TABLE 1. ETHREL EFFECT ON PERCENT OF INDICATED MATURITY OF PIMIENTO PEPPERS, DAVIS—1969

Treatment	Red	Breaker	Green
	Percent total weight		
Check	15.3	7.3	77.4
100 ppm	18.3	28.6	53.2
250 ppm	24.3	27.1	48.6
500 ppm	61.1	27.0	11.9

TABLE 2. ETHREL EFFECT ON PERCENT OF INDICATED MATURITY OF PIMIENTO PEPPERS, HOLLISTER—1969

Treatment	Red	Breaker	Green
	Percent total weight*		
Check	8.9	14.3	76.8
100 ppm	18.2	24.1	57.7
250 ppm	17.7	31.6	50.7
500 ppm	27.7	38.6	33.7

* Significant differences at 5% level.

TABLE 3. ETHREL EFFECT ON PERCENT OF INDICATED MATURITY OF CHILI PEPPERS DAVIS—1969

Treatment	Red	Breaker	Green
	Percent total weight		
Check	6.7	22.0	71.3
100 ppm	4.2	27.9	68.0
250 ppm	17.0	35.3	47.7
500 ppm	48.8	14.4	36.8

Photo 4 (below). Defoliation of leaves occurring at the 250 and 500 ppm rate of Ethrel applications.

An economic analysis questions

CENTRAL SORTING OF CANNERY TOMATOES

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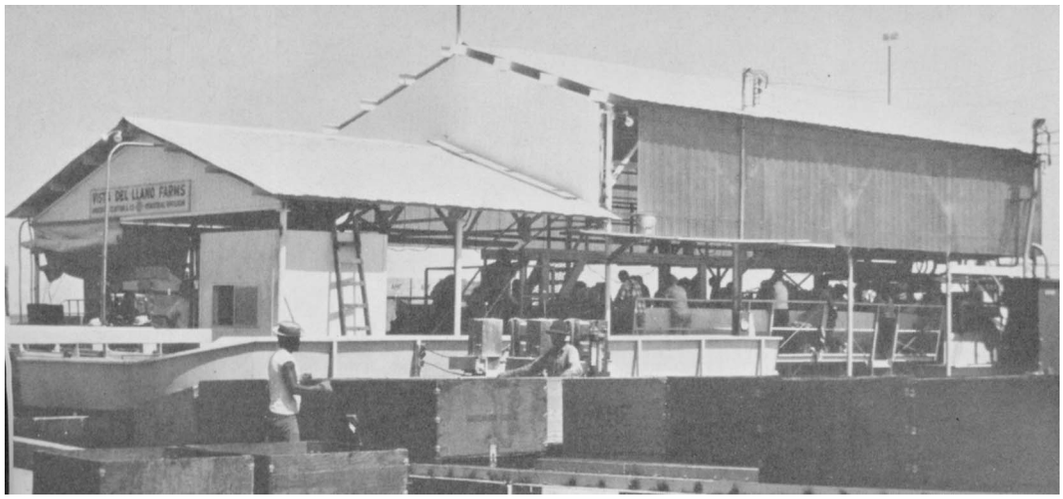
CENTRAL SORTING of cannery tomatoes has been used to some extent in most tomato growing areas of California. This article is not intended either as a criticism or as a recommendation, but rather as a brief economic appraisal of the system. The table shows the itemized costs per ton of tomatoes for sorting operations in California. The average of $12.28 per ton is in line with custom harvesting costs as well as costs for many growers with yields averaging 17.6 tons per acre.

The advantages of central sorting are that it requires fewer workers and they work under better conditions than if they were hand-sorting in the field—suggesting that it would be easier to get adequate

ECONOMICS OF CENTRAL SORTING OF TOMATOES—1968
Five Operations (3 in Fresno County, 1 in Yolo County, 1 in Ventura County)

	Number 1	Number 2	Number 3	Number 4	Number 5	Average
1. Amount handled per hour at central sorter (tons)	32.0	23.0	12.0	28.0	35.0	26.0
2. Yield per acre (tons)	18.77	14.0	9.5	20.0	25.7	17.6
3. Number of machine harvesters used	6	2	5	3	5	4.0
4. Cash costs per ton and number of workers in field						
Labor						
Number of sorters	22	10	15	6	25	15.6
Number of other workers	NA	14	NA	10	22	15.3
Wages paid per ton	$ 3.69	$ 2.69	$ 3.57	$ .93	$ 3.52	$ 2.88
Other costs per ton*	$ 2.65	$ .99	$ 2.66	$ .99	$ 2.83	$ 2.02
TOTAL cash costs per ton, field	$ 6.34	$ 3.68	$ 6.23	$ 1.92	$ 6.35	$ 4.90
5. Cash costs and number of workers at central sorter						
Labor						
Number of sorters (average number)	NA	18	25	30	30	25.75
Number of other workers, full or part time	NA	13	NA	9	16	12.67
Wages paid per ton	$ 2.28	$ 3.20	$ 4.76	$ 2.42	$ 3.18	$ 3.17
Other costs per ton*	$ .69	$ 1.10	$ 1.20	$ .43	$ 1.22	$ .93
TOTAL cash costs per ton, central sorter	$ 2.97	$ 4.30	$ 5.96	$ 2.85	$ 4.40	$ 4.10
6. Total all cash costs per ton, including field and central sorter	$ 9.31	$ 7.98	$ 12.19	$ 4.77	$ 10.75	$ 9.00
Labor cost per ton	$ 5.97	$ 5.89	$ 8.33	$ 3.35	$ 6.70	$ 6.05
Percent labor cost of total cash cost	64%	74%	68%	70%	62%	68%
Other costs per ton*	$ 3.34	$ 2.09	$ 3.86	$ 1.42	$ 4.05	$ 2.95
Percent cash cost of total cost	76%	70%	73%	54%	87%	72%
7. Overhead cost per ton						
Central sorter	$ .96	$ 1.59	$ 2.26	$ 1.16	$ 1.62	$ 1.52
Field	$ 1.97	$ 1.79	$ 2.53	$ 2.85	—	$ 2.29
TOTAL	$ 2.93	$ 3.38	$ 4.46	$ 4.01	$ 1.62	$ 3.28
Percent overhead cost of total cost	24%	30%	27%	46%	13%	28%
8. Total costs per ton (cash and overhead)	$ 12.24	$11.36	$ 16.65	$ 8.78	$ 12.37	$ 12.28
9. Investment per acre in central sorter equipment	$165.00	$90.00	$128.00	$166.00	$178.00	$145.00
10. Investment per acre in field equipment	$222.00	$95.00	$270.00	$210.00	—	$199.00

* Includes repairs, fuel for harvesters and transport equipment, electric power, equipment rentals and interest on operating capital.
NA = no data available.



Large capital investment is involved in central sorting of canning tomatoes as indicated in photo of typical plant, above.

labor during periods of labor shortage. The flotation or mechanical separation of many of the green tomatoes—possible in a central sorting system—also saves labor. Growers can also work closer to the maximum grading standards and have the possibility of reconditioning rejected loads at minimum cost. Since the tomatoes are washed prior to shipping, a cleaner product is produced for the cannery.

Disadvantages of central sorting include equipment considerations. Since the machine sorter is usually a permanent, stationary unit, transportation of fruit from the field to the sorter can be inconvenient and expensive. Therefore fields should be located within two or three miles of the sorter. Also, processors have complained, and several reports have indicated, that the increased handling in a central sorting system results in a higher percentage of cracked and broken fruit. Overhead costs for additional equipment and for transportation from the field to the sorter have been higher than for conventional field harvest. Also, the savings in labor costs have not generally been enough to compensate for the higher investment in additional equipment.

Conditions necessary before a large expansion of central sorting could be considered practical would include: (1) a substantial increase in labor costs; (2) a tougher skinned tomato that would tolerate extra handling; and (3) more refined equipment capable of handling a higher tonnage with reduced fruit damage. Partial processing of the fruit on the ranch or at the central sorting station could also make this method of harvesting more practical.

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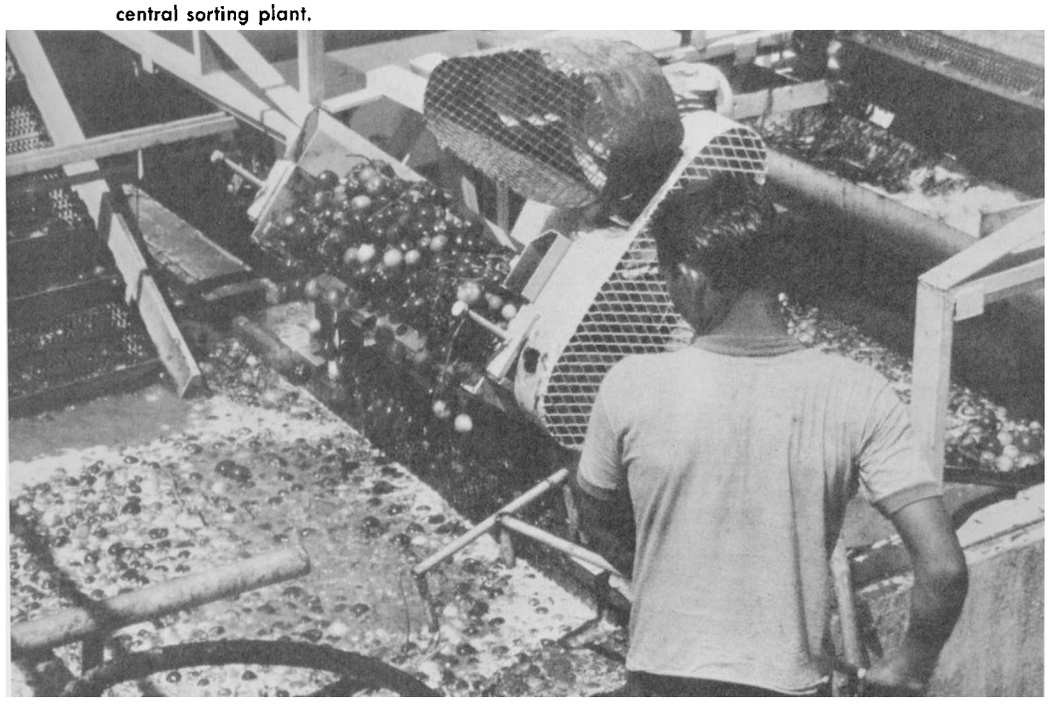
Tomatoes are dumped from field bins into washing vats shown before they start through the central sorting plant.



WHEN WATER FREEZES, it releases 80 calories per gram. This energy can be used to keep plants from dropping below the freezing point. The lettuce and alfalfa plants shown in these photographs (and cover) were coated with ice by sprinkling while temperatures dropped below freezing. Water was applied at approximately 0.1 inch per hour from 5/64-inch nozzles on Rain Bird 14V sprinklers set at 30 × 40 ft spacing. The photographs were taken at 9 a.m. December 31, 1969. The ice began melting at around 8 a.m. and was gone by 11:30 a.m. There were no visible signs of damage to the plants. The table shows temperatures of plants that were ice coated as compared with those not sprinkled.

Infiltration rates of water into the soil may limit this method of frost protection. Where rates are low, a single night's application of water may bring the soil to near saturation. Subsequent applications then leave free water standing in the field, which may prove detrimental to crop growth. One of the major advantages of sprinkling is that soils retain the granulation developed during seed bed preparation. Flooding the soil causes the soil granules to disperse and results in more dense, compact soil. For best results from sprinkling, flooding of the soil surface should be avoided. Frost protection by sprinkling should be of greatest utility on soils with high intake rates.

The lettuce plants in these photographs were grown at the Imperial Valley Field Station in test plots of the Department of Water Science and Engineering. The planting was done on a flat surface without the conventional bed-and-furrow configuration. Seeds were planted with soluble seed tape in a grid system with distances of 10, 12, 14, 16, and 24 inches between plants. These plantings produced 62,000; 43,000; 37,000; 33,000; and 22,000 plants per acre respectively as compared with the conventional 26,000 plants per acre. The objective of the experiment was to determine the plant spacing that would produce the most uniform maturity with the highest possible yield per acre. Frost protection information included here was a side result of the basic experiment.

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