capacity. They are placed onto the carrier for hauling and taken off at the gin for unloading or storage by means of a hydraulic lift arrangement mounted on the carrier.

It appears that the combined use of the carrier-baskets by gin patrons and ginners for gin yard storage would often reduce both the hauling and storage costs. For example, for an investment of $73,000 sufficient baskets and carriers could provide storage for about 600 bales at a time and about 3,600 bales for a season, assuming each basket is used an average of 6 times. It is estimated that on this basis temporary storage could be obtained at a per-bale cost of about $1.85 for depreciation and interest and a total cost, at California's existing insurance rates, of approximately $2.25 per bale.

At the same time, important savings to gin patrons as compared with the use of conventional trailers would result because of lower initial costs and smaller annual outlays for tire replacements and licensing fees.

SOME ECONOMIC CONSIDERATIONS IN STORING SEED COTTON AT GINS

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NEED FOR SEED COTTON STORAGE

In 1949 only 6 percent of the U. S. cotton crop was gathered by machines, as compared with 22 percent in 1953. 1/ This increased use of mechanical pickers and strippers in recent years has caused large accumulations of cotton on gin yards during peak periods of the season. In some of the Western States over half of the crop was machine-picked in 1953, as compared with only 4 percent for Arizona and 13 percent for California in 1949. Texas, Mississippi, and Missouri also showed significant gains in mechanical harvesting for the same period. During this 4-year interval, it is estimated that the number of mechanical pickers in operation increased from 2,960 to 16,000, while the number of mechanical strippers available increased from 6,500 to 20,000. 2/

With the rapid increase in the movement of cotton to the gin resulting from mechanical harvesting, it soon became evident that either additional gins or facilities for storing cotton would have to be built. Gin investments range up to about $200,000 per gin, volumes range up to 12,000 bales per gin, and ginning revenue for the Belt as a whole averages almost $13 per bale. 3/ Practically all of the new plants have been equipped to handle cotton which was produced and harvested largely by a mechanized type of agriculture. As gins have increased their machinery facilities to handle mechanically harvested cotton, larger centrally located plants have replaced many small gins which were not financially able to provide adequate cleaning and drying facilities.

However, if sufficient plants were constructed to handle the peak loads of ginning it is obvious that the total seasonal gin capacity in any specific gin community would not be utilized efficiently, and the overall cost of such services would be increased. Moreover, the scarcity of competent gin managers and labor for the operation of modern gins presented difficulties in obtaining proper operation of a large number of such plants.

1/ Charges for Ginning Cotton, Cost of Selected Services Incident to Marketing and Related Information, Seasons 1949-50 and 1953-54. U. S. Department of Agriculture, Washington 25, D. C.

2/ From Mule to Machine in Cotton. National Cotton Council, Memphis, Tenn., and correspondence dated July 6, 1954.

3/ See footnote 1.

Another important factor that deters the erection of large, expensive plants to handle heavy supplies of cotton during the height of the ginning season was the probability of acreage controls in newly expanded areas of production. Additional gins, built to assist in handling cotton at specific gin points, would represent an investment that might be out of proportion to the volume to be handled under a controlled acreage program. In addition, this would result in significantly higher charges for the services performed.

It is not the purpose of this study to evaluate the economic advantages of increased gin capacity versus additional storage. Current industry practices indicate that ginners have concluded that seed cotton storage in some form offers advantages which are more economical than the construction of additional gins to handle large amounts of cotton during peak harvesting periods. Seed cotton storage at gins has for years been an accepted practice in parts of the Cotton Belt. The usual facilities provided east of the Mississippi River, used largely to store clean, handpicked cotton, have been in the form of small, octagonal-shaped houses with a capacity of approximately 50 bales. However, rectangular storage houses have been popular in the Carolinas.

In the Southwest and Far West, where rainfall is of little or no consequence, some storage houses have been used in the past. More recently, however, there has developed a trend in those areas to place seed cotton on the ground in round or rectangular stacks and move it to the gin suctions in various ways. Under such conditions, the erection of fixed storage facilities has virtually stopped.

In order to meet peak harvesting conditions, management at some plants constructed large storage houses on the gin premises, while others were of the opinion that producers shared in the responsibility for storage. It was pointed out that no farm storage facilities were available in these newly developed cotton-producing areas. However, farm storage in lieu of storage at the gin would permit the use of such facilities for a relatively longer time and for various storage purposes, but most farmers do not now consider permanent or stationary farm storage feasible in view of the cost of moving the cotton into and out of such facilities.

As an offset to this, producers in many areas have purchased additional trailers for transporting cotton, which also provided temporary storage facilities until the cotton could be ginned. Others stored cotton in the field and observed insurance regulations with respect to distances between piles and number of bales of seed cotton stored in each pile, until such time as available trailers were returned from the gin.

OBJECTIVES AND METHOD OF STUDY

The principal objectives of this study were to: (1) appraise the different cost factors involved in storing seed cotton and ascertain the storage costs under different methods; (2) indicate the practicability of seed cotton storage by different methods; and (3) determine under commercial conditions the effects of seed cotton storage on the quality and value of ginned lint.

Three gins in the San Joaquin Valley of California and two gins in the Yazoo-Mississippi Delta, entailing different types of storage facilities, were included in this study. Other plants in the latter area which utilized abandoned tenant houses and barns on a temporary basis for storing machine-picked cotton were contacted, but it was not possible to secure valid cost data on their operations.

The fire rating bureaus in the two States were contacted with reference to regulations and rates, and considerable information was obtained from the insurance agencies for the respective gins. Utility companies in the areas involved made power calculations to determine the cost of operation of the facilities included. Operating data and other information were obtained from gins and patrons in both areas where carrier-basket types of conveyances were used in lieu of conventional trailers during the 1952 and 1953 seasons for transporting cotton to gins.

FACTORS AFFECTING THE COST OF SEED COTTON STORAGE

There are many items which have pronounced effect on the cost of providing seed cotton storage at gins. The most important of these factors are the following: original cost of the facility, applicable insurance rates, power and labor requirements, the amount of cotton actually stored, and the length of time it remains in storage. The two latter factors, in turn, are largely governed by the capacity of the gin in relation to the number of gin patrons, the peak volumes, and general weather conditions.

For comparability of data, it has been assumed that 200 cubic feet per bale are required for machine-picked cotton in all types of storage facilities. Seed cotton was ginned from these facilities in varying amounts and at irregular intervals.

Therefore, it was assumed, in order to determine insurance costs more accurately, that the facilities were filled to capacity and remained in such condition for 60 days. Labor costs which resulted from the storage operation were based on the net increase in the labor force for any gin. Power costs were determined from actual meter readings for the facilities involved.

Storage Facilities in San Joaquin Valley of California

Cost of Storage Facilities. - Total cost of 3 concrete houses and equipment installed at one gin amounted to $72,484, with a capacity of 1,200 bales (table 1). Investment per bale of capacity approximated $60. Three all-steel houses, with a capacity of 750 bales, cost $33,450 and represented a per-bale investment of $45. A third facility, consisting of wooden racks with a capacity of 400 bales, cost $21,406, or $54 per bale of capacity. In terms of their actual use, however, investment per bale of cotton actually stored ranged from $21 for the rack system to $57 for the concrete houses. These compare with an investment in ginning facilities in this area of approximately $20 per bale ginned.

Table 1. - Capacity, investment in storage facilities, and seed cotton stored, by type of facility, San Joaquin Valley, California, season 1951

Type of storage facility	Capacity	Replacement cost	Investment per bale of:- Actual capacity	Investment per bale of:- Cotton stored	Seed cotton stored
	Bales	Dollars	Dollars	Dollars	Bales
Concrete houses	1200	72,484	60	57	1,269
All-steel houses	750	33,451	45	22	1,500
Rack system	400	21,406	54	21	1,000

The concrete and all-steel storage houses studied in California were conventional structures insofar as arrangement of bins and methods employed in unloading seed cotton were concerned (fig. 1). Building plans for the concrete house were approved by the State fire rating bureau and all safety features were incorporated, which resulted in very low basic building and cotton insurance rates. All bins have outside doors, with underground suction located at the outer edge of each bin and connected with the gin suction system. An overhead catwalk is used in each building, eliminating an aisle between the two rows of bins.

The all-steel storage houses are conventional in structure except that two of the three have underground suction systems from the gin, and the largest of these houses is equipped with a booster fan to aid the gin suction system.

The movable-rack system is composed of 50 racks, each 8 feet wide by 10 feet high by 20 feet long, with a total capacity of 400 bales. Housing facilities for these consist of a shed built in a U shape from boiler tubes with individual stalls for each rack. A truck equipped with a hydraulic lift transports the rack to the rack-filling section alongside

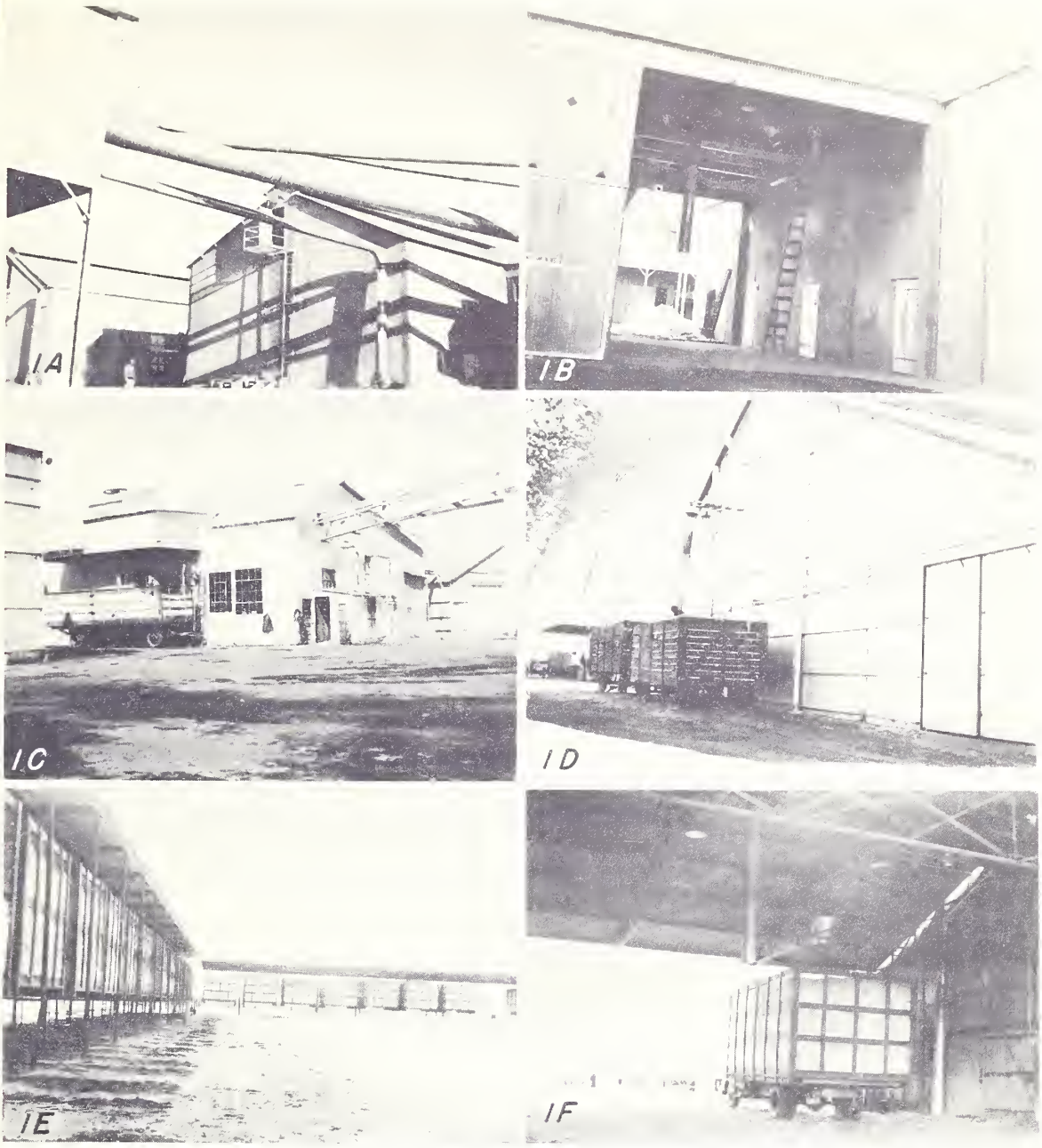


Figure 1.--Views of three storage facilities in California. (1-A and 1-B) Two of three concrete houses with central unloading suction. (1-C and 1-D) Three all-steel houses, with gin in middle and unloading suction on house adjacent to second gin. (1-E and 1-F) Movable-rack system under shed built in U-shape and one rack on truck, equipped with hydraulic lift, at unloading suction, preparatory to being moved to shed.

the regular gin suction. There cotton is unloaded from the patron's trailer through a Rembert fan and dropped through a small cyclone into the rack. Upon completion of this operation, the truck is backed into the stall, the hydraulic lift is lowered, and the filled rack is placed on its supports in the stall until ready to be ginned from the racks.

Cost of Insurance: - Seed cotton insurance and building insurance constitute two major cost items in storing seed cotton. At the same time, they are difficult to determine because of various methods of applying basic rates by the insurance agencies.

The State fire rating bureau determines the basic rate structure which is applicable for fixed storage facilities. This determination is based on the type of structure and its susceptibility to fire plus safety features such as available fire-fighting equipment, minimum distances between buildings, and other factors.

Annual basic rates for storage buildings varied from $1.12 per $100 of valuation for concrete houses to $2.96 for the rack system (table 2). Annual basic insurance rates for cotton stored in the different types of facilities ranged from $1.69 to $4.21 per $100 of valuation. The actual amount of premium paid depends on (a) the length of time the cotton was in storage; (b) the type of reporting policy used to report the number of bales; and (c) value of such cotton while in storage.

All types of reporting insurance policies permit the gin to account accurately for the volume of cotton placed in storage. These reporting dates may be daily, weekly, or monthly. Also, in California it may be feasible to obtain coverage of maximum liability by paying a premium at the beginning of the season, which covers the value when all the storage facilities are completely filled. Under such a policy, the gin is protected between the reporting dates when more cotton is in storage than last reported.

Premiums are determined by the amount of cotton actually in storage on a specific date. They are charged against the premiums paid for maximum liability at the beginning of the season, and any amount remaining in this fund at the end of the ginning season is refunded to the gin. Such a system permits the gin to be fully covered at all times, while the net insurance cost is based on the cotton in storage on specified reporting dates.

Table 2. - Basic annual insurance rates for buildings and for seed cotton in storage, by type of facility, San Joaquin Valley, California, season 1951

Type of storage facility	Rate per $100 valuation		Insurance cost per bale	
	Buildings	Seed cotton 1/	Buildings 2/	Seed cotton 3/
	Dollars	Dollars	Dollars	Dollars
Concrete houses	1.12	1.69	0.58	0.86
All-steel houses	2.71	1.42	.54	.38
Rack system	2.96	4.21	.57	.56

1/ Applicable rates are usually determined on a pro rata basis for the length of time cotton is in storage; i.e., for 30 days, 19 percent of the annual rate applies; for 60 days, 27 percent; and 90 days, 35 percent.
2/ Based on 90 percent coverage of full value of buildings and equipment.
3/ Based on coverage for 60 days for storage at full capacity and a value of $200 per bale for insurance purposes.

In order to eliminate, as far as possible, any variations in insurance charges resulting from differences in length of time that cotton remained in storage and the type of reporting policy in effect, it was assumed that any storage facility would be filled and remain in such condition for 60 consecutive days. Thus, storage in the true sense was assumed to be effective, particularly in view of the large volumes to be ginned and favorable weather conditions which exist throughout most of the ginning season in this area.

Seed cotton insurance costs amounted to 86 cents, 38 cents, and 56 cents per bale for concrete, all-steel, and movable-rack storage systems at their respective stored volumes of 1,269 bales, 1,500 bales, and 1,000 bales. Building insurance, based on coverage of 90 percent of full value, ranged from 54 cents to 58 cents per bale, the variations being dependent on type of structure and the capacity of the facility. The ability of the gin to utilize the total capacity more than one time would, of course, reduce these unit costs considerably.

Of particular importance is the competition which exists among insurance agencies for gin and cotton insurance business in this area. The annual premiums for large plants vary from $5,000 to $8,000 for insurance on buildings, machinery, seed cotton, and lint cotton. Agents are constantly developing information on premium-loss ratios and presenting this information to their home companies and the State Fire Rating Bureau. They do this to obtain more favorable rates for the gins they serve and to secure additional business from other gins.

This is exemplified by the basic annual rate charges which were applied to seed cotton stored in the movable-rack system from the outset of its operation in 1951. Because this type of facility was the first of its kind, the rate structure of the rating bureau did not include an applicable rate. Therefore, the seed cotton stored under such a system was to be treated as cotton stored in the open and an annual basic rate of $10 per $100 of valuation would be applicable. However, through arguments presented by the responsible insurance agency and the gin, this rate was adjusted downward to $4.21 for the year involved. Indications are that it will be further decreased in future years or a different type of insurance policy would be applicable for the coverage desired.

Another indication of the degree of competition and possibilities for reduced insurance rates may be seen in the application of certain forms of insurance to newly developed systems of storage. For instance, insurance agencies were quick to apply marine policies, which covered movable personal property, to the use of trailers and other types of conveyances on which seed cotton was transported to the gin and in which it was stored temporarily while waiting to be ginned. This form of insurance is not regulated by the fire rating bureau. Therefore, it is highly competitive in nature, and the rate applicable to any individual gin is based solely on its past premium-loss ratio.

Thus, under such a policy, insurance costs per bale of seed cotton ranged from 12 cents to 35 cents, regardless of the value of the contents of the conveyance or the number of days the cotton remains in the trailer or basket and, further, provided that the seed cotton is not placed in a fixed storage house. In the latter case, the flat rate will be required and also the applicable rate will apply for the length of time the seed cotton remains in fixed storage.

Labor Requirements and Costs. - Labor and power constitute the two main types of operating costs in the operation of seed cotton storage facilities. Their importance is, in turn, dependent upon the type of facility and the labor and equipment employed in moving cotton into and out of storage.

Labor requirements depend to some extent on the efficient utilization of the gin labor force, if it may be used in storage operations. In one instance, two of the gins in California reported that two men were added to the gin labor force to handle storage houses. However, they were not required on a full-time basis and were assigned to other jobs such as preparing bale ties for use, clean-up jobs, relief for regular members of the gin crew, or various duties on the yard. Generally, while placing cotton in storage, one man was assigned to the unloading suction while another man was located inside the storage house to handle valves and to serve as a fire watcher.

About 9 minutes per bale were required for this operation, while 12 minutes per bale were required to gin cotton from the house. This was due to the distance involved in moving the cotton, loss of efficiency in movement of air and cotton, and the uneven rate of feeding cotton to the suction system from the storage house. Two additional men were also required when cotton was being ginned from storage.

Man-hours required per bale for handling seed cotton in and out of storage varied little for concrete and all-steel houses, being 1.6 and 1.5 man-hours per bale, respectively (table 3). At $1.30 per hour for labor, this represents a labor cost of $2.08 and $1.95 per bale for handling cotton in and out of storage, for the respective types of facilities.

For the gin employing the rack system, two men who were regularly employed to make up ties and clean up in and around the gin also unloaded the producers' trailers and watched for fires as the cotton dropped from the cyclone into the rack. The regular yard man hauled the rack to the gin suction at time of ginning. Thus, labor was utilized efficiently, and only the time allocated to the unloading of patrons' trailers could be assessed to storage. On a per-bale basis, this amounted to 0.3 man-hours for this system, at a cost of 39 cents per bale.

Table 3. - Labor requirements and costs for handling seed cotton in storage, by type of storage facility, San Joaquin Valley, California, season 1951

Type of storage facility	Amount of seed cotton stored	Labor per bale	Cost per hour	Cost per bale
	Bales	Man-hours	Dollars	Dollars
Concrete houses	1269	1.6	1.30	2.08
All-steel houses	1500	1.5	1.30	1.95
Rack system	1000	.3	1.30	.39

Power Requirements and Costs. - Power requirements and costs varied considerably for the different types of storage facilities, although the cost of power was relatively low for handling cotton in and out of storage. Per-bale kilowatt-hour requirements amounted to 14.2 for concrete houses, 6.7 for all-steel houses, and 2.5 for the rack system (table 4). A 60-horsepower motor was used to operate two No. 45 fans plus a separator in placing cotton in storage at the concrete houses. The necessary power to operate a No. 45 fan was used to move the cotton from storage to the gin. Because of the greater distance involved, more horsepower was required to perform this job than for handling the cotton at the gin suction.

Table 4. - Power requirements and costs for operation of seed cotton storage facilities, San Joaquin Valley, California, season 1951

Type of storage facility	Amount of seed cotton stored	Kilowatt hours per bale 1/	Cost per kilowatt hour	Cost per bale
	Bales	Number	Cents	Cents
Concrete houses	1269	14.2	1.2	17
All-steel houses	1500	6.7	1.2	8
Rack system	1000	2.5	1.2	3

1/ Based on actual meter readings made by Pacific Gas and Electric Co., Bakersfield, California.

The all-steel houses employed one motor to operate a No. 40 fan in placing cotton in storage, and a No. 45 fan operated by a second 40-horsepower motor to serve as a booster system to the regular gin suction in moving cotton from storage to the gin. Power costs averaged 17 cents, 8 cents, and 3 cents per bale for concrete, all-steel, and rack storage systems, respectively.

Total Costs of Storage. - The three storage facilities in California handled volumes ranging from 1,000 to 1,500 bales, and total cost of operating these facilities ranged from $6,100 to $10,598 (table 5). On a per-bale basis, the concrete, all-metal, and movable-rack storage systems incurred costs of $8.35, $6.27, and $6.10, respectively. Operating expenses amounted to approximately one-half of total costs for the concrete storage facility, of which labor accounted for about $2.00 per bale. Interest on investment was substantially higher for this facility which was due primarily to the much larger investment as compared with the other two facilities.

Operating expenses were significantly lower for the movable-rack storage facilities, which reflects lower labor, insurance, and power costs. Because of the type of construction and the resulting shorter expected life of these racks, depreciation on a seasonaland per-bale basis was significantly higher for this storage facility than was true for the other storage houses.

If volumes handled were adjusted to 1,500 bales for each of these types of storage facilities, it is estimated that total cost of operation for the movable-rack storage facility would be reduced approximately $1.71 per bale, or to about $4.39. Similarly, total costs for the concrete facility would be reduced about 81 cents, or to approximately $7.54 per

Table 5. - Cost of storage of seed cotton, by items and by type of facility, San Joaquin Valley, California, season 1951

Item	Concrete houses		Metal houses		Rack system	
	Per season	Per bale	Per season	Per bale	Per season	Per bale
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
Cost:						
Operating:						
Labor	2,573	2.03	2,964	1.98	390	.39
Seed cotton insurance 1/	1,094	.86	1,140	.76	561	.56
Power	216	.17	120	.08	30	.03
Watchman	228	.18	225	.15	225	.22
Repairs	786	.62	900	.60	500	.50
Other insurance 2/	200	.16	230	.15	30	.03
Total	5,097	4.02	5,579	3.72	1,736	1.73
Fixed:						
Building insurance 3/	730	.58	816	.54	571	.57
Depreciation 4/	1,872	1.47	1,673	1.12	2,937	2.94
Interest on investment 5/	2,899	2.28	1,338	.89	856	.86
Total	5,501	4.33	3,827	2.55	4,364	4.37
Total cost	10,598	8.35	9,406	6.27	6,100	6.10

1/ Seed cotton insurance based on 60 days storage and $200 per-bale value for seed cotton.
2/ Includes unemployment insurance and workmen's compensation insurance.
3/ Building insurance based on 90 percent coverage of full value.
4/ Depreciation based on expected life of 40 years for concrete building; 33 years for all-metal house; and 20 years for shed covering movable racks and 5 years for racks and truck.
5/ Interest on investment based on 4 percent of present value.

bale, as compared with a total cost of operation of $6.27 for the all-metal houses at a similar volume. Over three-fourths of the reductions in costs are due to decreases in fixed expenses for building insurance, depreciation, and interest on investment. While these adjustments assume a greater turnover of cotton in the movable racks than in the stationary facilities, such an assumption is not unrealistic in view of their comparative operating expenses.

Storage Facilities in Yazoo-Mississippi Delta

Cost of Storage Facilities. - Replacement costs for a concrete-block storage building in the Yazoo-Mississippi Delta amounted to $45,279 for a capacity of 415 bales, as compared with a series of four wooden houses with an investment of $21,200 for about the same volume (table 6). Neither facility actually cost this amount to erect, because the former was constructed largely from materials on hand prior to 1940. The material for the wooden houses was obtained from surplus army buildings purchased at relatively small cost.

The concrete-block house was constructed with seven stalls on each side, with a hallway in the middle which contained the necessary piping. All stalls could be utilized for storage spaces for mechanical pickers during the off season (fig.2). Cotton was unloaded at a special station and passed through a 24-shelf drier and combination cleaner-extractor prior to being placed in storage.

Normally, this cotton remained in storage for approximately one week before it was ginned. However, the seed in cotton picked about the first of October of 1950, contained excessive moisture. Thus, reduction in moisture content by preliminary drying was insufficient to permit this cotton to remain in storage longer than three days, since a significant degree of heating took place and necessitated ginning. The equipment through which the cotton was placed in storage was so arranged in an annex to the gin that it could again be used as supplemental machinery to the regular gin machinery from storage to the gin, or as a part of the regular ginning set-up when cotton was ginned directly from the trailers.

The series of 4 wooden houses was so located that cotton was unloaded at a central station and blown to a house by hot air supplied by a heater operating below a separator. Thus, the only drying received by cotton was performed in approximately 100 feet of exposed pipe located between the unloading machinery and the house.

Cost of Insurance. - Insurance for buildings on gin premises is higher in the Yazoo-Mississippi Delta than in California. This is due to the types of buildings, the building programs, and the degree of modernization in the two areas. On a State-wide basis, California gins are relatively new and buildings are generally of non-combustible material.

Table 6. - Capacity, investment in storage facilities, and seed cotton stored, by type of facility, Yazoo-Mississippi Delta, season 1950

Type of storage facility	Capacity 1/	Replacement cost 2/	Investment per bale of: - Actual capacity	Investment per bale of: - Cotton stored	Seed cotton stored
	Bales	Dollars	Dollars	Dollars	Bales
Concrete-block house	415	45,279	109	30	1500
Wooden houses	420	21,200	50	50	420

1/ Based on requirement of 200 cubic feet per bale.
2/ Includes building and machinery incidental to storage house operation. Based on building and installation costs in 1950.

The great majority of the gins in the Mississippi Delta are similar to those in California. However, there are many, both in the Delta area and in the hill section of Mississippi, which were erected prior to 1940 and are composed of combustible materials. The Fire Rating Bureau determines rates according to premium-loss ratios on a State-wide basis. Thus, the newer and more modern gins, where storage is usually performed, are confronted with a rate structure that in reality is influenced by older and more obsolete plants, many of which are lost through fires each year.

Insurance rates on seed cotton storage buildings are dependent on the type of material used in construction. A basic rate of $3.50 per $100 of valuation is applied to wooden buildings and to brick, stone, or reinforced concrete storage buildings if located within 25 feet of the gin. Some buildings, however, are constructed entirely of a noncombustible material. That type of building is eligible for co-insurance, which reduces the rate by 30 percent if the building is insured for 90 percent of its full value. Because of this and other factors, a concrete-block house, insured under a co-insurance clause, would be assessed at an annual rate of $1.58 per $100 of valuation as compared with $3.50 per $100 of valuation if the building is constructed of combustible materials (table 7).

Wooden buildings are not eligible for the application of co-insurance clauses and the consequent reductions from the basic rate. The cost of building insurance on a seasonal basis, where storage capacity was virtually identical, amounted to about the same for both types of structures. However, the value of coverage for the concrete house was more than twice that for wooden buildings. On the basis of the amount of seed cotton actually stored, per-bale costs for building insurance for these respective structures amounted to 43 cents and $1.59 per bale.

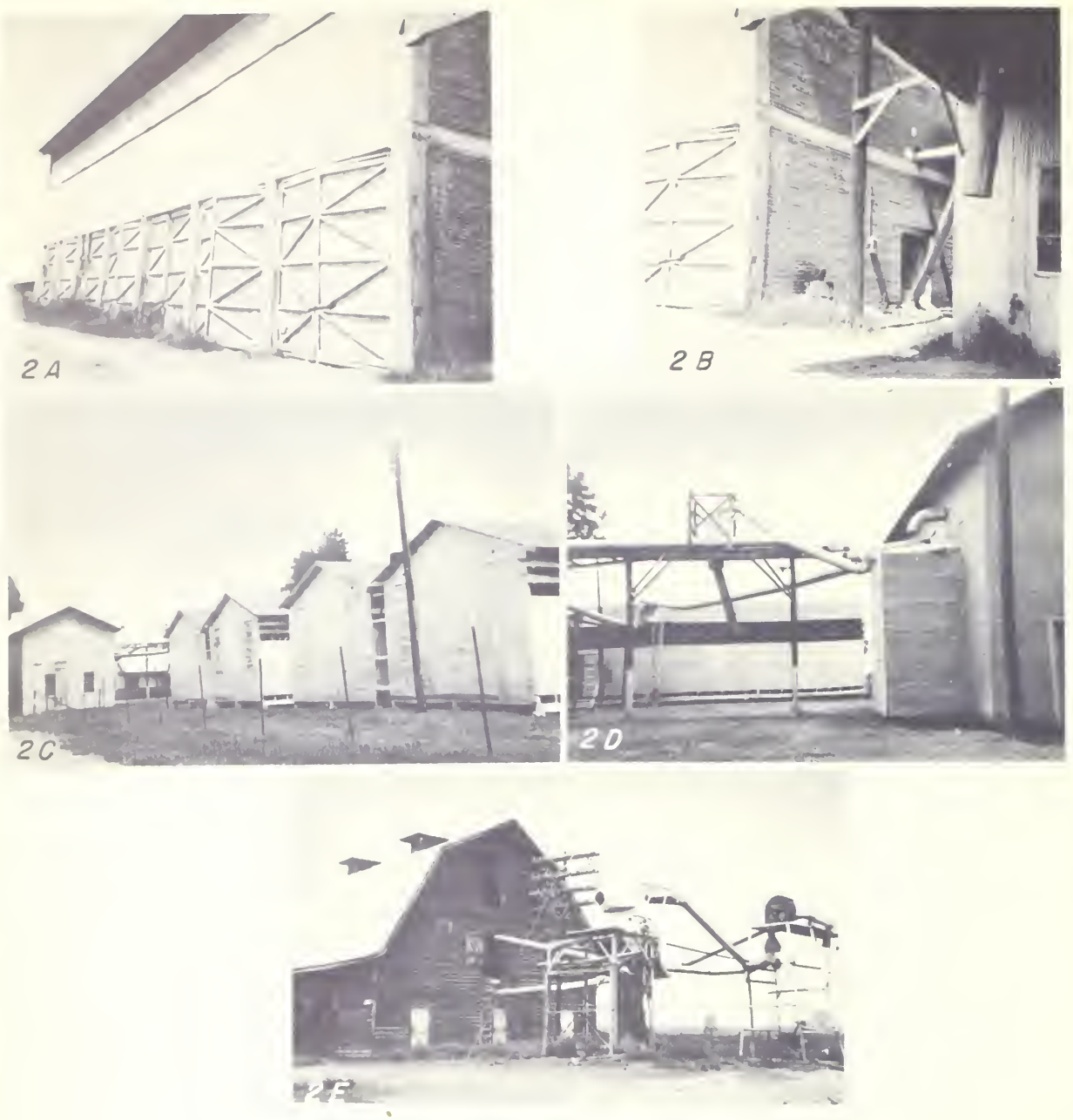


Figure 2.--Three storage facilities in Yazoo-Mississippi Delta. (2-A and 2-B) One side of concrete-block house with unloading suction in cleaning annex adjacent to storage house. (2-C and 2-D) Four wooden houses with unloading suction. (2-E) Typical plantation barn loft used for storage, with unloading and loading suction. Not shown is tractor which supplies power.

Table 7. - Basic annual insurance rates for buildings and for seed cotton in storage, by type of facility, Yazoo-Mississippi Delta, season 1950

Type of storage facility	Rate per $100 valuation		Insurance cost per bale	
	Buildings	Seed cotton 1/	Buildings 2/	Seed cotton 3/
	Dollars	Dollars	Dollars	Dollars
Concrete-block house	1.58	3.50	0.43	1.89
Wooden houses	3.50	3.50	1.59	1.89

1/ Applicable rates are determined on a pro rata basis for the length of time cotton is in storage; i.e., for 30 days, 19 percent of the basic annual rate applies; for 60 days, 27 percent; and 90 days, 35 percent.
2/ Based on 90 percent coverage of full value of buildings and equipment.
3/ Based on coverage for 60 days for storage at full capacity and a value of $200 per bale for insurance purposes.

Insurance on seed cotton stored in fixed storage facilities is determined by the rate applicable to the highest rated building on the gin premises as determined by the State Fire Rating Bureau. However, in no case may this annual basic rate be less than $3.50 per $100 valuation of seed cotton regardless of the type of construction employed in any storage facility 4/. The applicable rate for seed cotton is determined on a pro rate basis for the time cotton is in storage and the length of time governing the percentage reduction from the basic annual rate. For instance, cotton stored for 30 days would be assessed at 19 percent of the annual rate of $3.50 per $100 of valuation. For 60 days the rate would be 27 percent of the annual basic rate. Therefore, if storage facilities were filled for 60 days, the cost per bale for insurance of the seed cotton would be $1.89, regardless of the type of fixed facility employed.

Labor Requirements and Costs. - Labor requirements for the concrete-block house included in this study amounted to 1.2 man-hours per bale, as compared with .7 man-hours for the facility composed of 4 wooden houses (table 8). An additional laborer was employed for 2-1/2 months at the former storage facility in placing cotton in storage, and 4 men were employed on a temporary basis to aid in moving the cotton from storage to the gin. Only two additional laborers were added to the gin crew at the gin employing wooden houses when the cotton was ginned from storage. At 55 cents per hour, labor costs for the two facilities were 66 cents and 38 cents, respectively, per bale of cotton placed in storage. Thus, while labor requirements were slightly less than those in California, the costs involved were considerably less because of the large difference in wage rates.

4/ Insurance rates for 1954 for seed cotton on gin premises in Mississippi have been increased from $3.50 to $5.00 per $100 valuation.

Table 8. - Labor requirements and costs for handling seed cotton in storage, by type of facility, Yazoo-Mississippi Delta, season 1950

Type of storage facility	Amount of seed cotton stored	Labor per bale	Cost per hour	Cost per bale
	Bales	Man-hours	Dollars	Dollars
Concrete-block house	1500	1.2	.55	.66
Wooden houses	420	.7	.55	.38

Power Requirements and Costs. - Fuel required for the operation of seed cotton storage facilities in the Delta area of Mississippi included that used for drier operation, in addition to that for power units. The series of 4 houses which employed hot air to place the cotton in storage consumed an average of 10 kilowatt hours per bale for the total operation. This included additional power required for gin suction operation because of the added distance involved between the storage houses and the gin (table 9). Average electricity charges in this area amount to 3 cents per kilowatt-hour, or 30 cents per bale, for power. One gallon of liquefied petroleum gas per bale was required in the operation of the heater supplying hot air in the blowing system at an average cost of 10 cents per gallon.

Thus, total fuel costs amounted to 40 cents per bale. In 1950 the concrete-block facility employed a 24-shelf tower drier to dry machine-picked cotton as it was placed in storage. This facility required an estimated 2 gallons of liquefied petroleum gas per bale, which, when added to the fuel required for power, amounted to a cost of 40 cents per bale for this particular operation.

Total Cost of Storage. - Seasonal costs of operation in the Yazoo-Mississippi Delta are estimated at $3,792 and $8,811 for wooden and concrete-block houses, respectively, or $9.03 and $5.87 per bale of seed cotton stored (table 10). The principal difference in operating expenses occurred in the cost of labor, which was higher for the concrete-block house. At their respective volumes of 420 and 1,500 bales, large differences occurred in such fixed expenses as building insurance, depreciation, and interest on investment.

Table 9. - Estimated power requirements and costs for operation of seed cotton storage facilities, Yazoo-Mississippi Delta, season 1950

Type of storage facility	Seed cotton stored	Liquefied petroleum gas used per bale for -		Cost per bale for fuel for 1/	
		Power	Drying	Power	Drying
	Bales	Gallons	Gallons	Dollars	Dollars
Concrete-block house	1500	2	2	0.20	0.20
Wooden houses	420	2/	1	.30	.10

1/ Based on cost of electricity at 3 cents per kilowatt hour and 10 cents per gallon for liquefied petroleum gas.
2/ 10 kilowatt hours per bale.

If both types of facilities handled a volume of 1,500 bales, it is estimated that per-bale costs for the wooden houses would be decreased about $4.32. Almost all of this decrease would result from lowered fixed costs for building insurance, depreciation, and interest on investment. It is also estimated that the amount of labor required to handle the increased volume at the wooden storage facility would be at least equal to that employed at the concrete-block storage house. Thus some of the decreased costs resulting from larger volumes would be offset by an increase of approximately 27 cents per bale for labor costs. Comparative total costs at volumes of 1,500 bales would be $4.71 and $5.87 for wooden and concrete-block houses respectively.

This difference of $1.16 per bale would be due principally to the higher depreciation and interest on investment resulting from a larger original investment in the concrete-block house. Any savings on building insurance which may be gained from the application of discounts available from basic building rates under co-insurance clauses would be largely offset by the lower original investment in wooden houses. Therefore, although storage houses of this type would be subject to much higher basic insurance rates, the annual premiums paid for the two types of structures would be approximately equal. However, the values of the coverage would not be the same.

Seed-cotton basic insurance rates, under Mississippi laws, may not be less than $3.50 per $100 valuation. Thus, the type of structure in which seed cotton is stored would have little or no effect on the per-bale cost of such coverage. This is due to the fact that basic rates for almost all types of structures is less than $3.50 per $100 valuation. For 1954, the minimum rate of $5.00 per $100 valuation for seed cotton is substantially above any building rate now applicable.

Table 10. - Cost of storage of seed cotton, by items and by type of facility, Yazoo-Mississippi Delta, season 1950

Item	Wooden houses		Concrete-block house	
	Per season	Per bale	Per season	Per bale
	Dollars	Dollars	Dollars	Dollars
Cost:				
Operating:				
Labor	162	.39	990	.66
Seed cotton insurance 1/	794	1.89	2,835	1.89
Power	126	.30	300	.20
Repairs	100	.24	200	.13
Drier fuel	34	.08	300	.20
Total	1,216	2.90	4,625	3.08
Fixed:				
Building insurance 2/	668	1.59	641	.43
Depreciation 3/	1,060	2.52	1,725	1.15
Interest on investment 4/	848	2.02	1,820	1.21
Total	2,576	6.13	4,186	2.79
Total cost	3,792	9.03	8,811	5.87

1/ Seed cotton insurance based on 60 days storage and $200 per-bale value for seed cotton.

2/ Building insurance based on 90 percent coverage of full value. For all-metal or concrete houses, deductions from basic rate are applicable under co-insurance clause. For wooden buildings, co-insurance clause is not applicable under Mississippi law.

3/ Depreciation based on expected life of 20 years for wooden buildings and machinery; 33 years for concrete-block house and 20 years for machinery.

4/ Interest on investment based on 4 percent of present value.

COSTS INVOLVED IN TEMPORARY STORAGE FACILITIES

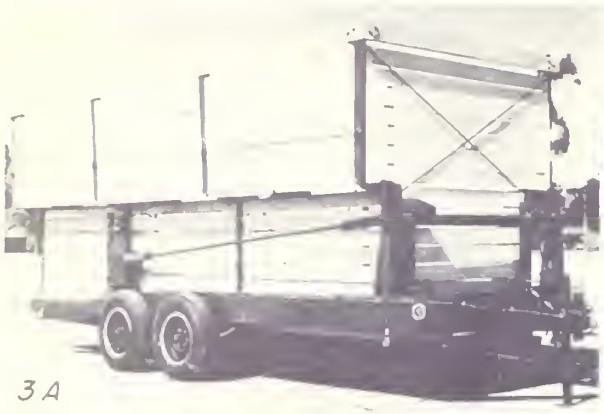
During the past few years when the capital investment required to erect a modern gin increased significantly, management in many areas have decided against the erection of stationary seed cotton storage facilities. The reason was that with the large volume of cotton handled during the season a storage facility having a capacity of several hundred bales would be uneconomical when related to the costs involved and the volume to be handled.

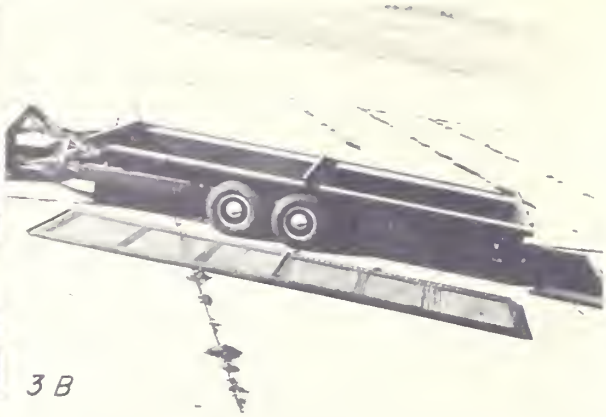
One company, which erected over 25 new gins in the western part of the Cotton Belt where ginning volumes are large, added no storage facilities at any of these new gins. Therefore, the demand existed for some system of temporary storage, either on the farm or by the use of additional trailers of some type which could also be used for temporary storage. Accordingly, in 1951 a California company manufactured on a limited basis a carrier-basket type of arrangement, consisting of low-bed trailer carriers and large non-wheeled containers which are handled by hydraulic systems mounted on the carriers.

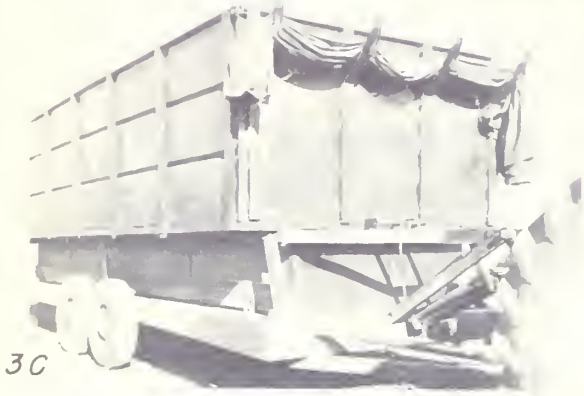
Additional types of this conveyance were offered in 1952, and a company in the Delta area of Mississippi developed a similar system which was used at one gin in this area in 1953 (fig. 3). In addition to these facilities, producers bought additional trailers for use in connection with mechanical harvesters. Any discussion of storage should therefore include an analysis of these types of temporary storage facilities.

The carrier-basket combination appears to offer many advantages over the storage-house system and the trailers which are required for transporting cotton from farm to gin. Labor costs and power costs attributable to the use of storage houses are eliminated. In addition, under California conditions, annual licensing costs are greatly reduced. Trailer license costs amount to approximately $21 per trailer, and the cost of license of a carrier amounts to $26. However, one carrier will handle up to 10 baskets, depending on the distance and number of pickers involved. Only the chassis and not the baskets requires a license.

Another significant saving is accomplished by the fact that rubber replacement for one carrier is about equal to that for one trailer. However, because the carrier will service the equivalent of about 10 trailers, a saving in annual rubber costs for about 9 trailers will be achieved. One producer in the Delta area of Mississippi has estimated that the savings on rubber for his fleet of 1 carrier and 8 baskets, as compared with comparable capacity in trailers, will almost equal the investment in these baskets over a period of about 12 years.







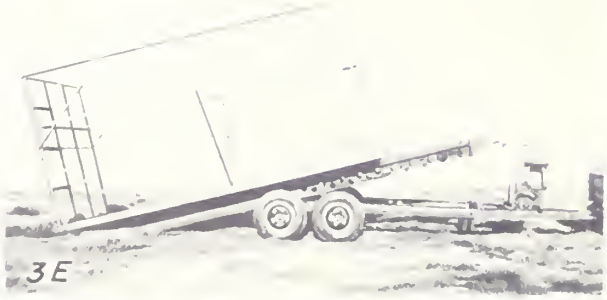


Figure 3.--Carrier-basket combinations for handling seed cotton and providing temporary storage. (3-A) Basket, which has wooden slatted sides, in locked carrying position on carrier. This conveyance built in California. (3-B) Basket with expanded metal sides removed so that bottom can be used for handling grain. (3-C) Carrier-basket in field. Note tarpaulin in place. (3-D) Basket in field to receive cotton. (3-E) A carrier-basket system developed in California, which uses a mounted gasoline-motor winch to move basket onto carrier chassis.

Original cost of each basket amounts to $475, which includes a tarpaulin cover. These baskets are of all-steel construction with sides of sheet steel or expanded metal. The sides can be removed and the bottom of the basket used for purposes other than handling seed cotton. The cost of each carrier amounts to $950, which includes 4 heavy-duty tires, hydraulic lift, and pressure hose connections for use with the hydraulic system on a tractor. This assembly can also be obtained for use in connection with operation from a pickup truck. If State highway regulations require a lighting and braking system, these can be installed for approximately $100 per carrier.

A major saving on insurance can be achieved by the use of such temporary storage facilities as the carrier-basket arrangement affords. Insurance for such coverage of seed cotton while on the gin premises is based on marine or inland marine coverage and is not subject to Fire Rating Bureau determination. Thus, it is considerably cheaper than would be the coverage in a storage house. Basic rates range from 12 to 35 cents per bale in California, based on each individual gin's past fire record.

In 1953 a similar policy was offered to gins in Mississippi which specified a charge of 15 cents per bale, regardless of the number of days on the gin premises. This compares with a basic annual rate of $3.50 per $100 valuation on a pro rata basis for fixed storage houses. This would amount to 66 cents per bale for 30 days' storage, or about 32 cents per bale for one week's storage. These same rates are also applicable to cotton stored on trailers or in baskets.

The use of temporary storage facilities in the form of baskets would necessitate the orderly movement of cotton to the gin suction. This ordinarily would not involve more than a week's delay at the gin. The delay in ginning cotton from storage would be much longer, thereby adding daily to the insurance charge. The reason is that it would not be feasible or practical to gin from storage while several hundred bales of cotton in trailers were on the premises waiting to be ginned. Other savings can be achieved through the elimination of power requirements for storage house operation and for labor which would be necessary in placing cotton in storage and in ginning from storage houses.

Operation of the carrier-basket arrangement in the Delta area of Mississippi in 1953 at one gin revealed certain operating difficulties which may be encountered in other areas. For instance, each basket was designed to accommodate approximately 5 bales, or about 200 cubic feet per bale of seed cotton. Because of inexperience in handling the carrier on the gin yard, in removing empty baskets from the gin suction, and in placing another basket for unloading, yard help would generally pull a conventional trailer under the suction. Thus, some of the loaded baskets remained on the yard for longer periods of time than would ordinarily be true.

Even in relatively dry harvesting seasons such as that experienced in 1953, a certain amount of heating would occur in baskets loaded with 5 bales. This necessitated the use of an additional man on the gin suction. One plantation operator solved this difficulty by placing 4 bales on each basket, thereby utilizing 250 cubic feet per bale as compared with 200 cubic feet when 5 bales were loaded. Double suction systems for gins, such as are found in western plants, would also reduce the pressure on yard help to move baskets quickly. Also, a more convenient method of moving baskets on gin premises through the use of wheels attached to the baskets might be considered as compared with the use of a carrier for gin yard work.

The use of trailers and the costs involved in conjunction with transporting cotton to gins for storage in fixed facilities must be considered when cost comparisons are made between fixed and temporary facilities. It is extremely difficult to draw comparisons, due to the fact that there are no gins which are known to have fully utilized the carrier-basket system for temporary storage. Therefore, certain assumptions must be made in such an analysis. These relate to the number of gin patrons, the number of trailers owned, daily volumes of mechanical harvesting, turn-around time at gins, willingness of producers to make certain changes in their equipment, and organization for transporting seed cotton to gins.

Initial investment in carrier-basket systems as compared with conventional trailers are approximately equal for 10 trailers and 10 baskets accompanied by 1 carrier. It is estimated that a good 4-bale trailer costs approximately $600, while a carrier costs $950, and each basket costs $475. Expected life of these all-steel baskets is estimated to be 20 years with little or no repairs. This is about 8 years more than the life of an average wooden trailer. Based on the assumption that a group of producers patronizing any gin would eventually own a fleet of 200 baskets and 20 carriers, as compared with 200 trailers to obtain equivalent capacity, a saving of $6,000 would be achieved in initial investment.

However, more substantial savings could be achieved for annual outlays for rubber replacement and licensing fees for a carrier-basket system. For instance, it is estimated that rubber replacement for each vehicle amounts to one wheel per year at a cost of approximately $35. Annual savings in rubber achieved by using a carrier-basket system as compared with equivalent trailer capacity would be about $6,300. The reason for this is that only 20 chassis are involved in the former system, while all 200 trailers are so equipped. In addition, annual savings in licensing fees add about $3,680 to this amount, as the annual highway license fees paid for each of the 200 trailers would cost $21 as compared with $26 for each of the 20 carriers. This savings feature is especially applicable in California where licenses are required for each trailer.

The purchase of baskets by any gin in lieu of building a storage house should be fully investigated before a final decision is made on the type of storage facility desired. If gin patrons would change to this type of conveyance because of the economy involved, a gin could achieve substantial savings in the long run. For instance, a gin could purchase baskets and offer them to patrons on an interchangeable basis. During the height of the ginning season when substantial backlogs of seed cotton would be on the gin premises awaiting ginning, it is estimated that a large gin would have one week's ginning on the yard, or about 600 bales. Purchase by the gin of basket capacity sufficient to accommodate such a volume would involve 150 baskets and perhaps 2 carriers for yard work.

Although the initial investment would be relatively high, or about $73,150, the per-bale cost for depreciation and investment would be relatively low because all baskets could be used at least 6 times during the season. Thus, a seasonal storage capacity of 3,600 bales would be obtained and a per-bale cost of about $1.85 would be incurred for depreciation and interest.

Basket insurance in California would approximate $6 per basket annually, or about $900 for 150 baskets. On a per-bale basis, this cost would amount to 25 cents per bale of cotton stored. Seed cotton insurance would amount to 15 cents per bale regardless of number of days the seed cotton remained on the gin premises. Therefore, total cost of operation of such a system to the gin would amount to approximately $2.25 per bale for 3,600-bale storage capacity. Such cost factors as labor and power are eliminated along with significant reductions in other cost items. Thus, total seasonal costs of operation of such temporary storage facilities at gins are considerably less than for those where storage houses are employed. In addition, the difficulties involved in securing additional labor for storage-house operation on an intermittent basis are eliminated.

Also, greater efficiency is obtained in the actual ginning process by ginning from trailers as compared with longer time required to gin cotton from storage houses. Therefore, some reductions in ginning costs would be achieved largely through more efficient use of the labor force and by better power efficiency.

EFFECTS OF SEED COTTON STORAGE ON LINT QUALITY

Machine-picked cotton usually has a moisture content that is higher than that of hand-picked cotton. Moisture is frequently applied to the picking spindles and doffing mechanism of the picker during operation of mechanical pickers. In addition, green, leafy material is usually gathered with the cotton and often contains considerable moisture.

Extensive laboratory and field tests were conducted during the 1949 and 1950 ginning seasons in connection with different treatments of seed cotton containing varying amounts of moisture. These tests established the fact that under certain conditions cotton could be stored without harmful effects on quality. 5/

It was found that seed cotton containing not more than 14 percent moisture could be stored without harmful effects on quality of the lint and seed. It was also determined that such treatments as passing hot air through the cotton during storage would remove excessive moisture. However, providing this service on a large-scale basis for a commercially operated plant handling large volumes of cotton would be unprofitable.

Concurrently with the laboratory investigations, studies were conducted on a limited scale at commercially operated plants which provided storage facilities for patrons in the northern Delta area of Mississippi. Substantial amounts of rain occurred during the latter part of August and continued until approximately September 20 of the 1950 ginning season. Clear, sunny days followed and continued until the first week in November of this relatively short ginning season under controlled acreages and a relatively small crop.

On the basis of the small volume of cotton available for study, there was a wide variation in the foreign matter and moisture content of machine-picked cotton received at all gins, both for immediate ginning and for storage (tables 11 and 12). Foreign matter ranged from below 4 percent to over 7 percent, while moisture content of the seed cotton ranged from 12 percent to above 17 percent at the various gins. Some bales received at individual gins contained as high as 24 percent moisture.

There were widely varying degrees of success with defoliation, and broad differences in rankness of plant growth. The degrees of skill in applying moisture to picker spindles were revealed in the wide variation in moisture content, especially in a dry harvesting period. Growers had difficulty in keeping their fields relatively free of grass. For this reason about 40 percent of the samples were designated as grassy by the classer.

When comparable cottons were either ginned at time of harvest or stored for subsequent ginning, cleaning machinery seemed to remove more foreign matter and moisture from the stored cotton than from cotton

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5/ Looney, Z. M., and Speakes, C. C., Conditioning and Storage of Seed Cotton with Special Reference to Mechanically Harvested Cotton. U. S. Department of Agriculture, 38 pp., illus., March 1952.

Table 11. - Effect of foreign matter and seed cotton moisture content on quality of stored and non-stored machine-picked cotton, by gin groups, Yazoo-Mississippi Delta, season 1950

Item	Unit	Machine-picked cotton			
		Stored in moderately equipped gins		Ginned at time of harvest	
		Without lint cleaners	With lint cleaners	Elaborately equipped gins with lint cleaners	Very elaborately equipped gins with lint cleaners
Foreign matter					
Wagon	Percent	5.4	6.4	5.0	7.5
Feeder	do	1.6	1.6	2.1	2.2
Moisture content					
Wagon	do	11.9	14.9	13.2	14.0
Feeder	do	9.6	9.7	9.7	11.8
Lint moisture	do	4.0	5.2	4.8	4.9
Grade	Index 1/	94.0	88.6	93.2	91.4
Staple length	1/32 inch 2/	34.4	34.0	34.3	34.4

1/ 100 = Middling; 94 = Strict Low Middling; 85 = Low Middling.
2/ 34 = 1-1/16 inch; 35 = 1-3/32 inch.

ginned at time of harvest (table 13). This was reflected in a slightly higher designation for the leaf element of grade.

An analysis of varying storage treatments indicates that excessive moisture content of the seed cotton when received at the gin exerts a most significant influence on cotton quality. In a typical instance, relatively clean machine-picked cotton containing 3.7 percent foreign matter was divided into two lots. One lot contained slightly in excess of 15 percent moisture and was stored where atmospheric air was pulled through the lot for 5 hours daily for 30 days prior to ginning. All of the 8 bales sampled were spotted, with a value equivalent to Low Middling plus even though the leaf designation was Middling. Preparation element of grade for 6 of the 8 bales was designated as below normal. The second lot, having a moisture content of 12.9 percent and placed in storage with subsequent treatment, had a grade equivalent in value to Middling with no deterioration in color.

Another indication of the effect on lint quality of excess moisture in stored seed cotton was noted in a 10-bale lot where high-moisture cotton was placed in storage and not subjected to any treatment prior to ginning. This cotton was picked 40 miles from the gin premises from fields in which rank

Table 12. - Effect of seed cotton moisture content and varying storage treatments on quality of machine-picked cotton, by gin groups, Yazoo-Mississippi Delta, season 1950

Item	Unit	Machine-picked cotton				
		Stored in moderately equipped gins		Very elaborately equipped gins	Ginned at time of harvest	
		Air pulled daily	Dead storage	Air pulled daily	Moderately equipped gins	Very elaborately equipped gins
Foreign matter						
Wagon	Percent	3.7	3.7	6.4	3.7	4.0
Feeder	do	1.0	1.3	.9	1.4	1.0
Moisture content						
Wagon	do	15.1	12.9	12.1	17.8	12.2
Feeder	do	9.2	10.0	7.0	12.8	8.7
Lint moisture	do	4.6	4.2	3.6	6.4	4.5
Grade	Index 1/	90.4	98.0	95.5	94.6	95.2
Staple length	1/32 inch 2/	35.0	34.6	34.0	35.0	34.0

1/ 100 = Middling; 94 = Strict Low Middling; 85 = Low Middling.
2/ 34 = 1-1/16 inch; 35 = 1-3/32 inch.

Table 13. - Effect of storage conditions on removal of foreign matter and moisture from mechanically harvested cotton, Yazoo-Mississippi Delta, season 1950

Item	Seed cotton moisture content			Seed cotton foreign matter content		
	Wagon	Feeder	Removal	Wagon	Feeder	Removal
	Percent	Percent	Percent	Percent	Percent	Percent
Stored cotton	13.2	9.0	31.8	5.5	1.6	70.9
Non-stored cotton	13.9	10.3	25.9	5.7	2.0	64.9

growth was present. Defoliation had not been fully effective, and considerable amounts of grass were included in the picking process. The moisture content was 15.2 percent (table 14). This excessive moisture resulted in the seed cotton heating while in storage and forced the gin management to turn this cotton over in the house and gin it soon thereafter.

Table 14. - Effect of dead storage on cotton quality for damp, mechanically harvested cotton ginned at a moderately equipped gin with lint cleaners, Yazoo-Mississippi Delta, season 1950

Item	Seed cotton				Lint moisture	Grade 1/	Staple length 2/
	Foreign matter		Moisture				
	Wagon	Feeder	Wagon	Feeder			
	Pct.	Pct.	Pct.	Pct.	Pct.	Index	32nd inch
Before lint cleaning	4.8	1.8	15.2	10.5	7.5	77.4	34.2
After lint cleaning	4.8	1.8	15.2	10.5	7.5	83.7	34.4

1/ 76 = Strict Good Ordinary; 85 = Low Middling.
2/ 34 = 1-1/16 inch; 35 = 1-3/32 inch.

All 10 bales sampled were designated as spotted in color, and 9 of the 10 bales were classed as below normal in preparation. Thus, the cost of turning the cotton, when added to the grade losses from reduced preparation and increased dullness of the color factor of grade, was significant.

One gin in the Mississippi Delta provided drying and cleaning facilities for machine-picked cotton as it was placed in storage. Early-season damp machine-picked cotton which received this treatment was found to heat in storage after two to three days, thus forcing the immediate ginning of such cotton. These facilities have since been discontinued for cotton entering storage. Likewise, a California gin which provided only cleaning facilities for cotton entering storage has since discontinued the use of these cleaners.

It would appear, therefore, that in any area where mechanical harvesting is practiced with subsequent storage in some form the problem of moisture in seed cotton becomes critical in nature. It is reasonable to assume that contamination can be caused in storage by the mixture of

a few bales of relatively damp cotton with those that require no treatment prior to ginning. Further, it is difficult, in the absence of instruments which provide fast and accurate determinations, for management to determine when cotton contains in excess of 14 percent moisture.

Therefore, it would appear that the only safe method of avoiding damage, particularly in areas where rain provides the water supply, would be to place in storage only dry machine-picked cotton and to gin immediately any relatively damp cotton. An important aid in making this determination could be the moisture content of the seed as determined by frequent official analyses made in most areas, together with personal inspection of the loads of seed cotton as they are brought to the gin.

Inspection of the seed in a load of machine-picked cotton will aid materially in determining the extent of moisture present and also the location of this moisture. If the seeds are soft, no pre-storage treatment will be effective, as the moisture present in the seed will equalize between the seed and the lint after being placed in storage. Therefore, the only practical solution would be to gin immediately any cotton received which contains excess moisture in the seed.

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