Developments in Mechar

cotton harvester further improved toward full efficiency

J. P. Fairbank

Few California farmers grow cotton exclusively.

They also grow barley, flax, alfalfa, grain sorghums, sugar beets, potatoes, fruit, and truck crops. Many of them have livestock enterprises—beef, hogs, sheep, and dairies. They grow cotton only if it fits into crop rotations and if they believe it will be profitable.

The 1948 crop—800,000 acres in round figures—was nearly 50% over 1947. A further increase is predicted for 1949 but at a lesser rate.

Progress in plant breeding is now spotlighted by the new Acala 4-42 strain with its superior quality of fiber.

Modern Machines

The main progress in mechanization is the trend to mechanical harvesting. Last year between 70 and 80 cotton pickers of the spindle type were used in California. This year there may be five times as many.

California is well suited to mechanization. Its fields are large and level and its farmers are accustomed to using power machinery. Weather conditions are generally favorable. High average yields per acre of cotton in the state make for large output per machine per hour.

The stripper type harvester has not been so well received in California's high-producing fields. There is the possibility that it may find a place in stripping fields which have been harvested by the spindle type machines, as well as in fields of relatively small plants.

New gins are being built with a full complement of modern machinery, and new equipment to better handle mechanically harvested cotton is being installed in older gins.

Irrigating labor in California amounts to more than chopping and hoeing labor as a rule, but since it is spread over the growing season it does not cause serious peak labor demands. The irrigation furrows and ditches complicate the other cultural operations and prevent the use of methods found to be good in nonirrigated cotton districts.

Attention is being given to so-called precision planting of cotton seed. Sugar beet and vegetable seeds now can be planted with greater precision by machine than hand labor will plant them. Uniform spacing of single plants is desirable for sugar beets where uniformity in size aids mechanical harvesting but there is some question as to the importance of spacing and thinning of cotton. Given optimum moisture and fertility conditions over which some control by irrigation is possible, it may not be necessary to thin or chop cotton except for weed control.

Weed and grass control is one of the major problems in mechanization, not only in labor costs but in its influence on mechanical picking.

Johnson grass, Bermuda grass, water grass, and the late summer grasses which come on after the last cultivation give some trouble. They not only reduce harvesting efficiency but they entangle the lint and cause grassy bales. Flame and sprays supplementary to cultivation have been tried but a definite answer is elusive. In the matter of flaming and spraying, the equipment industry is ahead of the plant physiologists and chemists. Flame and grass sprays can be applied if the chemists and plant scientists will tell what to use, when and how much.

Rarely do agricultural implements reduce labor requirements and cash costs so greatly as the cotton picker does. Nevertheless better performance in picking efficiency, quality, and machine costs is wanted. To achieve these improvements requires the full coöperation of the growers, the ginners, the agronomists, the engineers, and the manufacturers.

California cotton plants have many bolls near the ground where they escape the spindles. It is not uncommon for one third of the bolls to be within six inches from the ground, in which zone major losses occur. Perhaps pickers can be designed to lift up more of these low bolls but probably there are limitations. By breeding and cultural methods it is hoped the plants can be induced to fruit higher off the ground without reducing the yield.

The effect plant spacing might have on boll position, whether bed planting is better than our customary flat planting, and whether plants should be spaced single file, or in hills or bunches for increased efficiency of the harvester are being investigated.

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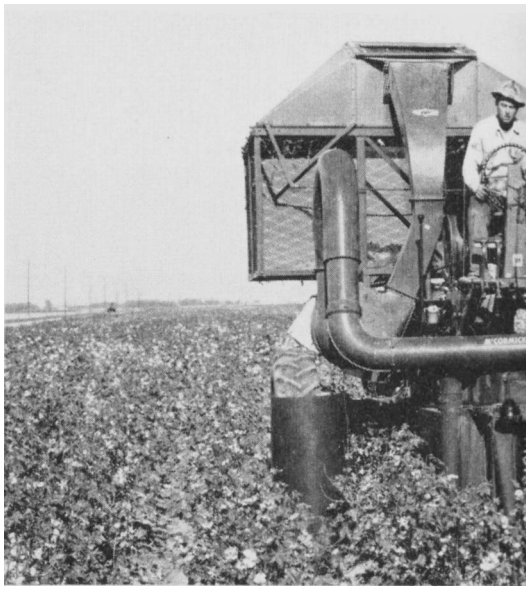

Above. Improved cotton harvester i

***Below.* Brush-type almond harvester attached to standar estimated at ab**

Newly designed prune catcher is pushed by tractor onto conveyor belts to be carrie

Transferring leafhoppers into a sleeve cage on a test tree.

DECLINE

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relatively isolated location near Baldwin Park. As materials became available, two screenhouses were constructed at the same location. These are 84 by 96 and 72 by 120 feet in size, respectively, and are covered with 32-mesh plastic screen to make them insect-proof. The screen has been effective in keeping free-flying insects out. It has also raised the temperature and the humidity so that the trees in the screenhouses have grown much more rapidly than those outside. Trees planted in June, 1947, are now beginning to touch the nine-foot ceiling. The long incubation period of the quick decline disease in the plant has slowed the work seriously. A young citrus tree inoculated with quick decline requires a period of one to two years before it shows symptoms. Even then the symptoms may develop slowly, being very obscure at first.

Transmission tests are made by taking insects which have fed on trees infected with quick decline, either naturally or in cages, and confining them on small healthy trees. When the right insect is used under the right conditions, the tree will become affected with the disease. Since it is impossible to collect most species in sufficient numbers on infected trees, most of the insects used are either collected on other plants or reared in the insectary. After a transmission test is completed the insects are killed, and their identity determined by experts. No live insects are ever taken out of the quick decline area.

Total transmission tests to date number 748, involving 137,841 individual insects in more than 200 species. Of these, 351 tests, in which 30,760 insects in 145 species were used, were to plants in the field; and 397 tests, involving 107,081 insects in about 160 species, were to plants in the screenhouses. The number of insects used per test ranged from one or two in the case of certain large species to a test in which 14,000 aphids were transferred to a tree over a period of more than three months.

To date, it is not known which insect carries the quick decline virus. There is one sick tree in the plot outside the screenhouse and another that is strongly suspected. Since these appeared a good series of tests has been made with the insects involved. It is now necessary to wait at least another year for these tests to show whether they are in the right direction.

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COTTON

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There may be days or even weeks on end when the humidity is so low that the usual defoliants do not work well. The solution for that problem lies with the chemists and the plant scientists to a large extent, though the engineers may have a job to do on applicators which will thoroughly cover the foliage with an optimum range of particle sizes.

When labor is saved by mechanization many people must be trained to operate and repair the machines. The driver of a four-row tractor cultivator must have far different training than the man who operates a hand hoe. The same is true for flame weeders. The purpose of cotton mechanization will be defeated if mechanical cotton pickers are operated by untrained and careless men. In California last year—1947—the major distributors of cotton pickers held night schools for owners and operators. The instruction was given by skilled men. This fall the program was enlarged to include daytime training meetings in cotton fields where a number of pickers were actually run by the students under the personal supervision of experienced men.

Progress in all types of farm mechanization will continue insofar as the individual problems encountered are solved by the coördinated efforts of growers, ginners, manufacturers, plant scientists, entomologists, soil technologists, chemists, economists, engineers, and teachers.

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CATCHER

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When the catcher is in place under the tree, the back of the slot is against the trunk of the tree with the frame members reaching forward. This section is fitted by hand with a removable metal cover which has a raised center to deflect the prunes as they drop so they will roll onto belt conveyors placed on either side of the catcher frame. The conveyors are operated from the tractor power take-off.

Two operators are necessary to tend the receiving boxes at the front ends of the conveyor belts. One man controls the clutch which starts and stops the conveyor belts.

The trees are shaken usually by two to four men equipped with pneumatic knockers. The air is furnished by a compressor in conjunction with the tractor. Practical experience with this harvesting method has demonstrated that each knocker augments the others to increase the efficiency and thoroughness of the job.

Speed of the harvesting operation—which averages about five minutes a tree—depends upon the skill of the box tenders and the effectiveness of the pneumatic tool operators.

When the work is well organized there is little waiting on the placing of the catcher equipment.

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Pneumatic knockers, or limb-shakers, in the hands of skilled operators speed up mechanized harvesting.