Mechanization's March in Agriculture*

The job of the local office farm placement representative has been in a state of flux during the 1950's and 1960's. His responsibilities to farm employers and workers are not changing, but the farms he serves grow larger in acreage, and the workers he serves are developing skills to cope with the ever-increasing number of machines in agriculture.

These same machines which demand higher skills in the workers who operate them are also sharply reducing the number of jobs available to seasonal agricultural workers.

A tremendous amount of research is now being devoted to developing labor-saving devices for harvest and preharvest work. Progress toward mechanization of the harvest is proceeding on two broad fronts. The first is modification of the task to be performed. The second is development of machines to do the task without modifying the work.

Progress in mechanization of the cannery tomato harvest is an example of job modification. It was not possible to develop a machine that would satisfactorily duplicate the traditional selective, multipick hand-harvest operation. Therefore, it was necessary to change the work to be done in the harvest. This was done by developing a new tomato plant through genetic research and the modification of cultivating practices. The fruit of the new tomato plant all ripens at the same time and can withstand bruising. This permits a once-over harvest job that machines can do and have been designed to do satisfactorily and economically.

At the other extreme, the developers of lettuce harvesting machines have been able to accept the crop as it is and to devise a mechanical system for duplicating the job done by hand. Efforts also are being made to adapt the lettuce crop for once-over harvesting, since mechanization would then be more economical.

These two approaches, or combinations of them, are being applied toward increasing productivity in virtually all of the remaining important hand-labor jobs in agriculture. The scope of mechanization research and development is illustrated by a partial list of the crops which are currently the subject of active programs: tomatoes, lettuce, cucumbers, strawberries, apples, cantaloupes, asparagus, citrus fruits, raspberries, blackberries, cabbage, grapes, and celery.

The effects of this research have profound economic implications in terms of the elasticity of demand for hired farm labor—that is, the tendency for growers to hire fewer workers when wages rise. In 1965, the elasticity of demand for labor varied from crop to crop depending on the state of the technology. For some crops, agricultural scientists and engineers had developed methods of machine handling which were competitive with hand-labor costs at the wages prevailing in some areas. For these crops, the adoption of mechanization contributed to a rise in productivity and a decrease in labor requirements in 1965.

For other crops, a mechanized method of producing a marketable product had been developed, but the adoption of the method was being delayed because the cost of machine-handling was greater than the cost of hand labor.

For still other crops, growers are rejecting the current method of machine-handling, not because of cost considerations, but because of technological deficiencies in the method itself.

The following describes the 1965 experience and the outlook for selected vegetable, fruit, and sugar crops.

Tomatoes for Processing

The tomato harvester eliminated more man-hours of vegetable work in 1965 than any other machine. Preliminary estimates indicate that the tomato harvester used an average of 240 man-hours of labor, with an average crew of 24 working 10 hours a day each. Thus, one machine, requiring 1.2 to 1.7 man-hours per ton, could harvest 140 to 200 tons per day. This compares with 7.2 or 7.3 hours required to harvest a ton by hand. Output by machine ranged from 140 to 200 tons per day. About 25 percent, or some 600,000 tons, of the California crop was mechanically harvested in 1965. Assuming a reduction of nearly 6 man-hours per ton, this eliminated about 3.5 million man-hours of labor.

For 1966, manufacturers expect some 800 tomato harvesters in the fields. These machines can easily handle 120,000 acres, or 80 to 85 percent of the normal California acreage

*This article is based primarily on material presented at the National Farm Labor Conference in San Antonio, Tex., in January.

TOP

This self-propelled tomato harvester is operated by a crew of 12 men.

CENTER

Yakima Morning Herald photo

This battery-operated harvesting machine cuts the asparagus spears at the desired length and deposits them in the boxes at the side.

BOTTOM

This experimental lettuce harvester has a rotary, wheel-type elevator for lifting cut heads from the field to the conveyor for loading.

of cannery tomatoes. Adaptability of other production areas is likely to be slow, due to the availability of hand labor.

Lettuce

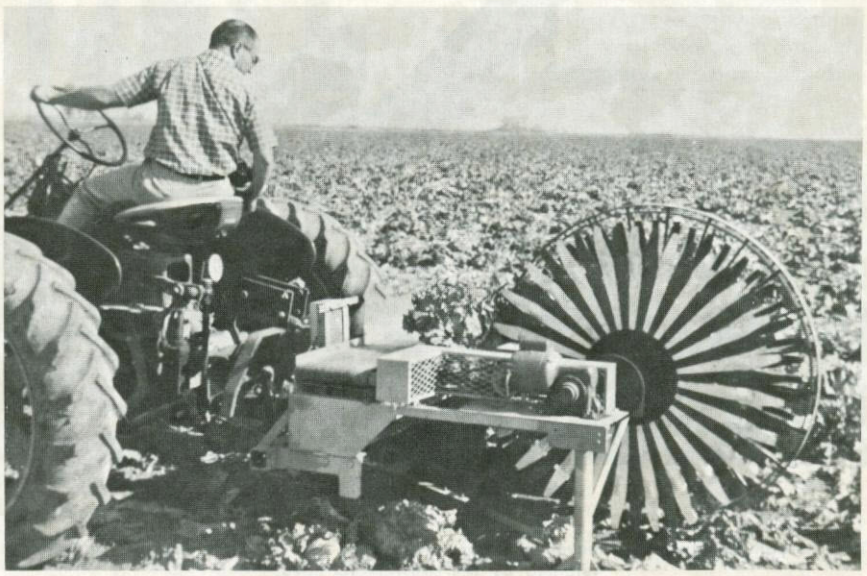
The ability of growers to get sufficient help delayed adoption of the costly selective lettuce harvester in 1965. However, further tightening of the labor supply or wage increases might cause rapid adoption of this technology.

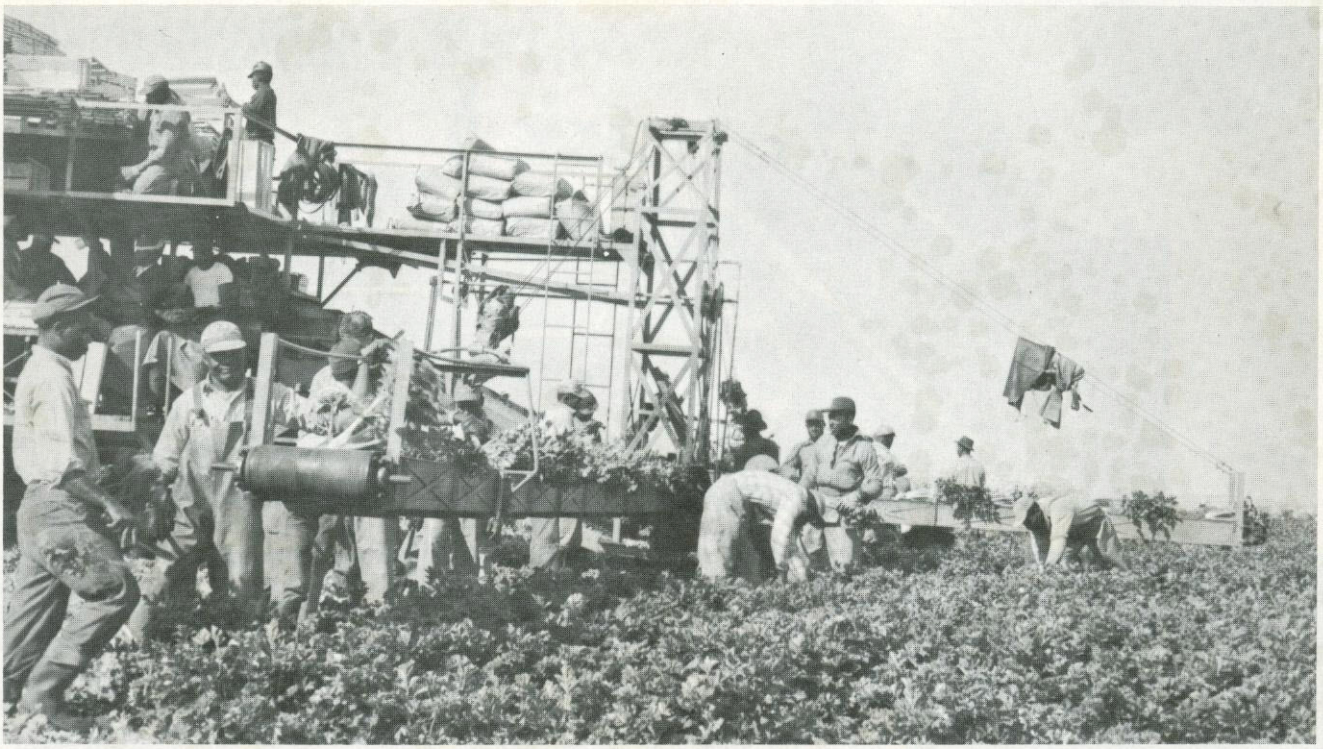
Cucumbers

Two principal types of mechanical harvester are available to growers—a "one-pick" machine and a "multipick" machine. The one-pick machine lifts a swath of vines, cuts the roots, strips off the pickles, and discards the vines. The multipick machine straddles the row, lifts the vines onto a picking bed, knocks the pickles from the vines, and returns the vines to the ground. Data are not available on costs of harvesting by machine, but users estimate the cost as the same or less than hand harvesting.

Asparagus

It appears that the "nonselective" harvester is ready for adoption. The





The "mule train" harvesting celery in a Belle Glade, Fla., field.

machine is said to harvest premium white asparagus more cheaply than hand labor when wage rates are $1.40 or more per hour.

Celery

In Florida, celery is cut by the "mule train." Workers with knives walk in front of the big machine, cutting the celery and throwing it onto a conveyor belt. These belts carry the stalks to a central assembly line for washing and packing into wire bound crates. The crates then are loaded onto a truck which is towed in reverse by the harvesting machine. Then they are taken to a hydracooling plant before being shipped to market. A cutting machine to replace hand cutters was tried experimentally on the 1965–66 crop. Results were sufficiently encouraging to induce several growers to purchase this equipment.

Photo courtesy Holly Sugar Corp.

This mechanical harvester removes sugar beet tops, digs and loads the beets. The tops are retained by the growers for feed.

Fruits

Mechanical harvesting of apples and other noncitrus fruits for processing is a distinct possibility. While an apple may be bruised by shaking, it can be utilized without great loss of quality if processed quickly. By proper timing and scheduling of processing plants, shaken fruit can be processed within 2 hours of harvest.

Much research is being devoted to

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mechanization of citrus fruit, but progress is extremely slow and difficult. The shaker and catching frame method of harvest is being tried on citrus for processing, but results are far from satisfactory. So far, it has not been adopted commercially.

Sugarcane

Although the cane harvests in Hawaii and Louisiana have been mechanized for many years, sugarcane cutting and topping in Florida is still done with a machete. Then it is picked up by a modern loader which mechanically saws the cane into short pieces and elevates it into large rubber-tired steel hopper carts. Technicians believe the operation could be modernized further by mounting a cutting head on the loader. A producer is experimenting with such a device this year. However, many industry people believe this is impossible in Florida because soil and wind conditions cause a very tangled growth.

Sugarbeets

The sugarbeet industry has been largely converted to machine operations. Precision planting, blocking, thinning, weed control, and harvesting have all been converted from hand to mechanical operations.