

EIGHT ELECTRIC SORTING machines in use at a Michigan plant. Fruit on conveyor belt enters hopper; individual cherries are picked up

by vacuum head and scanned by photoelectric eyes. Blemishes on fruit are rejected, good cherries pass.

## Electric Sorters and Destemmers for Tart Cherries Score Advances in 1964

2246

Continuing field research with the electro-optical grading machine and with destemmers for cherries shows design improvements available. Recent studies by USDA scientists and engineers indicate both devices are economically feasible and practical. Inplant results also show the desirability of using competent technical help to set-up and monitor the machines.

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Electric sorting machines, first introduced to the tart cherry industry in 1963, scored notable advances in performance in 1964. They sorted cherries efficiently at faster rates and at lower costs. These are the conclusions reached by the research group who studied 20 of the machines located in five canneries of Michigan.

The machines, developed by the Electric Sorting Machine Division of Mandrel Industries, Inc.,\* pick up each cherry by vacuum, scan it instantly with electric eyes, and then either reject or pass it according to the presence or

absence of blemishes. In 1964 the units rejected an average of 3.3% of the original orchard-run cherries to give a sorted product having 94.8% U.S. No. 1 fruit.

In 1963 about 40 sorting machines were in use in the cherry belt; in 1964 the total had increased to 93, of which 70 were in Michigan.

The significant findings of this study appear in Table 1. The units were especially effective in eliminating cherries severely blemished with wind-whip, limb-rub, and decay. They also discarded a small percentage of seriously scalded cherries. On the other hand, they did not throw out significant numbers of under-colored fruit or fruit having attached stems, and they inadvertently rejected 1.2% of good cherries in 1964. Human sorters normally lose about 0.4% of good fruit.

The manner of installing the sorters in processing lines varied with the cannery. In one plant, eight sorters were connected directly with eight pitters and the entire processing line handled only machine sorted cherries (see photo). However, four human sorters were used to remove under-colored fruit, attached stems, and occasional pits that had passed the sorting machines and pitters. In other plants

\*Mention of a particular product is not intended as an endorsement over other similar products not mentioned.

machine and hand sorted cherries were blended before pitting. Bruising was negligible provided the cherries were discharged from the sorting machines directly into water.

Performance of the machines was often variable and depended partly on their adjustment and care. In one plant, for example, the capacity of four machines supplied with similar cherries ranged from 742 to 2261 pounds per hour per machine. Reliability and competence of technical help were key factors in sorter performance.

Performance was affected also by the character of the raw fruit. Firm, clean, free-flowing cherries enhanced performance, whereas soft, badly bruised, improperly cleaned cherries caused production slow-downs.

Processors considered the chief advantages of the sorters to be: (a) effective elimination of major defects; (b) reduced sorting costs; (c) easement of labor problems, especially those concerned with short production runs at beginning and end of season; and (d) sorting of low grade lots that could not profitably be sorted by hand.

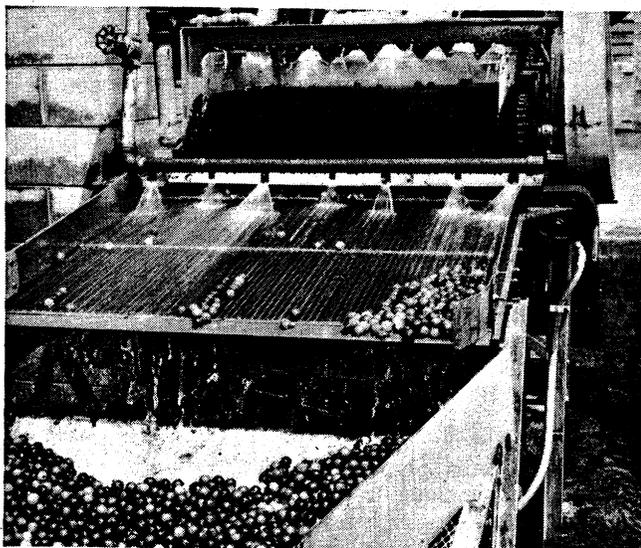
### Destemmers

Studies in 1962 indicated that the presence of 2.9% of attached stems on mechanically harvested tart cherries was a prime cause for a 17% slow-down in rate of processing. Consequently, in 1963 the National Canners Association circulated a questionnaire to determine the availability and specifications of destemmers for tart cherries.

In 1964, four types of destemmers were made available for testing in four canneries of Michigan. Three of the machines (A, B, C of Table 2) had been used previously with sweet cherries, brined cherries, grapes, olives, currants, or plums; the fourth unit (D) was new in 1964. Standardized small-scale tests were carried out with all four machines, and two of them (A, D) were placed in cannery processing lines where each supplied cherries for six pitters.

The results of these tests appear in Table 2. All of the destemmers effectively removed the major portion of attached stems (86.8 to 97.8%). Their estimated capacity ranged from 1.5 to 5.0 tons per hour, and the amount of bruise damage they caused ranged from 0.2 to 1.8%. The estimated per ton costs in 1964 varied with the efficiency of stem removal.

Additional trials with the destemmers are contemplated in 1965, and modifications in equipment and adjustments in costs can be expected. Practical and satisfactory destemmers for tart cherries appear to be a near reality.



NEW DESTEMMER during 1964 field trials. Device behind lower spray is eliminator which conveys cherries to the destemmer. Fruit goes to flume or bulk bins.

Table 1. Comparative performance of electric cherry sorting machines in Michigan in 1963 and 1964.

FACTOR	Average		Range	
	1963	1964	1964	
U.S. No. 1 cherries before sorter	88.6%	92.8%	83.8-	97.4%
U.S. No. 1 cherries after sorter	92.4%	94.8%	89.6-	98.5%
Total cherries rejected	5.4%	3.3%	0.1-	16.5%
Scarred, decayed cherries rejected	3.3%	1.6%	0.1-	8.3%
Scalded cherries rejected	0.5%	0.5%	0.0-	5.8%
Good cherries rejected and lost	1.6%	1.2%	0.1-	7.6%
Size of ave. cherry, no./lb.	100.0	111.0	100.0-	126.0
Sorting rate, lbs./hr./sorter	1514.0	1789.0	742.0-	2653.0
Estimated cost of sorting, \$/ton	8.90	4.85*	3.27-	11.70

\*Costs for 1964 were estimated on the basis of a first year equipment cost of \$1700, use of equipment for 600 hours, and a sorting rate of 1789 pounds of fruit per hour. Estimate includes labor charge of \$1.51 per hour for part time use of one employee to keep machine properly adjusted and supplied with cherries, and to inspect fruit after machine sorting. Cost of installing sorter is not included. Average labor cost of hand sorting was \$7.65 per ton in 1962.

Table 2. Comparative study of destemmers for tart cherries.

FACTOR	TYPE OF DESTEMMER			
	A	B	C	D
Total tests, no.	6	10	4	25
Efficiency of stem removal	97.8%	93.9%	92.4%	86.8%
Damaged cherries	1.0%	0.8%	1.8%	0.2%
Estimated capacity, tons/hr.	5.0	3.0	1.5	5.0
*Estimated cost, \$/ton	**	1.28	**	0.33

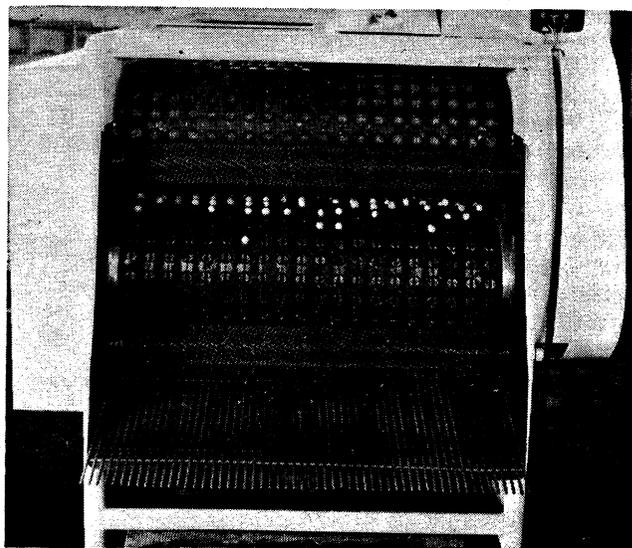
Data are averages of test samples containing 20% and 100% of attached stems.

\*Estimated per ton costs of destemmers B and D are calculated on the basis of complete payment for equipment in the first year divided by total tonnage destemmed during a 600 hour season. Charges for installation and maintenance are not included.

\*\*Not available

### Acknowledgment

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DESTEMMER, WIDELY USED on brined cherries in California uses rotating brush to seat fruit in perforated plate. Rubber roller knocks stem from fruit and fruit is discharged over inspection belt.