

do a fairly satisfactory job. Burning then follows, during which operation care should be taken that all stalks and bits of debris are consumed by the flames.

In harvesting, if the stalks are cut flush with the ground surface, most of the borers may be removed from the field in the stalks. The ordinary corn binder leaves stubble at least 5 inches long. By the use of a binder equipped with the stationary-knife, low-cutting attachment, the stalks may be cut at the ground surface. (Fig. 161.) For surface cutting by hand a special corn-harvesting hoe may be used.

After the corn is removed from the field, careful ensiling results in practically complete borer destruction, as does also mechanical husking and shredding. Borers which escape the knives of the silage cutter perish in the silo. Those that are not killed in the husker-shredder die from exposure or from being trampled in the yard.

The foregoing applies particularly to the 1-generation area, or north-central infestation. With some modifications, chiefly as to plowing and the low-cutting of the corn, the measures are applicable to the 2-generation or New England infestation.

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MECHANIZATION IN SOUTH HAS BEEN RETARDED BY LACK OF A COTTON-PICKING MACHINE

Below the Mason and Dixon line, in the old Cotton Belt, the use of mechanical power and equipment has lagged, when compared with its use in other farming regions. This is not because the southern planter is more conservative, more satisfied to carry on after the fashion of his fathers, less progressive than his neighbor in the newer cotton regions of Texas and Oklahoma, or less eager for efficient methods of production, than are farmers in the Wheat and Corn Belts; but because of peculiar circumstances that have, at any rate until now, generally counterbalanced much of the effectiveness of the larger units of machinery.

Where farm machinery has proved its economic value in the South it has been adopted rapidly and generally. Thus in the Cotton Belt of western Texas and Oklahoma, where itinerant labor is available for chopping and picking, and where the size of farm and the topography are generally well suited to the use of large machines, mechanization to a considerable degree has been adopted for handling cotton, grain sorghums, truck, and small grains, which are the principal crops grown. A survey of the rice area of Arkansas shows that there is not a single rice farm without tractor power. Even the most highly mechanized sections of the Wheat Belt are not generally so completely stocked with machine power.

In contrast to the general use of power machinery by rice growers, the cane growers of Louisiana have been cautious about replacing their mules with tractors. Of 74 cane farms studied in 1929 only 8 were using tractor power. Others contemplated the use of tractors for the 1930 season. The cotton farmers in the hill sections of the South make a still smaller use of mechanical power and even in the Delta sections the mule remains the prime source of power.

Factors Resistant to Mechanization

A number of factors contribute to this resistance to mechanization in much of the "Old South." The cropper system of tenure is based upon small farming units, and can operate only with them. So long as cotton is chopped and picked by hand, there is no advantage in conserving labor for other operations since the workers must be retained throughout the year so that they will be on hand for these very important and seasonal duties. To this difficulty is added the handicap in the shortage of available labor now trained in the use of mechanical devices. Over a great part of the Old South the farms are too small to warrant a heavy investment in mechanical equipment. Especially on the hill farms the fields are small and irregular in shape with a soil and topography that make terracing necessary to prevent erosion. In the wooded sections stumps in the fields often hinder the use of any except small mule-drawn implements.

Cotton, corn, rice, sugarcane, peaches, tobacco, and grain in various combinations make up a diversity of crops in the Southern States. Although tractors were in general use throughout other agricultural regions in this type of production, their adoption in the South was slow and it was not until a general-purpose tractor with specialized equipment was available that any real progress in mechanization in fruit and truck culture did take place.

Under conditions that have long existed, with mules as the only available source of motive power, the hill-section operator and his family can handle 25 to 40 acres of crops, and the plantation-cropper family about 15 acres of cotton plus a few acres of feed crops, whereas the west Texas operator alone, with larger equipment, takes care of 100 acres of crops, except during harvest. Although figures by States are not available, it is hardly probable that mechanical power in the form of tractors, trucks, and automobiles was an important factor in most of the South before the World War, or until the small tractor, pulling 2 and 3 bottom plows, was introduced about 1918. In 1919, the first year in which tractors were reported by the United States census, there were about 29,000 tractors on farms in the 10 cotton States as compared with more than 246,000 on all farms in the country. Of the total number in the Cotton Belt, about 9,000, or 31 per cent, were in Texas. Many of these were on farms that produced small grains, primarily wheat. During this same year, Mississippi could muster a total of only about 600; whereas the Corn Belt State of Illinois had 23,000 tractors on farms and the wheat State of Kansas had 17,000.

Trucks and Autos in South

As the acreage of cotton that can be handled by one man is limited by the amount that he can chop and pick, the tractor of that period did not materially affect the cotton acreage handled per man. But, acreages of other crops handled per worker no doubt showed a slight increase. Trucks and automobiles were also of relatively little importance at that time and by 1919 there were in 10 Southern States only about 21,000 of the former and 367,000 of the latter, with Texas again leading in both, and Louisiana having the fewest. During the decade from 1909 to 1919 there was an increase of over 9 per cent in the total number of mules in the 10 States. There was, however, a 19 per cent

increase in crop acreage, which resulted in a decrease in mules per 100 crop acres from 6.8 to 6.3 head, indicating that mechanical motive power was beginning to exert some influence on southern agriculture.

From 1919 relatively rapid strides were made in mechanization in the cotton States as a whole, and by 1924 the number of tractors had increased from about 29,000 to 59,000; trucks from about 21,000 to 57,000; and automobiles from about 367,000 to 664,000. During the 5-year period, 1924 to 1929, tractors again increased markedly. This increase was due to several causes, chief of which was the introduction of the general-purpose tractor, together with planting and cultivating equipment. In 1929, according to the United States census, there were about 112,000 tractors, an increase of about 290 per cent in 10 years; trucks numbered 177,000, an increase of about 740 per cent; and automobiles 1,068,000, an increase of 190 per cent. In number of tractors, Texas again led. Mississippi, however, led on a percentage basis with an increase of about 730 per cent, whereas Louisiana had the lowest percentage increase. By 1929, Texas also led in total numbers of trucks and automobiles, with South Carolina having the fewest trucks and Louisiana the smallest number of automobiles. Mississippi showed the greatest percentage gain in trucks and automobiles from 1919 to 1929, with an increase of about 1,540 per cent for the former and 440 per cent for the latter. As in the preceding decade, crop acreage in the 10 States increased, and in 1929 was about 15 per cent higher than in 1919. Mules during the same period showed a decline of nearly 8 per cent in total numbers, or from 6.3 to 5.1 head per 100 crop acres.

Multiple-Row Planters and Cultivators

In the early period of tractor usage, plows, listers, and disk harrows were about the only implements used for drawbar operations. With the development of the general-purpose tractor came the 2-row lister, and 2-row and 4-row planters and cultivators. The combine harvester-thresher, which has revolutionized harvesting and threshing operations in the Great Plains, has also invaded the Cotton Belt States. Figures showing the numbers of combines by States are not available, but it is known that as early as 1925 one combine was purchased and used in Mississippi. A study made in South Carolina in 1931 included 36 grain combines, 20 of which were bought that year. Georgia also has a considerable number, and one plantation in North Carolina had 5 combines in 1928.

With the increasing use of tractors, power equipment, trucks, and other machines, values of machinery per crop acre have changed materially. For the years 1899 and 1909, when all equipment was mule drawn, values amounted to only \$2 and \$3 per crop acre, respectively. By 1919, due not only to more machinery but to a high general price level, values had risen to \$6, an increase of 100 per cent over 1909, on a crop acreage 19 per cent greater. With more efficient tractors and equipment, with some decline in prices, and with an acreage 15 per cent greater than in 1919, values per crop acre in 1929 averaged \$1 lower than those of 1919.

While mechanical power in the South has been affecting numbers of mules, total acres in crops, and machinery values per acre, there has also been a noticeable effect on the capacity of individual workers. Comparisons between 1909 and 1929 show that in North Carolina the

acreage handled per worker increased from 13⁵ to 16 acres; in South Carolina from 16 to 20; in Georgia, from 19 to 25; in Alabama, from 17 to 21; in Tennessee, from 16 to 22; in Mississippi, from 14 to 18; in Louisiana, from 15 to 19; and in Arkansas, from 16 to 23. In Oklahoma and Texas, where wheat as well as cotton is an important crop, acreage increases per worker between 1909 and 1929 were from 38 to 59 for the former State and from 25 to 46 for the latter. For the entire Cotton Belt the average crop acreage per worker increased from 19 to 28 acres, or 47 per cent.

In the Mississippi Delta cotton produced with mules required an average of 128 hours of man labor and 39.3 hours of mule work per acre, while that produced with tractors and some mule work required 90.8 hours of man labor, 5.5 hours of tractor and 5.3 hours of mule work.

Mechanization Prospects in Cotton Belt

What is in store in the way of more efficient and widespread utilization of mechanical power in the Cotton Belt? Eli Whitney's invention of the cotton gin was to the cotton planter what the invention of the threshing machine was to the grain grower; but the grain binder or combine harvester-thresher has no counterpart in cotton-harvesting machines and this one fact alone affects the entire future structure of mechanization for the production of cotton. As previously stated, the acreage of cotton that one man can handle is usually limited to the amount that he can chop and pick. By using a hill-drop planter, hand chopping and hoeing can be largely eliminated, but the picking is still to be done by hand; so the situation in much of the cotton country remains static. Without a successful cotton-picking machine, the planters in many sections are faced with the necessity of maintaining throughout the year a labor force sufficient to pick the crop, and extensive mechanization would result in piling up many idle hours for the croppers waiting for harvest time. The sugarcane planter finds himself in much the same position as the cotton grower. Planting and harvesting are still done by hand because of a lack of suitable equipment.

At present there are a number of cotton-picking machines which, according to unbiased observers, are nearing the stage of development bordering on success. In the last few years there have been developed machines for planting and harvesting cane which, according to reports, have possibilities of success. The next few years should witness the success or failure of the cotton and cane machines; and if they are successful there may be in many sections a concerted rush toward mechanization just as pronounced as that which has occurred on the wheat farms of the Great Plains.

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COTTON QUALITY AFFECTED IN GINNING PROCESS BY MOISTURE IN SEED COTTON

Each season the problems encountered by growers and ginners in handling and ginning cotton seem to increase. There appears to be no single factor, however, so important to the ginning of cotton and to its resultant quality as the moisture content of the raw seed