

Machine Apple Harvesting Tested



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Agricultural engineers at Penn State University have developed a machine for the future — a harvester for apples grown on narrow hedgerows or trellises, a culture method of tomorrow.

The trellis apple harvester has worked well during the short time it has been used in experimental orchards. In future years it may help to solve the problem of labor shortages in the tree fruit industry, according to its designers, Gary W. Allshouse and C. L. Morrow.

This machine straddles the tree rows and is similar in appearance to high clearance tractors or grape harvesters. It is possible to harvest trees eight feet in height and three feet across the row with the new machine. For hedgerow apple production, dwarf-type trees are planted six to eight feet apart in the row with about 12 feet between rows.

Overlapping fiberglass plates padded with foam rubber are

used to form a seal around the tree and collect the fruit. These plates also channel the harvested fruit onto conveyor belts. Conveyors on either side carry fruit toward the rear of the machine, elevate it, and then lower it into a bulk bin.

During the current harvesting season, a rotating, vibrating shaker with numerous bars reaching into the tree is being used to detach the fruit. In limited tests on Golden Delicious and York varieties, the shaker has removed 85 to 90 per cent of the fruit. The engineers plan to redesign the shaker for more vigorous action to harvest more of the crop.

A number of specific operational problems need some additional study, Allshouse and Morrow point out. However, the concepts and principles used in the preliminary design have proven valid.

The overlapping plates used to

collect fruit have done very well, the engineers claim. Damage to tree trunks has been slight.

However, there were two obvious drawbacks. The harvester could not be backed up once started down the row. Also, it was necessary to enter and exit from the rows in a fairly straight line which increased the turning space needed at row ends.

Last year, an experimental shaker that attached by a clamp to each tree was used to detach the fruit. This unit was mounted on the side of the harvester and operated with a three-inch stroke up to 300 cycles per minute.

Although the tree shaker did a fairly good job of removing fruit, 90 per cent, it was not fast enough to be practical. Allshouse and Morrow believe that between 100 and 150 trees must be harvested per hour to reduce machine harvest costs to

the same level as present hand harvesting. Their estimate figure on a machine cost is roughly \$20,000 with a 10 per cent fruit loss.

Assuming a 20 per cent time loss for changing bins and turning at the row ends, a machine harvesting continuously down the row must travel at a rate of about 3/10 mile per hour. Using the rotating vibrating shaker developed for the current season, the machine has operated at speeds up to one mile per hour.

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