nized Farming Equipment

brush-type almond harvester and new prune catcher successful in field

R. R. Parks

n field test in San Joaquin Valley.

d new rear-engine tractor. Harvest cost with this machine is out $8.00 an acre.

to place under the tree. Sloping sides cause fruit to roll to the forward edge for boxing.

Brush type almond harvesters—in practical use for the first time this year—already have demonstrated advantages over the suction type harvesting equipment introduced three seasons ago.

Chief among these advantages is the lower initial cost of the farmer-developed brush harvester, one of which is now scheduled to sell for about $2,400, complete with tractor. This outfit—one of the best performing brush machines this year—comes as an attachment to a standard new type tractor with the engine mounted behind the driver.

Brush harvesting equipment is available for either sacking or bulk handling in trailers and many growers are equipping for bulk handling because of the lower operation cost.

Another advantage to the grower employing the brush harvester is that no *stick tights* occur in the harvest and no drying is necessary. Some extra trash and clods are picked up but the quantity usually is not objectionable.

The huller shed is kept busy with one machine. In fact, the machine usually stands idle a third of the time waiting for the shed to catch up, or for the knockers to fell more nuts to the ground.

Brush machines can move across an orchard at twice the speed of the suction harvester. The suction machines are limited to about one half mile an hour speed to obtain the most efficient action from the suction nozzles.

One brush machine that harvested 120 acres of almonds this year moved at about one mile an hour in heavy going and better than two miles an hour in clean-up work or in the light crop areas in the orchard.

The suction machines appear to do more thorough work with one time over the orchard and some of them are capable of harvesting 98% and better of all the nuts on the ground.

Brush machines still are leaving some nuts after their first pass at a heavy crop—perhaps a 2% to 5% loss which they pick up on a second going-over.

Estimates derived from the first year's operation of brush harvesting machines place the harvest cost with this equipment at $8 an acre, based upon the following data.

Machine and tractor cost	$2,400	
Miscellaneous repairs, etc.	100	
For five years' depreciation	$2,500	
Annual capital costs	$500	
100 acres use	$5	per acre
Tractor operator's wages	2	" "
Fuel, etc.	1	" "
Harvest cost	$8	" "

Proper preparation of the orchard floor is essential to successful mechanical harvesting with either the brush or suction type harvester.

Mechanical harvesting requires better and more painstaking preparation than is necessary with the old harvesting method of knocking both green and ripe nuts onto sheets.

The orchard floor is prepared considerably in advance of harvest time—usually just after the last irrigation when the soil moisture is right for leveling.

Ground preparation methods vary but usually involve floating, dragging, and rolling in both directions to provide a smooth surface free from clods.

A considerable number of nuts are allowed to fall naturally before knocking is begun which is then accomplished with about half the effort and manpower required formerly, and all nuts fall.

Prune Catcher

An estimated five minutes for each tree is all the time required by a new mechanical prune harvester in practical use for the first time this past season.

A farmer and a mechanic, jointly working with ideas obtained from the University and elsewhere, developed this machine.

The main feature of this harvesting system is the metal catcher frame and the method of placing it under the tree.

The catcher frame is 18 feet across, with extensions that can increase it to 24 feet. It is covered with metal and supported on two caster wheels placed to carry the weight of the catcher.

Two parallel frame members extend to the rear of the catcher—like shafts—to enable a tractor to work between them pushing the frame, as a horse would do.

The two frame members also extend forward beyond the center of the catcher, to form a **U**-shaped slot.

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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.