



Mechanical aids to

SWEET POTATO HARVEST

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APPROXIMATELY 9,000 acres of sweet potatoes are grown annually in California, with Merced County accounting for more than 60 per cent of this total acreage. Fresno, Stanislaus, San Joaquin, and Kern counties grow the remaining 40 per cent of the acreage. The

average yield of marketable roots is low—from 4.5 to 5.0 tons per acre. In the past, the farm family grew the crop with members of the family providing the necessary labor to produce and harvest. Individual growers are now increasing their sweet potato acreage, thereby replacing a number of the farm family units. The development of mechanical

harvest aids has contributed to the change to larger acreages. This tractor-drawn mechanical harvester digs and conveys the roots past four or five people on the trailer unit who snap the roots from the stems and place them in boxes. The stems, cull roots, and trash drop back onto the ground at the rear of the harvest-aid machines. Space is provided

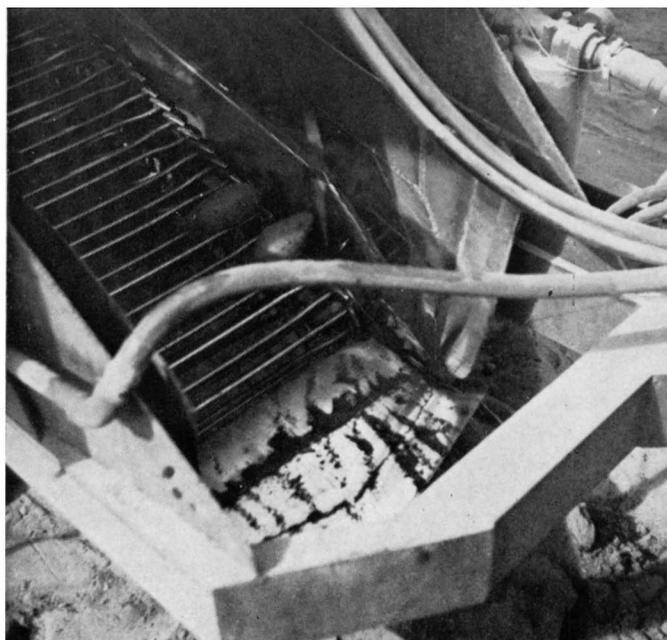


TABLE 1. MAN-HOURS OF LABOR REQUIRED TO HARVEST A TON OF SWEET POTATOES BY THE VARIOUS METHODS

Operation	Old method Man hrs.	Mechanical aid	
		Boxes Man hrs.	Bins Man hrs.
Vine cutting	0.12	0.08	0.08
Digging	0.36	0.55	0.55
Supplying empty boxes	0.81	0.20	0.20
Picking, snapping, and filling boxes or bins	4.30	2.73	2.64
Loading and unloading	0.55	0.60	0.52
Storage	0.53	0.10	0.10
Supervision	0.37	0.13	0.13
Total	7.04	4.39	4.22
Yield (tons acre)	10.80	8.00	5.70

TABLE 2. EACH OPERATION IN THE HARVESTING PROCESS EXPRESSED AS PER CENT OF THE TOTAL HARVEST TIME

Operation	Old method	Mechanical aid Boxes	Mechanical aid Bins
Vine cutting	1.7	1.8	2.0
Digging	5.1	12.5	13.0
Supplying empty boxes	11.5	4.5	5.0
Picking, snapping, and filling boxes or bins	60.7	66.2	66.0
Loading and unloading	7.8	13.9	12.3
Storage	7.5	2.3	2.3
Supervision	5.2	3.0	3.0
Total	100.0	100.0	100.0



on this aid for several pallets, on which empty and full boxes can be stacked.

Table 1 indicates the man-hours of labor required to harvest a ton of sweet potatoes by the two different methods. The harvest process is divided into seven operations, and the man-hours of labor for each operation are shown. Since the yield per acre has a direct relationship to the labor required, this has been entered in the table.

In the old method the vines were cut and the roots dug immediately ahead of the harvest crew. The vine cutting was done at a slower speed than for the mechanical aid. The roots were dug with a small tractor-drawn digger and dropped back onto the ground. This operation was independent of the other operations that followed after the roots were dug (see photos). With the mechanical aid, the speed of the digging has to be adjusted to the amount of roots the workers can handle.

With the boxes stacked on the mechanical aid within reach of the workers, a minimum amount of time is spent moving boxes. The time-consuming operation of picking up the root, snapping it off the stem, and placing it in a box or bin requires the most labor of all the operations. In the old method of harvesting, considerable time was consumed picking up the root from the ground, snapping or removing the root from the stem, and placing it in a box. A simple combined digger-conveyor eliminated this task and the need to move the boxes down the rows as they were being filled.

Such a system reduced the labor requirement by 38 per cent. Considerable time was consumed loading and unloading the boxes on and off the mechanical aid. The 0.60 man-hour quoted in table 1 is an average of both hand and forklift handling. This operation involves the whole crew when it is done by hand.

Table 2 shows each operation in the harvest process expressed as a percentage of the total harvest time. Over 60 per cent of the total time is used by the workers in handling the sweet potato roots. The time available for digging is increased by the mechanical aid since it provides sufficient time for the workers to pick up and snap the roots from the stems on the conveyor chain. In the old method the digging operation was separated from the remaining operations in the harvesting process.

Use of bins decreases the box handling time. A method of placing the roots in bulk bins is a problem to be solved in the future.

Supervision of the crew is simplified with the mechanical aid, since the tractor driver can observe all the workers and can adjust the volume of roots by regulating the speed of the tractor.

Table 3 indicates the average time required for each operation in the harvesting of a lug box of sweet potatoes. In the old method, about half of the total time was used in handling the lug box, and the remaining time was used to handle the roots. On a box basis, a 73 per cent saving in time per box is realized by use of a mechanical aid.

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TABLE 3. AVERAGE TIME (MINUTES) REQUIRED FOR EACH OPERATION IN HARVESTING A LUG BOX OF SWEET POTATOES

Operation	Old method	Mechanical aid
	min.	min.
Snapping	0.50	0.11
Placing roots in box	1.05	0.24
Obtaining box	0.55	
Moving box down row	0.67	
Moving box (mech. aid)		0.09
Stacking boxes	0.33	
Unloading and loading box (mech. aid)		0.22
Waiting for roots		0.24
Personal	0.55	0.10
	3.65	1.00

