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To simplify information, when trade names of products have been used, no endorsement of named products is intended, nor criticism implied of similar products which are not mentioned.

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March, 1978 - 250 cc - kmg

UC Cooperative Extension

MACHINE HARVEST COST-PROCESSING TOMATOES - 1977

SUMMARY, DISCUSSION AND COMPARISONS

Over the years, machine performances have improved and become more efficient. Only part of this can be attributed to mechanical improvement within the machines. Other improvements also had to take place. Growers had to be more precise in their management skills. Production practices have had to improve. Labor has become more proficient. Cultivation equipment has been developed which leaves the field in better conditions for harvest. The harvester alone is not the whole answer.

Part of the over-the-years development picture can be pieced together from the following table. Note the over-the-years change in comparison to the 1977 data. The averaged figures are from answers given to survey questions. The indicated calculated data was from calculations on assumed operations based on questionnaire data.

MACHINE HARVEST PERFORMANCE OVER THE YEARS

	1961	1963	1965	1967	1969	1977
Average Yield --Tons/A	17.0	23.2	20.1	18.1	25.2	25.7
Avg. No. Sorters/Machine	11.0	11.8	14.0	13.4	14.6	16.0
Average Tons/Hour	3.7	6.8	6.8	7.6	11.6	22.1
Average Tons/Machine	1000	1168	2537	3200	3276	5052
Average Days Operated	36.0	18.0	39.0	36.8	41.4	60.8
Average Acres/Day	2.2	2.8	3.1	3.9	3.9	6.2
Avg. Acres/Machine/Year	80.0	50.0	122.0	156.0	133.0	220.0
Calculated Cash Cost/Ton	$9.50	$5.81	$7.26	$7.36	$7.64	$8.50[1]
Calculated Overhead Cost/Ton	$4.64	$4.11	$3.08	$2.15	$2.29	$3.72[1]
Calculated Total Cost/Ton	$14.14	$9.92	$10.34	$9.51	$9.93	$12.22[1]

[1]This cost figure is for a manual sorting, bin operation. For cost information for electronic and bulk delivery operations, see Table XI in the text.

In a multiple machine harvest operation, there are some savings due to sharing some costs such as supervision, forklifts, etc., but the per ton costs at the end will not be greatly different. Bin operations would effect the most advantages from multiple harvester operations.

When all costs are considered, the claims made for large savings when electronic sorting is used doesn't show that much economic advantage. In practice, electronic machines operate best under good conditions. Under adverse conditions, electronics may be a disadvantage. Often, the available manual sorting machines are concentrated on the problem fields or problem areas in fields and electronic machines used on the better areas.

Efficiency is very important in having an economical harvest. Consequently, growers should continue to focus and plan all production practices toward and around the future harvest.

MACHINE HARVEST COST-PROCESSING TOMATOES - 1977
Yolo County Area

Compiled by
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With advice by Doyle Reed, Extension Economist

BACKGROUND

Machine harvest of processing tomatoes has been a standard method of harvesting for many years. Cost studies of harvesting by machine have been conducted a number of times. In Yolo County, the first such study was in 1961 and the last one was in 1969.

From observation, machine performances have changed. Methods and procedures have changed. Bulk delivery systems are being widely used. The use of electronic sorting mechanisms has become a reality.

The make up of the industry has changed. Observations indicated that operations have become more efficient. The makes of harvesters used have changed. Operations have become larger. There have been shifts in the areas of production. Varieties have not changed much but are in the process of changing to meet the industry's needs in bulk delivery and in-field vine storage.

INTRODUCTION AND PURPOSE

A number of years have passed since the last cost of machine harvest study was completed. Since then, new procedures and methods of harvest have been developed and used. Machine designs have also changed, which influences efficiencies. Many of the changes in production ahd harvesting procedures were gradual and incipient. The question of, "What are the costs of harvest?" needs to be answered.

To compound the situation, bulk delivery has become widely used and an increasingly used system of harvest. How does this influence costs of harvest?

Electronic sorting of tomatoes has developed into a usable and efficient system under good harvest conditions. How does electronic sorting harvest compare to manual sorting harvest costs? Then, how does electronic-bulk compare with manual-bulk or electronic-bin compare with manual-bin combinations?

PROCEDURE

To obtain information on the make up of processing tomato harvesting in the area, a questionnaire was sent to tomato growers within the area. From the information on the returned questionnaires, a composite picture of tomato growing and harvesting was developed. Using the questionnaire data as basis and adjusting certain data to meet current costs, a set of criteria was developed for an assumed operation. Using this assumed data, costs of harvesting tomatoes by machine were calculated.

It is not possible to cover all harvest conditions. Each operation works under a different set of conditions and parameters. This assumed and calculated study is an attempt to arrive at a "middle of the road" position. Under field conditions, quotas, overripe, mold situation, etc., would or could alter otherwise smooth efficient operations. An assumed no problem situation was used for this study.

In the field, the tendency by growers is to assign manual sorting machines and use bin operations in the problem fields. In the questionnaire, the field conditions were not a consideration. Thus data on the manual sorting and bin operations may be skewered toward the high side when compared to normal field operations. (In good to fair field conditions, the normal compliment of sorters is 12 to 14 people per machine instead of the 16 shown in the study.) Also bin operations were frequently used to open fields in preparation for bulk operations. Opening fields is a slower and more costly than normal harvest operation. Bulk operations were not charged for opening fields for harvest. Nor were bin operations credited for delays due to opening fields for bulk. For 100% bulk operations, opening fields is an added procedure, an added cost, using specialized equipment, but was not considered in this study.

On pages 11 through 15, the detailed breakdown and method of developing costs of harvest--cash and overhead--is shown. It is detailed, so growers and other interested people can figure cost for their operations or a similar simulated operation.

In Tables IX through XI, the calculated results are summarized and the costs per ton shown.

TABLE I

Average harvest operations and performances found as reported by growers in the survey of harvest operations.

Machines per operation -- Total - 2.5 Range - 1-8
Electronic - 25%
Manual - 75%
Acres represented in study -- Total - 20,698
Acres per operation -- Average - 545 Range - 60-1945
Tons represented in study -- 474,866
Tons per operation -- Average - 12,760 Range - 1380-45,900
Tons per acre -- Average - 25.75 Range - 3-42
Tons per year per machine -- 5052
Machine Use - Hours Per Year -- Average - 881 Range - 120-1620
Estimated Tons Per Hour -- Average - 22.1 Range - 8-33
Days operated (calculated) -- 60.8
Electronic -- Average - 22.8 Range 12-33
Manual -- Average - 21.4 Range - 8-26
Operating day only -- 57%
Operating night only -- 19%
Two shifts operation -- 24% Day and night
Acres per shift per machine -- Average - 6.7 Range - 2.6-12
Acres per shift -- Electronic - Day - 7.1 Range - 3.5-10
- Night - 6.9 Range - 3.5-10
Manual - Day - 6.2 Range 2.6-12
- Night - 6.0 Range 4-10
Acres per year per machine -- 220 Average (Includes 2 shift operation)
Hours per shift - Day operation -- Electronic - 9.5
Manual - 9.5
Hours per shift - Night operation -- Electronic - 9.5
Manual - 9.5
Hours per shift - Quota days -- Average - 7.4
Trailers per machine - bin operation -- Average - 2.6 Range - 2-4
Dollies per machine - bulk operation -- Average - 1.7 Range - 1-6
Forklift per bin operation -- Average - 1.3 Range - 1-3
Sorters per machine -- Electronic -- Average - 6.3 Range - 1-10
Manual -- Average - 16 Range - 12-20
Swampers used in 50% of operations
Operation supervisor used in 60% of operations
Mechanic used in 53% of operations (Some part-time)

TABLE II

Hours of Labor used in Tomato Harvest as indicated by the Survey.

Employee	Hours Per Day Average	Range
Operator - Electronic or Manual	9.9	8 - 13
Sorters - Electronic - Day shift	9.4	8 - 10
- Manual - Day shift	9.4	8 - 10
Trailer pullers	9.8	8 - 12
Bulk Tank pullers	9.9	8 - 12
Forklift	9.6	6 - 15
Swampers	9.5	8 - 10.5
Harvester Tenders	10.5	9 - 12
Mechanic	9.9	4 - 13
Operation Supervisors	11.9	5 - 16

TABLE III

Survey Results for Costs for Labor in Machine Harvest Operation

Employee	Dollars Per Hour Cash	+	Benefits	=	Total	(Range)
Machine Operator	4.25	+	.47	=	4.72	(3.47 - 6.47)
Trailer Puller	3.50	+	.32	=	3.82	(3.32 - 4.17)
Bulk Tank Puller	3.56	+	.40	=	3.88	(3.40 - 4.40)
Forklift Operator	3.77	+	.40	=	4.09	(3.55 - 4.65)
Sorters - Day Shift	3.11	+	.32	=	3.43	(3.07 - 3.82)
- Night Shift	3.21	+	.32	=	3.53	(3.17 - 3.92)
Swampers	3.39	+	.32	=	3.71	(3.07 - 4.22)
Harvester Tender	3.74	+	.37	=	4.11	(3.62 - 5.37)
Mechanic	6.04	+	.50	=	6.54	(3.75 - 7.00)
Operation Supervisors	6.00	+	.75	=	6.75	(4.75 - 10.75)

Additional costs for temporary seasonal labor @ 15% of cash wage.

TABLE IV

Miscellaneous Information found in the Survey of Operations

Varieties Used - 95% of the operations used VF145-7879 as part or all of the acreage. In 21% of the operations, VF145-7879 was the only variety reported as grown. Other varieties reported as grown and the percentage of operations using the variety were: UC82 - 32%; VF134 - 11%; Petoearly - 32%; VF270 - 11%. Operations using miscellaneous other varieties not listed - 45%.

Makes of machines reported as used. 63% were Button-Johnson; 10% were FMC; 14% were Blackwelder; 13% were Hume. 3% of operations were custom harvested.

Age of machines reported - 14% were new; 9% - 1 year old; 10% - 2 years old; 17% - 3 years; 4% - 4 years; 5% - 5 years; 41% were over 5 years old.

Years of experience of grower - 10.3 Average Range 2-15
43% reported as having 12 years experience.

Standby machines not in general use -- Usage - Average - 88 hrs Range 0-350
Breakdown time per year, all machines - Average 21.4 hours Range 2-120
Unharvested Acres - 25% of operations with, 75% none. Those with had 54.5 acres average. Range ½ - 150. Cause for unharvested acres reported -- 33% Tonnage contracts; 56% from weather; 44% by quota; 22% for combination of causes.

Rejected loads - 5.8 Average number per operation Range 0 - 35
20% of operations had no rejects. Cause for rejects as reported - 43% for mold; 50% for green; 20% for color; 0% for worms; 24% multiple defects.

Percent loss in rejected loads - 9.3% Average Range 0 - 100
Inspection charges - 20¢ per ton

Delivery Method Used - 51% Bulk Range 0 - 100
49% Bin Range 0 - 100
Weight of fruit per bin - 978 Average Range 874 - 1500
Weight of fruit per truck - Bulk - 24.5 Ton Average Range 22 - 28
- Bin - 24.2 Ton Average Range 22 - 26
Special operations used to open fields for bulk harvest - 58% yes; 42% no.
Size of tractor to pull bulk tank - 112 Hp Average Range 70 - 150 Hp
to pull bin trailers - 61 Hp Average Range 28 - 125 Hp
Container rental charges - 88% None; 11% yes; 1% both
Cost of pickup usage for harvest - $20 per day Average; $930 per year
Toilet facilities - 2.5 units per operation Average Range 1-6
- $237 cost per year per operation Average Range 0-1006
Drinking Water Supplies - $161 per year Average Range 10-500
Misc. other supplies for harvest - $345 per year Average Range 30-2000
Overtime Used - 112 hours per year Average Range 0-500
Overtime Cost - $4.81 per hour Average per person

TABLE IV - continued

Method of Planting - 49% single rows; 35% twin rows; 16% both methods
Stand Establishment Method - 27% planted to stand; 27% hand thinned; 27% mechanically thinned; 5% left as emerged; 14% used combination of methods.
Special materials used - In part or all of operation - 27% used whiteners; 81% used ripeners; 84% used mold control materials; 11% unspecified or other materials.
Distribution of districts or areas reporting - 20% Woodland-Davis; 13% Dixon; 28% Clarksburg; 9% Western Yolo County; 14% North Yolo County; 16% Other (River-bypass-Sacramento)

TABLE V

Equipment Information Reported in Survey

Equipment	New Cost[1]	Life	Fuel Use	Repairs	Salvage Value	%Use on Tomato
Harvester						
Electronic	$102,473	6.7	39.7	$7,088	$17,354	100
Manual	40,864	7.7	35.5	4,878	5,491	100
Electronic Unit Only	44,470	6.3	--	2,389	6,500	100
Bulk Dollies	848	9.2	--	86	231	100
Tractor for Bulk	26,800	9.4	33.9	1,100	6,254	33
Tractor for Bins	9,807	9.5	20.3	634	3,383	36
Trailer - Bins	1,183	10.4	--	124	335	76
Forklift	9,242	9.7	17.0	459	3,231	67

Misc. Equipment - Disc, scraper, etc. - $1,579 per year.

[1]This was new cost when purchased. Current costs are higher.

TABLE VI

Assumed and projected specifications for a machine harvest cost study based on survey findings.

One Machine Basis

Acres per machine - 220
Tons per acre - 25
Tons harvested - 5500
Days (shifts) operated - 41
Tons per hour - paid time - 16
Tons per hour - operating - 22
Hours per day--paid - 9
Hours per day--operating - 8.5
Acres harvested per day - 5.7
Tons harvested per day - 136
Container Rental charge - 0

Number of Sorters
  Electronic - 6
  Manual - 16
Number of trailers - 3
No. of Dollies for bulk tanks - 2
Inspection fees per ton - $.20
Toilet facilities per acre - $.40
Drinking Water per acre - $.70
Misc. supplies per acre - $1.48
Pickup charges/acre - $4.50
Misc. Equipment use/acre - $2.70

TABLE VII

Assumed equipment cost, usage, life, etc., based on survey results and consulting certain other available information.

Equipment	New Cost	Yrs Life	Gals. Fuel /Day	Repairs Per Yr.	Salvage Value	%Use on Tomato Harvest
Harvester						
Manual	$ 83,000	7	35	$2,100	$ 6,000	100
Electronic	130,000	7	40	3,250	15,000	100
Electronics only[1]	55,000	5	--	1,500	6,500	100
Trailer	3 x 2,300ea	20	--	3 x 125	300	100
Dollies	2 x 850ea	20	--	2 x 75	225	100
Tractor - Bins	3 x 15,000ea	15	20	3 x 450	3,200	35
- Bulk	2 x 28,000ea	12	35	2 x 850	6,500	30
Forklift	13,000	10	20	550	3,500	65

Misc. Equipment - charged on an annual lump sum cash cost basis.

[1]This is for a package to convert a manual sorting machine to electronic sorting. This is included for information only. Sales tax extra.

TABLE VIII

Assumed labor specifications based on survey and current information.

Laborer	No. of	Hours /Day	Wages/Hour Cash	Benefits	Total
Operator	1	11	4.25	+ .47	= 4.72
Sorters for -					
Manual Sort Machines	16	9	3.25	+ .32	= 3.57
Electronic Sort Machines	6	9	3.25	+ .32	= 3.57
Swampers	2	9	3.25	+ .32	= 3.57
Tractor					
Bin trailer pullers	3	9.5	3.50	+ .32	= 3.82
Bulk tank pullers	2	9.5	3.55	+ .40	= 3.95
Forklift Operator	1	10	4.00	+ .40	= 4.40
Harvester Tender	1	10	3.75	+ .37	= 4.12
Mechanic	.5	11	6.00	+ .50	= 6.50
Operation Supervisor	.7	12	7.00	+ .75	= 7.75

DETAILED BREAKDOWN OF HARVEST COST
(One Machine and Supporting Equipment)

CASH OPERATING COSTS	Per Day			
	Electronic Sort		Manual Sort	
	Bin	Bulk	Bin	Bulk
Labor				
Machine operator - 1 @ $4.25 - 11 hrs.	$ 46.75	$ 46.75	$ 46.75	$ 46.75
Manual Sorting - 16 @ $3.25 - 9 hrs.	--	--	468.00	468.00
Electronic Sorting - 6 @ $3.25 - 9 hrs.	175.50	175.50	--	--
Trailer Men - 3 @ $3.50 - 9.5 hrs.	99.75	--	99.75	--
Gondola Men - 2 @ $3.55 - 9.5 hrs.	--	67.45	--	67.45
Swampers - 2 @ $3.25 - 9 hrs.	58.50	--	58.50	--
Forklift operator - 1 @ $4.00 - 10 hrs.	40.00	--	40.00	--
Harvester Tender - 1 @ $3.75 - 10 hrs.	37.50	37.50	37.50	37.50
Mechanic - .5 @ $6.00 - 11 hrs.	33.00	33.00	33.00	33.00
Operations Supervisor - .7 @ $7.00 - 12 hrs.	58.80	58.80	58.80	58.80
Additional Wages[1] - benefits	54.67	42.86	82.94	71.66
Labor Manager fees[2]	40.05	26.40	84.00	70.20
Total Labor Cost/Day	$644.52	$488.26	$1009.24	$853.36
Total Labor Cost/Ton @ 144 tons/day	*$4.47*	*$3.39*	*$7.01*	*$5.92*

[1]Additional wage benefits as shown in Table IX.
[2]Labor Manager costs for seasonal or temporary labor @ 15% of cash wage--sorters, swampers, 1 trailer man-

Machine Operation				
Fuel - Diesel @ $.41/gal.				
Harvesters--				
Manual Sorting - @ 35 gal/day x $.41/gal	$ 14.35	$ ---	$ 14.35	--
Electronic Sorting - @ 40 gal/day x $.41/gal	--	$ 16.40	--	$ 16.40
Tractors--				
For Bins - 3X @ 20 gal/day x $.41/gal	24.60	--	24.60	--
For Dollies - 2X @ 35 gal/day x $.41/gal	--	28.70	--	28.70
Forklift - @ 20 gal/day (gas @ 53.5¢/gal)	10.70	--	10.70	--
Repairs				
Harvester--				
Manual - $2,100 ÷ 41 days = $51.22/day	--	--	51.22	51.22
Electronic - $3,250 ÷ 41 days = $79.27/day	79.27	79.27	--	--
Tractors--				
For Dollies - 2 x $850 = $1700 x 35% ÷ 41 days	--	12.44	--	12.44
For Bins - 3 x $450 = $1350 x 35% ÷ 41 days	11.52	--	11.52	--
Trailers - 3 x $125 = $375 ÷ 41 days	9.15	--	9.15	--
Dollies - 2 x $75 = $150 ÷ 41 days	--	3.66	--	3.66
Forklift - 1 @ $550 x 65% ÷ 41 days	8.72	--	8.72	--
Total Machine Costs Per Day	$158.31	$140.47	$130.26	$112.64
Total Machine Costs Per Ton	*$1.10*	*$.97*	*$.90*	*$.78*

	Per Day			
	Electric Sort		Manual Sort	
	Bin	Bulk	Bin	Bulk
Miscellaneous Operating Cash Costs				
Container Rental @ No Cost	$ --	$ --	$ --	$ --
Inspection fees - 20¢/ton x 25 ton x 5.7ac/day	28.50	28.50	28.50	28.50
Toilet facilities - 40¢/ac x 5.7ac/day	2.28	2.28	2.28	2.28
Drinking water supplies - 70¢/ac x 5.7ac/day	3.99	3.99	3.99	3.99
Misc. supplies - $1.48/ac x 5.7ac/day	8.44	8.44	8.44	8.44
Pickup use for harvest - $4.50/ac x 5.7ac/day	25.65	25.65	25.65	25.65
Misc. equip. use for harvest--disc, scraper, - $2.70/ac x 5.7ac/day	15.39	15.39	15.39	15.39
Total Misc, Operating Costs Per Day	$84.25	$84.25	$84.25	$84.25
Total Misc. Operating Costs Per Ton (Cost/Day ÷ 144 Tons)	*$.59*	*$.59*	*$.59*	*$.59*
Total Cash Costs Per Day	$887.08	$712.98	$1223.75	$1050.25
Total Cash Costs Per Ton (Costs/Day ÷ 144 Tons/day)	*$6.16*	*$4.95*	*$8.50*	*$7.29*

OVERHEAD COSTS	Per Year, Electronic Sort Bin	Electronic Sort Bulk	Manual Sort Bin	Manual Sort Bulk
Harvester Investment and Sales Tax				
Manual Sorting - $83,000 + $4980tax = $87,980				
Electronic Sorting - $130,000 + $7800 tax = $137,800				
Depreciation - 7 year life				
Manual Sort Machine				
$87,980 - $6000 salvage = $81,980				
$81,980 ÷ 7 yrs = $11,711.43/yr	--	--	$11,711.43	$11,711.43
Electronic Sort Machine				
$137,800 - $15,000 salvage = $122,800				
$122,800 ÷ 7yrs = $17,542.86/yr	$17,542.86	$17,542.86	--	--
Interest on Investment				
Manual Sort				
$87,980 + $6000 salvage = $93,980				
$93,980 ÷ 2 = $46,990 Average Value				
$46,990 x 8% = $3,759.20/year	--	--	3,759.20	3,759.20
Electronic Sort				
$137,800 + $15,000 salvage = $152,800				
$152,800 ÷ 2 = $76,400 Average Value				
$76,400 x 8% = $6,112.00	6,112.00	6,112.00	--	--
Taxes, Insurance and Storage Costs @ 2.5% of Average Value				
Manual Sort				
$46,990 x 2.5% = $1174.75	--	--	1,174.75	1,174.75
Electronic Sort				
$76,400 x 2.5% = $1910.00	1,910.00	1,910.00	--	--
Total Harvester Costs/Year	$25,564.86	$25,564.86	$16,645.38	$16,645.38
Total Harvester Costs/Ton	*$4.65*	*$4.65*	*$3.03*	*$3.03*
Container Transport Investment				
Depreciation				
Trailers - 3 @ $2300 ea (includes sales tax)				
$2300 x 3 = $6900 - $900 salvage = $6000				
$6000 ÷ 20 yr life = $300/yr	300.00	--	300.00	--
Dollies - 2 @ $850ea (includes sales tax)				
$850 x 2 = $1700 - $450 salvage = $1250				
$1250 ÷ 20 yr life = $62.50/yr	--	62.50	--	62.50

OVERHEAD COSTS - continued	Per Year Electronic Sort Bin	 Bulk	 Manual Sort Bin	 Bulk
Container Transport Investment - cont.				
Interest on Investment				
Trailers - $6900 + $900 salvage = $7800 $7800 ÷ 2 = $3900 Average Value $3900 x 8% = $312.00/yr	$312.00	$ --	$312.00	$ --
Dollies - $1700 + $450 salvage = $2150 $2150 ÷ 2 = $1075 Average Value $1075 x 8% = $86/yr	--	86.00	--	86.00
Taxes, Insurance, Storage @ 2.5% of Average Value				
Trailers - $3900 x 2.5% = $97.50	97.50	--	97.50	--
Dollies - $1075 x 2.5% = $26.88	--	26.88	--	26.88
Total Container Transport Costs/Yr	$709.50	$175.38	$709.50	$175.38
Total Container Costs/Ton	*$0.13*	*$0.03*	*$0.13*	*$0.03*
Tractor Investment (includes sales tax)				
Trailer puller tractors - 3 @ 60Hp @ $15,000ea Gondola puller tractors - 2 @ 120Hp @ $28,000ea				
Depreciation - Tractors for				
Bin operation - 15 year life $45,000 - $9600 salvage value = $35,400 $35,400 ÷ 15 yr life = $2360.00/yr	$ 2,360.00	$ --	$ 2,360.00	$ --
Bulk operation - 12 year life $56,000 - $13,000 salvage value = $43,000 $43,000 ÷ 12 yr life = $3583.33/yr	--	3,583.33	--	3,583.33
Interest on Investment - Tractors for				
Bin operation $45,000 + $9600 salvage value = $54,600 $54,600 ÷ 2 = $27,300 Average Value $27,300 x 8% = $2184.00/yr	2,184.00	--	2,184.00	--
Bulk operation $56,000 + $13,000 salvage value = $69,000 $69,000 ÷ 2 = $34,500 Average Value $34,500 x 8% = $2760.00/yr	--	2,760.00	--	2,760.00

OVERHEAD COSTS - cont.	Per Year			
	Electronic Sort		Manual Sort	
	Bin	Bulk	Bin	Bulk
Taxes, Insurance and Storage - Tractors for				
Bin operation $27,300 Avg. Value x 2.5% = $682.50/yr	$ 682.50	$ --	$ 682.50	$ --
Bulk operation $34,500 Avg. Value x 2.5% = $862.50/yr	--	862.50	--	862.50
Total Tractor Overhead Costs/Yr	*$ 5,226.50*	*$ 7,205.83*	*$ 5,226.50*	*$ 7,205.83*
Tractors only used part time on Harvest Operation Tractor Cost Per Year Total--Bin operation $5226.50 x 35% = $1829.28	$ 1,829.28	$ --	$ 1,829.28	$ --
--Bulk operation $7205.83 x 30% = $2161.75	--	2,161.75	--	2,161.75
Total Tractor Cost/Ton (Cost/Year ÷ Tons)	*$0.33*	*$0.39*	*$0.33*	*$0.39*
Forklift Investment 1 @ $13,000 + $780 sales tax = $13,780				
Depreciation - 10 year life $13,780 - $3500 salvage value = $10,280 $10,280 ÷ 10 yr life = $1028.00/yr	$ 1,028.00	$ --	$ 1,028.00	$ --
Interest on Investment $13,780 + $3500 salvage value = $17,280 $17,280 ÷ 2 = $8,640 Average Value $8640 x 8% = $691.20/yr	691.20	--	691.20	--
Taxes, Insurance and Storage $8640 Avg. Value x 2.5% = $216.00/yr	216.00	--	216.00	--
Total Cost For Year	*$ 1,935.20*	*$ --*	*$ 1,935.20*	*$ --*
Forklift used on 65% of time on Harvest $1935.20 x 65% = $1257.88/yr	$ 1,257.88	$ --	$ 1,257.88	$ --
Forklift Cost Per Ton	*$0.23*	*$0.00*	*$0.23*	*$0.00*
Total Overhead Harvest Equip. Cost/Yr	$29,361.52	$27,901.99	$20.442.04	$18,982.51
Total Overhead Harv. Equip. Cost/Ton (Cost/Yr ÷ Tons/Yr)	*$5.34*	*$5.07*	*$3.72*	*$3.45*

TABLE IX

Summary of Investment and Overhead Costs for This Assumed Operation.

Equipment	New[1] Cost	Life Years	Depreciation[2]	Interest on Investment	Tax, Ins., & Storage	Total Overhead
Harvesters						
Manual	$ 87,980	7	$11,711.43	$3,759.20	$1,174.75	$16,645.38
Electronic	$137,800	7	17,542.86	6,112.00	1,910.00	25,564.86
Tractor for						
Bulk (2)	56,000	12	3,583.33	2,760.00	862.50	2,161.75[3]
Bins (3)	45,000	15	2,360.00	2,184.00	682.50	1,829.28[3]
Trailers - Bin(3)	6,900	20	300.00	312.00	97.50	709.50
Dollies - Bulk(2)	1,250	20	62.50	86.00	26.88	175.38
Forklift	13,780	10	1,028.00	691.20	216.00	1,257.88[3]

Misc. Equipment used for harvest charged at blanket annual cost of $594.00 per year or $2.70 per acre.

[1]Includes sales tax.
[2]Salvage value deducted before depreciation calculated.
[3]Only part of the annual use was on harvest operations. Tractors for bulk - 30% of annual use; Tractors for bins - 35% of annual use; Forklift - 65% of annual use.

TABLE X

Summary of Investment and Overhead Costs Per Harvest Method Unit

	Electronic Sorting		Manual Sorting	
	Bin Delivery	Bulk Delivery	Bin Delivery	Bulk Delivery
Harvester	$25,564.86	$25,564.86	$16,645.38	$16,645.38
Tractors	1,829.28	2,161.75	1,829.28	2,161.75
Container Carrier	709.50	175.38	709.50	175.38
Forklift	1,257.88	--	1,257.88	--
Total	$29,361.52	$27,901.99	$20,442.04	$18,982.51

TABLE XI

Summary Of Cost Per Ton Per Harvest Method For The Assumed Harvest Operation

COSTS	Electronic Sorting		Manual Sorting	
	Bin Delivery	Bulk Delivery	Bin Delivery	Bulk Delivery
Cash				
Labor	$ 4.47	$ 3.39	$ 7.01	$ 5.92
Machine & Equipment	1.10	.97	.90	.78
Misc. Operating	.59	.59	.59	.59
Total Cash	$ 6.16	$ 4.95	$ 8.50	$ 7.29
Overhead				
Harvester	$ 4.65	$ 4.65	$ 3.03	$ 3.03
Tractor	.33	.39	.33	.39
Container Carrier	.13	.03	.13	.03
Forklift	.23	--	.23	--
Total Overhead	$ 5.34	$ 5.07	$ 3.72	$ 3.45
TOTAL ALL COSTS	$11.50	$10.02	$12.22	$10.74