Costs and Returns in
Growing and Harvesting

CANNING FACTORY TOMATOES

Enterprise Accounts
Western New York
1934 - 1939

Prepared by

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Summary

This report gives the results of tomato enterprise accounts kept by 54 Monroe, Niagara and Orleans County growers in 1939 together with comparisons with enterprise accounts kept by Western New York growers in 1934, 1937, and 1938. Results from these tomato cost records indicate that:

1. Yield is the most important factor affecting costs per ton and net returns. Higher than average yields result in lower costs per ton and better than average returns.

2. The quality of tomatoes as measured by per cent grading No. 1's is the second most important factor affecting returns per hour of labor. The growers whose tomatoes graded high in No. 1's were also usually the growers with the higher yields.

3. Growers who set more than 3000 plants per acre obtained higher yields and somewhat higher returns per hour of labor than growers who set 3000 plants or less per acre. Replacement of plants which died resulted in slightly higher yields but in very little change in the return per hour of labor. However /it may pay a grower to "fill in" unless the pressure of other work is too great.

4. Reasonably heavy applications of both manure and fertilizer gave the highest yields and the best returns per hour of labor. Growers who in 1939 applied the heavier applications of manure also used the most fertilizer. Growers who applied no manure in 1939 spent more for fertilizer but obtained less than average yields and returns for labor.

5. Size of enterprise as measured by acreage of tomatoes has very little effect on yield, labor required per ton, cost per ton, or return per acre.

6. The number of cultivations required will vary with weather conditions and wood growth but growers who cultivated more than average number of times improved yields or returns only slightly.

7. Hoeing and weeding have shown variable results. Yields and returns per hour of labor were higher in 1939 for those who hoed or weeded 2 or more times than for those who did not hoe or weed. In 1937 and 1938 the growers who hoed or weeded their tomatoes obtained no higher yields or returns per hour of labor than the growers who did not hoe or weed.

8. No relation was found between method of setting and yields or returns. Growers who set their plants with machine had somewhat larger acreages of tomatoes and obtained about the same yields and labor returns as those who set by hand.

9. No definite relation could be found between time of planting and yields and returns, though in 1939 those who planted late in the season did get yields and labor returns somewhat below average. Tomatoes set late in the season have in the last two years graded lower than those set early or in the middle of the planting season.

10. Total man hours per acre have varied greatly with yield but labor in the growing operations has decreased each year. Apparently, growers are making more efficient use of man labor in their cultural practices. The time required for harvesting and delivering depends mostly on the yield.

COSTS AND RETURNS IN GROWING AND HARVESTING CANNING FACTORY TOMATOES IN WESTERN NEW YORK

Introduction

For the past several years growers of canning factory tomatoes in western New York have cooperated with their County Extension Services and the Department of Agricultural Economics and Farm Management at the State College of Agriculture in keeping detailed records of costs and returns from their tomato enterprises. At the end of each season the record books kept by each grower were collected and then analyzed by the Department of Agricultural Economics and Farm Management. In 1934, 118 growers kept accounts in seven western New York counties (table 1). In 1937, 47 Monroe County growers cooperated in keeping accounts. The next year 64 growers and in 1939, 54 growers kept enterprise accounts in Monroe, Orleans and Niagara Counties.

TABLE 1. LOCATION OF FARMS ON WHICH CANNING FACTORY TOMATO ACCOUNTS WERE COMPLETED IN WESTERN NEW YORK, IN 1934, 1937, 1938 AND 1939

County	Number of Accounts			
	1934	1937	1938	1939
Monroe	15	47	47	29
Orleans	36		10	19
Niagara	7		7	6
Chautauqua	32			
Erie	4			
Genesee	9			
Wayne	15			
	118	47	64	54

This report gives a summary of the costs and returns from the 54 enterprise accounts closed in 1939 together with some comparisons with experience of growers in the three earlier years, 1934, 1937 and 1938.[1]

Climatic Conditions

Both the temperature and rainfall have varied greatly during the four years in which tomato enterprise accounts were analyzed. A severe drought throughout the western New York growing area occurred during the 1934 growing season. The 1937 growing season was approximately normal in Monroe County, the only area in which accounts were obtained that year. The 1938 growing season was but slightly above normal in temperature and very little above in rainfall. The climatic conditions in 1939 were similar to the drought conditions of 1934 except not quite as dry in the western portions. Temperature was above normal and precipitation considerably below normal for most of the growing season that year.

TABLE 2. PRECIPITATION DURING SELECTED MONTHS COMPARED WITH NORMAL
Rochester Station, Monroe County

	Precipitation in inches					Per cent of normal			
	Normal	1934	1937	1938	1939	1934	1937	1938	1939
May	2.94	0.52	2.37	2.18	0.64	17.7	80.6	74.1	21.8
June	3.00	2.28	3.76	1.56	3.28	76.0	125.3	52.0	109.3
July	2.96	1.35	1.92	3.62	1.91	45.6	64.9	122.3	64.5
August	2.88	1.76	4.71	4.85	1.65	61.1	163.5	168.4	57.3
September	2.45	4.56	0.50	5.27	2.54	186.1	20.4	215.1	103.7

[1] The results of the earlier years have been reported previously in A.E. 88 for 118 accounts, western New York, 1934 by W. M. Curtiss and C. B. Raymond; in A.E. 192 for 47 accounts, Monroe County, 1938 by W. E. Keepper; in A.E. 236 for 47 accounts, Monroe County, 1938 by C. A. Bratton; and in A.E. 238 for 17 accounts in Niagara and Orleans Counties, 1938 by C. A. Bratton and T. N. Hurd. The use of this material is hereby gratefully acknowledged.

Acknowledgment is also due the growers who cooperated in keeping the enterprise accounts and to the farm bureaus of the several counties for help in distributing and collecting the record books.

TABLE 3. TEMPERATURE DURING SELECTED MONTHS COMPARED WITH NORMAL
Rochester Station, Monroe County

	Temperature					Per cent of Normal			
	Normal	1934	1937	1938	1939	1934	1937	1938	1939
May	57.1	59.6	58.1	56.9	59.8	104.4	101.8	99.6	104.7
June	66.1	70.2	66.8	67.8	67.6	106.2	101.1	102.6	102.3
July	70.7	73.0	72.8	73.6	72.2	103.3	103.0	104.1	102.1
August	69.2	67.3	74.2	73.6	73.4	97.3	107.2	106.4	106.1
September	62.4	66.9	61.2	59.5	64.6	107.2	98.1	95.4	103.5

Determination of Labor Rates and Cost of Equipment

Labor hired expressly for tomatoes was charged at the rate actually paid by each grower. Farm labor, including the operator was charged at a flat average rate computed by adding (1) the actual cost of regular hired help (including privileges), (2) the estimated value of unpaid labor and (3) the estimated value of the operator's time and then dividing the total value of labor by the total estimated hours of work. The average rate for all labor calculated in this way was $0.29 per hour (table 4).

TABLE 4. RATES CHARGED FOR LABOR AND POWER ON 54 FARMS GROWING CANNING FACTORY TOMATOES
Western New York, 1939

Item	Size	Rate Used
Man labor* (per hour)		$ 0.29
Horse work (per hour)		.18
Tractor use (per hour)	1 plow	.40
	2 plow	.49
	3 plow	.72
Truck use (per mile)	1 ton or less	.045
	1½ tons or more	.063
Automobile (per mile)		.037

*The actual cost per hour on each farm was used to calculate the total cost of man labor on that farm.

Horse labor was charged at $0.18 per hour. This was the average cost per hour of horse work on 75 New York Cost Account farms for 1938. Average costs per hour on cost account farms in 1938 were also used to calculate the charges for one and two plow tractors. The charge for three plow tractors was obtained from 1937 cost account results. Charges for tractor work varied from $0.40 for the one-plow tractors to $0.72 for the three-plow size. The charges for truck mileage were also based on 1938 cost account averages and the rate per mile for the automobile use was 3.7¢, the rate used in the three previous years.

Charges for the use of machinery were based on information obtained by Dr. J. P. Hertel in a survey of the costs of operating farm machinery on 438 farms in Chenango and Ontario Counties (table 5).

TABLE 5. COST OF OPERATING FARM MACHINERY*

Implement	Rate per acre	Implement	Rate per acre
Walking plow	$0.33	Horse-drawn cultipacker	$0.07
Tractor plow	.49	Tractor-drawn cultipacker	.06
Horse-drawn disk	.13	Cultivator (1-horse)	.08
Tractor-drawn disk	.11	Cultivator (2-horse)	.17
Harrow (spring-tooth)	.055	Cultivator (tractor)	.36
Grain drill	.27	Tomato setter	1.07
Lime sower	.23		
Roller	.04		
		Manure spreader	$0.10 per ton
		Manure wagon	.02 per ton

*Hertel, J. P., Cost of Operating Equipment on New York Farms, A.E. 209, 1936.

Summary of the Enterprise in 1939 Compared with 1934, 1937 and 1938

The 54 growers of canning factory tomatoes who kept enterprise accounts in 1939 had an average of 7.8 acres of tomatoes per acre (table 6). The average acreage of tomatoes grown per farm increased somewhat each year from 6.0 acres in 1934 to 7.8 acres in 1939. Yields per acre in 1934 and 1937 were low compared with yields in 1938 and 1939. Yields averaged 8.2 tons per acre in 1934, 8.4

tons in 1937, 11.7 tons in 1938, and 11.1 tons in 1939.[1] Yields have varied from 9 per cent to 27 per cent above state average in the four years. The range in yields in 1939 was from 3.6 tons to 20.9 tons per acre.

TABLE 6. FACTORS IN GROWING CANNING FACTORY TOMATOES
Western New York, 1934, 1937, 1938 and 1939

	118 Farms 1934.	47 Farms 1937	64 Farms 1938.	54 Farms 1939
Acres per farm	6.0	6.9	7.4	7.8
Average yield per acre (tons)	8.2	8.4	11.7	11.1
Average yield per acre for New York State (tons)	7.5	7.0	9.2	8.8
Returns per acre	$101.19	$108.49	$149.46	$130.48
Costs per acre	83.50	91.07	101.35	97.01
Net returns per acre	$ 17.69	$ 17.42	$ 48.11	$ 33.47
Receipts per ton	$ 12.18	$ 12.88	$ 12.77	$ 11.73
Costs per ton	9.77	10.81	8.66	8.72
Net returns per ton	$ 2.41	$ 2.07	$ 4.11	$ 3.01
Man hours per acre growing	43.5	37.8	33.6	32.4
Man hours per acre picking)	93.7	84.4	103.0	100.4
Man hours per acre delivering)			10.8	9.7
Total man hours per acre	137.2	122.2	147.4	142.5
Returns per hour of labor	$ 0.37	$ 0.47	$ 0.63	$ 0.52
Average per cent No. 1's	69	62	61	64
Average per cent No. 2's	29	37	38	35
Average per cent culls	2	1	1	1
Fertilizer per acre (pounds)	693	624	720	653
Plants per acre	3184	2988	3050	3040

The returns per acre in 1939 averaged $130.48. This included mostly sales of tomatoes to canning factories but also small amounts of sales on the fresh market and small amounts used in the farm homes. Total costs per acre of growing, harvesting, and delivering were $97.01, leaving a net return of $33.47. The average price received for all tomatoes was $11.73 and the average cost

1/ All yields are in terms of harvested tomatoes.

per ton $8.72. This left a net return of $3.01 per ton.

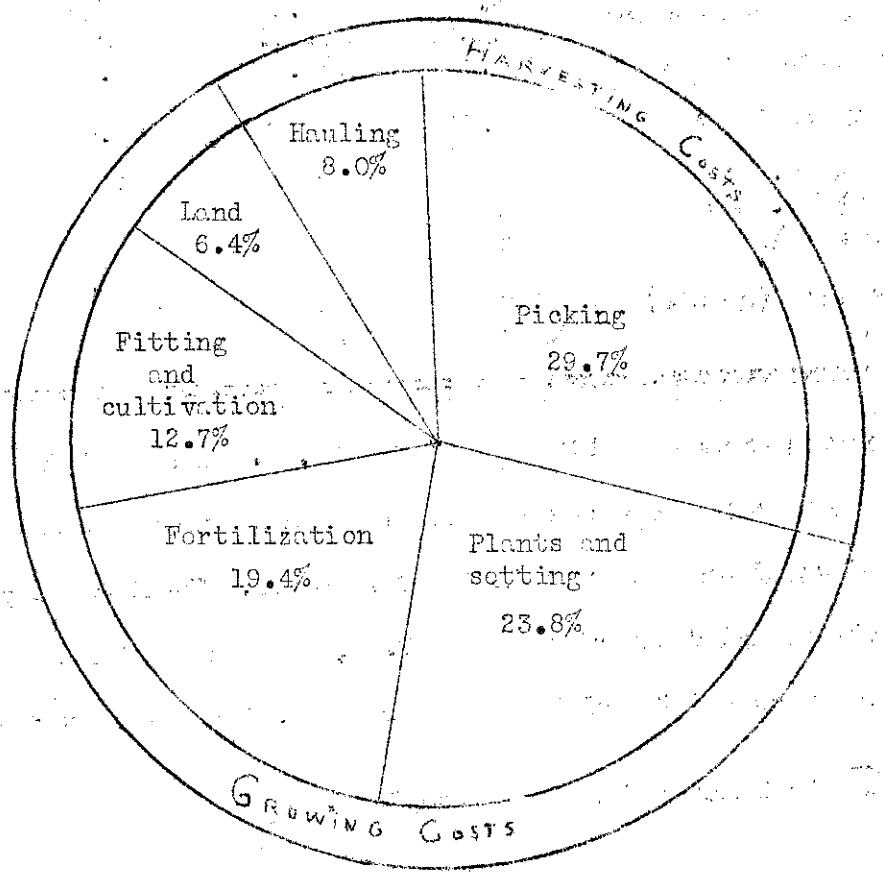
On the average, a total of 142.5 hours were required to grow, harvest and deliver an acre of tomatoes in 1939. This included 32.4 hours for growing, 100.4 hours for picking and 9.7 hours for delivering. Returns per hour of man labor averaged $0.52 for all farms in 1939.

In 1939, the part of the crop which was sold on a graded basis averaged 64 per cent No. 1's and 35 per cent No. 2's. One per cent were culls. Growers applied an average of 653 pounds of fertilizer and planted 3040 plants per acre.

Costs per Acre by Operations

The average cost of growing, harvesting and delivering an acre of tomatoes on the 54 farms in 1939 was $97.01 (table 7). Of this amount, $60.45, or 62 per cent was for growing, and $36.56, or 38 per cent was for harvesting and delivering (figure 1).

FIGURE 1. COSTS OF GROWING AND HARVESTING TOMATOES FOR THE CANNING FACTORY
54 Accounts, Western New York, 1939



For those growers who rented their tomato land for cash, the actual cash rent was used. For those growers owning their land, the expense included a five per cent interest charge and the proportionate share of the total farm taxes, based upon the growers' own estimates of the value of the tomato land. The use of land for tomatoes averaged $6.19 per acre, or 6 per cent of the total cost including the delivery to the canning factory.

TABLE 7. COST PER ACRE TO GROW, HARVEST, AND DELIVER CANNING FACTORY TOMATOES
54 Accounts, Western New York, 1939

Expense	Cost per acre	Per cent of total
Growing costs:		
Use of land	$ 6.19	6.4
Manure	6.18	6.4
Green manure	.68	.7
Fertilizer	10.63	11.0
Plants	17.24	17.8
Plowing	2.94	3.0
Fitting	3.17	3.3
Fertilizing	.89	.9
Setting	4.79	4.9
Filling in	.14	.1
Cultivating	4.54	4.7
Hoeing and weeding	1.68	1.7
Other	1.38	1.4
Total growing costs	$ 60.45	62.3
Harvesting and delivering costs:		
Picking	$ 28.22	29.1
Delivering	7.74	8.0
Other	.60	.6
Total harvesting and delivering costs	$ 36.56	37.7
Total growing, harvesting and delivering	$ 97.01	100.0

The charge of $6.18 per acre for barnyard manure included the value of the manure as estimated by growers, and also the cost of applying it. In determining the charge for manure, 40 per cent of that applied to the tomato land in 1939, 30 per cent of that applied in 1938, 20 per cent of that applied in 1937, and 10 per cent of that applied in 1936 was used. The charge for green manure was calculated at the rate of $3.04 per acre for those growers using green manure. This was the average cost on a number of cost account farms in 1938. Fertilizer costs averaged $10.63 per acre, or 11.0 per cent of the total. The cost of plants was $17.24 per acre, or about 18 per cent of the total cost. Charges for plowing, fitting, fertilizing, setting, filling in, cultivating, and hoeing and weeding included man, horse, and tractor labor as well as charges for machinery.

The cost of picking averaged $28.22 per acre, or 29.1 per cent of the total cost. Most of this charge was for man labor. Hauling averaged $7.74 per acre, and together with picking and other minor expenses made the total harvesting and delivering costs $36.56 per acre.

Costs per acre of growing, harvesting, and delivering tomatoes were higher in 1939 than in either 1934 or 1937, but less than in 1938 (table 8). Total costs in 1939 averaged $97.01 compared with $101.35 in 1938, $91.07 in 1937, and $83.50 in 1934. Growing costs of $60.45 per acre in 1939 were also higher than in 1934 and 1937, but lower than in 1938. The charges for the use of land and for manure have varied considerably during the four years.

TABLE 8. COSTS PER ACRE TO GROW, HARVEST, AND DELIVER CANNING FACTORY TOMATOES
Western New York, 1934, 1937, 1938 and 1939

Expense	118 Accounts 1934	47 Accounts 1937	64 Accounts 1938	54 Accounts 1939
Growing costs:				
Use of land	$ 7.66	$ 4.86	$ 4.62	$ 6.19
Manure	3.91	7.48	7.15	6.18
Green manure	--*	--*	.81	.68
Fertilizer	8.21	8.98	11.89	10.63
Plants	15.55	16.44	17.21	17.24
Plowing	3.42	3.08	2.68	2.94
Fitting	3.83	3.13	2.83	3.17
Fertilizing	1.65	0.96	0.95	0.89
Setting	5.41	5.74	4.95	4.79
Filling in	--**	--**	0.31	0.14
Cultivating	6.38	4.39	4.36	4.54
Hoeing and weeding	--***	3.27	1.98	1.68
Other growing costs	2.14	1.20	1.52	1.38
Total growing costs	$58.16	$59.53	$61.26	$60.45
Harvesting and selling costs:				
Picking	--#	--#	$30.96	$28.22
Delivering	--#	--#	8.84	7.74
Other	--#	--#	.29	.60
Total harvesting costs	$25.34	$31.54	$40.09	$36.56
TOTAL GROWING, HARVESTING AND SELLING COSTS PER ACRE	$83.50	$91.07	$101.35	$97.01
Acres per farm	6.0	6.9	7.4	7.8
Tons per acre	8.2	8.4	11.7	11.1
Total costs per ton	$ 9.77	$ 10.81	$ 8.66	$ 8.72

* Included with manure.
** Included with setting.
*** Included with cultivating.
# Not separated.

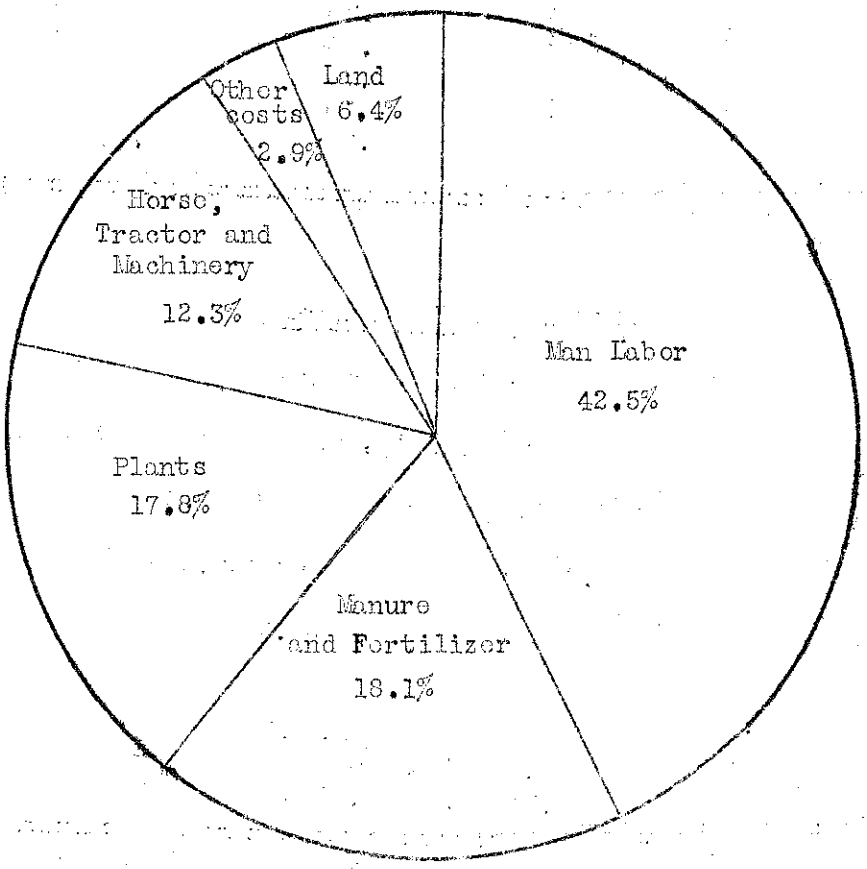
Costs Per Acre by Type of Expense

When classified on the basis of the type of expense instead of by operations as in table 8, the cost of 142.5 man labor hours at 29 cents per hour made up 42.5 per cent of the total cost, or over two-fifths of the cost of growing, harvesting, and delivering tomatoes (table 9 and figure 2). Plants make up the second most important item of cost, representing 17.8 per cent of the total cost in 1939. They were followed by fertilizer which amounted to 11 per cent of the total cost. Cost of land and manure each made up 6 per cent of the total cost per acre. Horse work, tractor work, and the use of trucks, automobiles, and other machinery, each was a relatively small part of the total cost of growing, harvesting, and delivering tomatoes.

TABLE 9. COST PER ACRE TO GROW, HARVEST, AND DELIVER CANNING FACTORY TOMATOES
54 Accounts, Western New York, 1939

Expense	Cost per acre	Per cent
Use of land	$ 6.19	6.4
Manure, 2.5 tons at $2.45 per ton	6.18	6.4
Green manure	.68	.7
Fertilizer, 653 lbs. at $32.55 per ton	10.63	11.0
Plants, 3040 at $5.67 per thousand	17.24	17.8
Man labor, 142.5 hours at 29¢ per hour	41.21	42.5
Horse work, 19.2 hours at 18¢ per hour	3.50	3.6
Tractor use, 5.9 hours at 47¢ per hour	2.78	2.8
Truck and automobile	3.13	3.2
Other machinery	2.64	2.7
Other costs	2.83	2.9
Total costs	$97.01	100.0

FIGURE 2. IMPORTANT COSTS IN PRODUCING CANNING FACTORY TOMATOES
Western New York, 1939



The growers used an average of 653 pounds of fertilizer at $32.55 per ton. A great variety of different kinds and analyses of fertilizers was used, but 4-16-4 and superphosphate were by far the most popular in 1939. Thirty-four per cent of the total fertilizer expense was for 4-16-4 and 25 per cent for superphosphate (table 10). A number of others used fertilizers closely akin in analysis to 4-16-4.

TABLE 10. KINDS OF FERTILIZERS USED
54 Accounts in Monroe, Orleans and Niagara Counties, 1939

Fertilizer	Number of farms	Amount		Cost	
		Pounds	Per cent	Dollars	Per cent
4-16-4	21	70,700	25.7	1,153	25.8
Superphosphate	20	74,350	27.0	828	18.5
4-14-6	7	14,300	5.2	253	5.7
5-20-10	1	8,000	2.9	161	3.6
4-15-7	3	8,000	2.9	153	3.4
5-10-5	3	6,200	2.3	111	2.5
Other	44	93,415	34.0	1,816	40.5

Labor Required per Acre

On the average 142.5 hours of man labor were required in 1939 to grow, harvest and deliver an acre of tomatoes (table 11). The average was 5 hours higher in 1938 when yields averaged 11.7 tons as compared with 11.1 tons in 1939. The total labor per acre averaged 137.2 hours in 1934 and 122.2 hours in 1937. In both years the yields averaged about 8 tons per acre.

TABLE 11. MAN LABOR PER ACRE TO GROW, HARVEST, AND DELIVER CANNING FACTORY TOMATOES
Western New York, 1934, 1937, 1938, and 1939

Operation	118 Farms 1934	47 Farms 1937	64 Farms 1938	54 Farms 1939
Plowing	4.5	3.4	2.8	3.2
Fitting	4.9	3.4	3.1	3.5
Fertilizing	2.4	1.5	1.4	1.3
Setting plants	14.7	11.3	9.7	9.8
Filling in	*	*	1.0	.5
Cultivating	14.6	6.4	6.1	6.6
Hoeing and weeding	**	10.5	6.7	5.6
Picking and loading	93.7	84.4	103.0	100.4
Delivering	***	***	10.8	9.7
Other	2.4	1.3	2.8	1.9
Total hours per acre	137.2	122.2	147.4	142.5

*Included with setting plants.
**Included with cultivating.
***Included with picking and loading.

There has been a considerable reduction in growing labor per acre. In 1934 when yields averaged only 8.2 tons, it required 43.5 hours to grow an acre as compared with 32.4 hours in 1939 when yields averaged 11.1 tons per acre. Labor for picking, loading, and delivering varies greatly with yields. In 1939 labor for picking and loading averaged 100.4 hours per acre and delivering required 9.7 hours, making a total of 112.0 hours for harvesting and marketing as compared with 116.6 hours in 1938. With considerably lower yields in 1934 and 1937, harvesting and delivering labor averaged 93.7 hours and 84.4 hours respectively.

With yields of 11 to 12 tons per acre (the average yield during the last two years) approximately 33 hours were required to grow and about 110 to 114 hours were required to harvest and deliver an acre of tomatoes.

Comparative Rates of Application of Manure, Fertilizer, Plants and Labor

An average of 2.5 tons of manure per acre was charged to the tomato crop in 1939 (table 12). This was less than the average of 3.4 tons in 1934, 3.2 tons in 1937, and 3.0 tons in 1938. Cost per ton of manure has been uniform at slightly less than $2.50 per ton except for 1934 when the charge was only $1.15 per ton.

TABLE 12. AMOUNTS PER ACRE AND COST OF MANURE, FERTILIZER, PLANTS AND LABOR IN GROWING CANNING FACTORY TOMATOES
Western New York, 1934, 1937, 1938, and 1939

Item	118 Farms 1934	47 Farms 1937	64 Farms 1938	54 Farms 1939
	Amount per acre			
Manure (tons)	3.4	3.2	3.0	2.5
Fertilizer (pounds)	693	624	720	653
Plants	3184	2988	3050	3040
Man labor (hours)	137	122	147	142
Horse work (hours)	36	22	17	19
Tractor use (hours)	3.3	4.3	6.3	5.9
	Cost per unit			
Manure per ton	$ 1.15	$ 2.32	$ 2.42	$ 2.45
Fertilizer per ton	25.15	28.76	33.04	32.55
Plants per thousand	4.82	5.50	5.64	5.67
Man labor per hour	.23	.33	.30	.29
Horse work per hour	.15	.18	.19	.18
Tractor use per hour	.50	.54	.55	.47

Fertilizer applications in 1939 were 653 pounds per acre, which is little higher than in 1937, but somewhat less than in 1934 and 1938. Value of fertilizer used has varied from $25 per ton in 1934 to $33 in 1938. Approximately 3000 plants have been used on the average for the last three years. In 1934, an average of 3184 plants were used. Plants have ranged in value from $4.82 per 1000 in 1934 to $5.67 per 1000 in 1939.

Man labor per acre in 1939 averaged 142 hours compared with 147 hours in 1938, 122 hours in 1937, and 137 hours in 1934. The average cost of man labor in 1939 was $.29 per hour as compared with $.30 in 1938, $.33 in 1937, and $.23 in 1934. In 1934, an average of 36 hours of horse work and 3.3 hours of tractor work were used per acre. By 1939 the proportion had changed to 19 hours of horse work and 5.9 hours of tractor use per acre. Speeding up cultural operations by substitution of tractor power for horses undoubtedly has an effect on man labor in the field operations. Reductions in man labor per acre in the growing operations were noted in the section on labor required per acre (page 14).

Rates per hour for horse work and tractor use have not varied greatly during the four years. The rate for horse work has averaged $.18 to $.19 per hour except in 1934 when the rate was $.15. Cost of tractor use has ranged from an average of $.47 per hour in 1939 to $.55 per hour in 1938.

Returns per Acre and per Ton

Receipts per acre from tomatoes averaged $130.38 in 1939 compared with $149.46 in 1938, $108.49 in 1937 and $101.19 in 1934 (table 13). The average price per ton received by growers in 1939 was $11.73, somewhat lower than in 1934, 1937 or 1938. Growing costs per acre in 1939 were about the same as those of the two previous years but higher than in 1934. The net returns of $33.47 in 1939 were high compared with 1937 and 1934 but considerably less than in 1938. Growers netted $3.01 per ton above all costs in 1939 as compared with a net return of $4.11 in 1938, $2.07 in 1937 and $2.41 in 1934.

TABLE 13. COSTS AND RETURNS IN GROWING CANNING FACTORY TOMATOES
Western New York, 1934 1937, 1938, and 1939

Item	118 Farms 1934	47 Farms 1937	64 Farms 1938	54 Farms 1939
Average receipts per acre	$ 101.19	$ 108.49	$ 149.46	$ 130.38
Growing cost per acre	58.16	59.53	61.26	60.45
Harvesting and delivering cost per acre	25.34	31.54	40.09	36.56
Total cost per acre	$ 83.50	$ 91.07	$ 101.35	$ 97.01
Net returns per acre	17.69	17.42	48.11	33.47
Total receipts per ton	12.18	12.88	12.77	11.73
Total costs per ton	9.77	10.81	8.66	8.72
Net return per ton	$ 2.41	$ 2.07	$ 4.11	$ 3.01

Variations in Prices of Tomatoes in 1939

Most of the growers sold their crops to canning factories according to U. S. government standard grades. Of the 54 growers in 1939, 45 sold on a graded basis, 8 sold on flat rate basis, and one did not sell to a canning factory (table 14). Eighty-eight per cent of the total crop was sold graded, 10 per cent was sold "Flat rate", and 2 per cent was disposed of by farm sales or used on the farm. Tomatoes sold graded averaged $11.76 and those sold "flat rate" averaged $11.14 per ton. With the exception of one grower whose crop graded very low in No. 1's, all growers received prices which averaged between $10.00 and $13.55 per ton. A total of 45 tons or about one per cent of the crop were sold as green tomatoes at an average of $14.47 per ton.

That part of the crop sold on a graded basis averaged 64 per cent No. 1's and 35 per cent No. 2's. The crops of two growers graded 80 per cent No. 1's while only one grower's crop fell below 50 per cent No. 1's.

TABLE 14. SALE OF CANNING FACTORY TOMATOES
53* Farms in Monroe, Niagara and Orleans Counties, 1939

Number of farms	Sold graded at:
1	$16 for No. 1's and $8 for No. 2's
1	15 " " " 8 " "
31	15 " " " 7 " "
1	14 " " " 8 " "
2	14 " " " 7 " "
9	14 " " " 6 " "
	Sold flat rate at:
4	$12 per ton
2	11 " "
2	10 " "
53	

*One grower sold most of his crop as green tomatoes but was included in the analysis because he received prices approximating those received by growers who sold to canning factories.

TABLE 15. DISPOSAL OF TOMATOES
54 Farms in Monroe, Niagara, and Orleans Counties, 1939

How sold	Tons	Per cent of total	Average price
Graded	4143.6	88	$ 11.76
Flat rate	449.0	10	11.14
Green	45.1	1	14.47
Farm and market	37.4	1	10.79
Home use	5.9	*	17.79
	4681.0	100	11.73

*Less than .5 of one per cent.

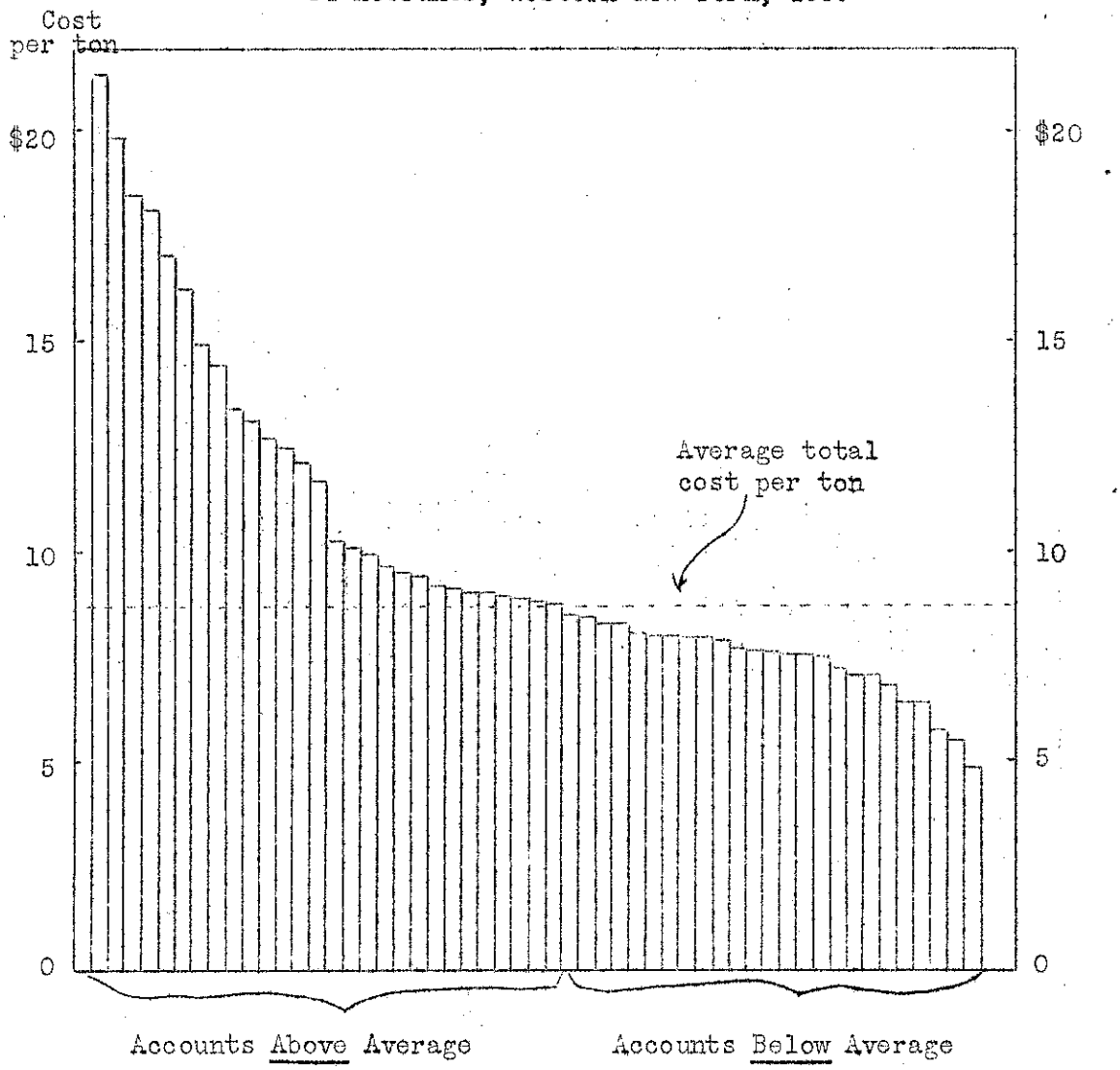
The prevailing contract price was $15 for No. 1's and $7 for No. 2's. Thirty-one growers sold at $15 and $7, nine sold at $14 and $6, two sold at $14 and $7, and three others sold at variable rates. Of the eight growers who sold "flat rate", four sold for $12, two sold for $11 and two sold for $10 per ton.

Variations in Costs

The average total cost per ton in 1939 was $8.72 per ton but only a few growers produced their tomatoes at approximately average costs. Cost per ton varied greatly between farmers and ranged from $4.81 to $21.40 (figure 3). Returns averaged $11.73 per ton. The costs of 13 or one-fourth of the growers exceeded their total return.

The principal reason for this great variation in costs was the variation in yield. The two growers who had the highest cost per ton were the two with the lowest yield per acre.

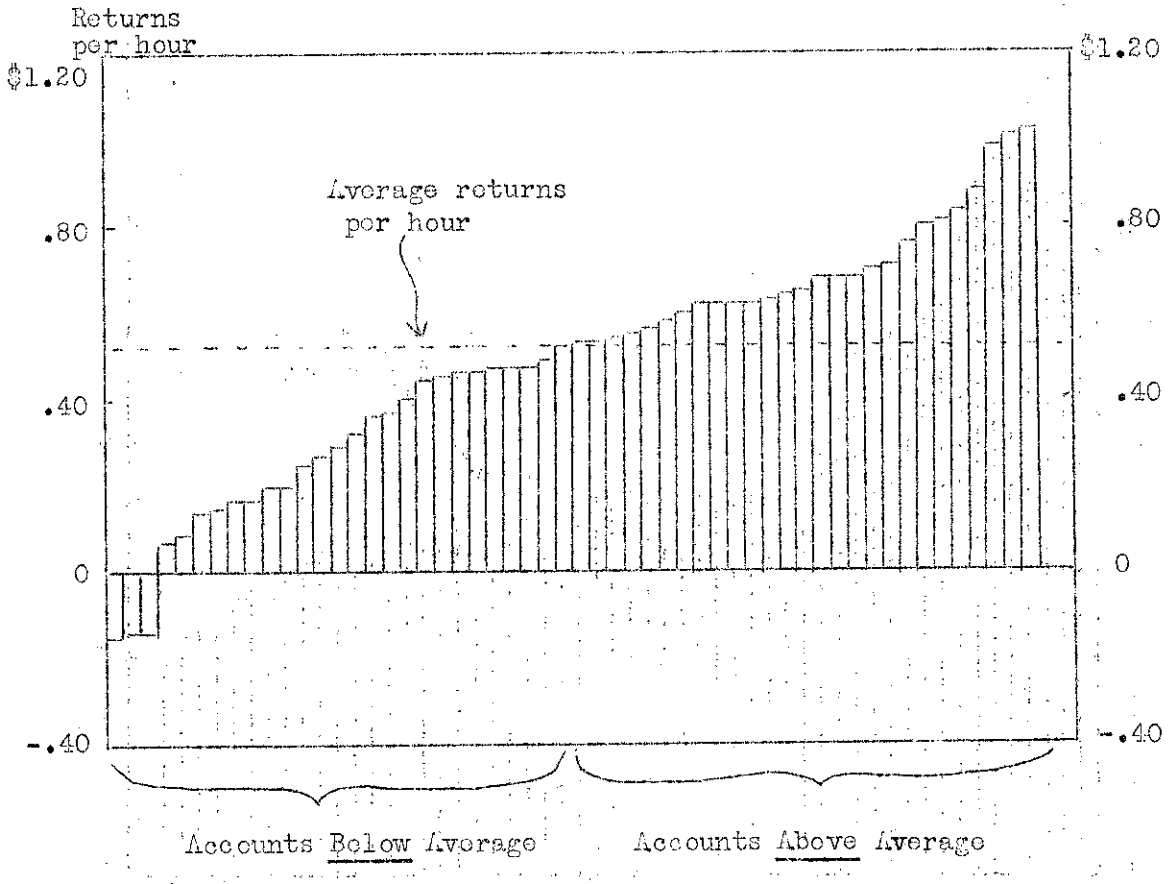
FIGURE 3. COST OF PRODUCING A TON OF TOMATOES FOR THE CANNING FACTORY
54 Accounts, Western New York, 1939



Variation in Labor Returns

The returns per hour of labor also varied greatly as did costs. Although the average return per hour of labor was $.52 in 1939, one grower netted only $-.15 while another received $1.02 per hour (figure 4). Three failed to get any return for the labor expended on the enterprise after allowing for all other expenses including the use of land, machinery, farm power, and the like. Ten growers netted some return for their labor but not enough to cover the cost of all the labor used. Twenty-eight or one-half of the growers made labor returns of over 50¢ per hour.

FIGURE 4. RETURNS PER HOUR OF LABOR FROM TOMATOES
54 Accounts, Western New York, 1939



The grower who made the highest labor returns had also the highest yield -- 21.0 tons per acre. The grower who got the lowest return per hour of labor had a yield of only 3.6 tons per acre and the highest growing cost per ton. Since price per ton and growing cost vary but slightly, the growers with the highest yields usually obtain the highest returns per hour of labor.

Relation of Yield to Costs

Yield is the most important factor affecting total costs per ton of growing, harvesting, and delivering tomatoes. Total cost per acre usually increases with yield but the growing and the total cost per ton decreases rapidly with higher yields. Nineteen accounts with a yield of less than 10 tons per acre in 1939 had average total costs per acre of $84 (table 16). Their growing and total costs per ton were considerably above average. Seventeen accounts with the higher yields had a total cost per acre of $112 and total cost per ton of $7.20 compared with the average of $8.72.

TABLE 16. RELATION OF YIELD TO COSTS OF GROWING AND HARVESTING TOMATOES
54 Farms in Monroe, Orleans, and Niagara Counties, 1939

Yield in tons	Number of accounts	Average yield in tons	Total cost per acre	Growing cost per ton	Total cost per ton
Less than 10	19	7.4	$ 84	$ 7.80	$ 11.36
10 to 12.5	18	11.1	97	5.43	8.77
12.6 or more	17	15.5	112	4.12	7.20
All accounts	54	11.1	$ 97	$ 5.43	$ 8.72

Growing costs decreased more rapidly than did harvesting and delivery costs with increase in yields. Harvesting and delivery costs decreased only slightly from $3.56 per ton for the group with low yields to $3.08 per ton to the group with yields of twelve and one-half tons or more per acre. Harvesting and delivery costs are made up largely of labor costs which tend to vary with the size of crop.

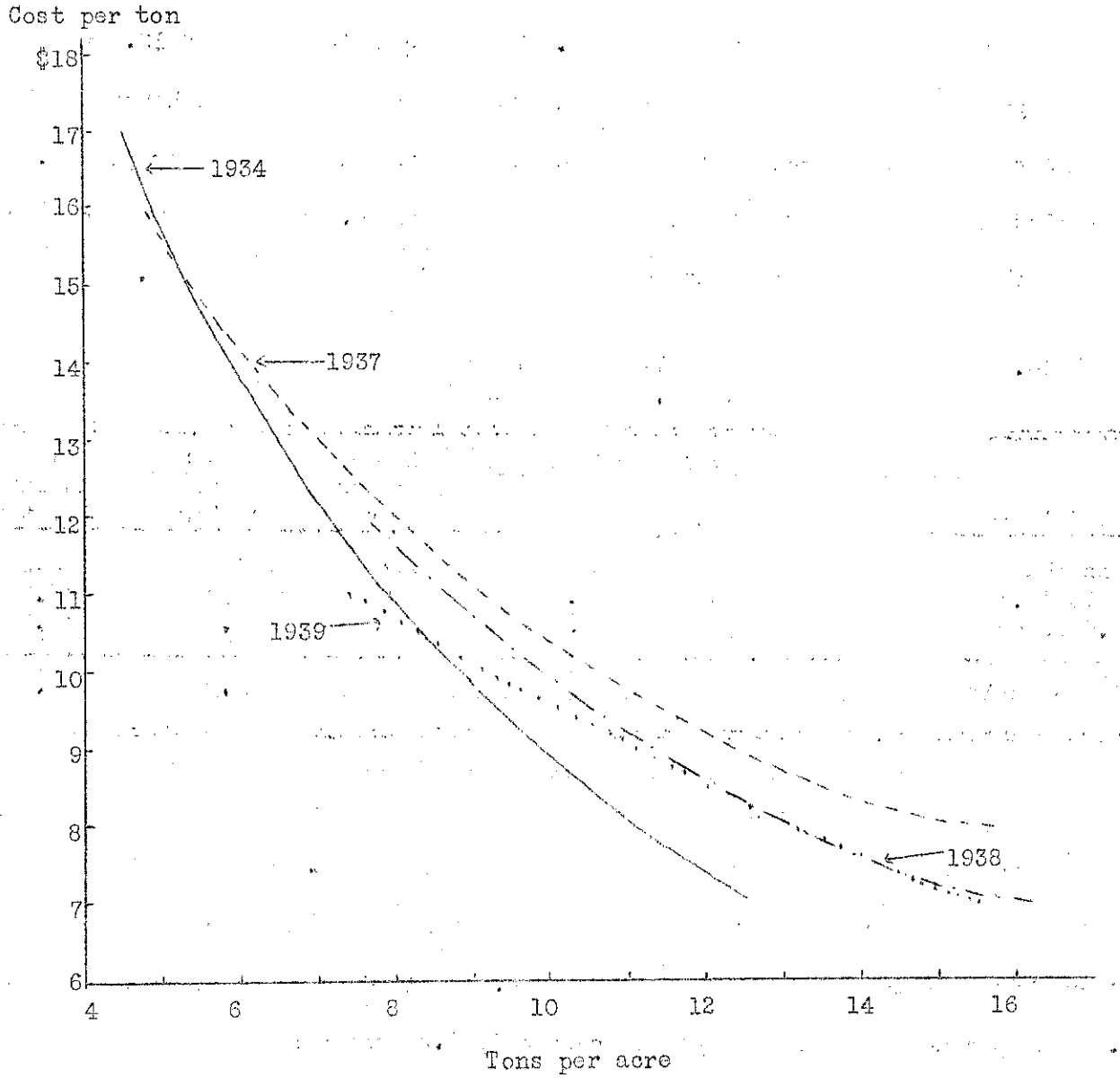
Growing costs, on the other hand, consist mostly of fixed costs which vary very little regardless of yield. The reduction in growing cost per ton with increase in yield per acre contributes the most to a lower cost per ton with better yields.

The spread in cost per ton has decreased between low and high yield groups but a marked lowering of total cost per ton with higher yields holds true for every year (table 17 and figure 5). In 1934 and 1937 there were more growers who obtained lower yields than was true in 1938 and 1939. In the last two years yields in general were higher and there were fewer farmers with very low yields. The difference in the growing season rainfall and the area in which the growers were located account for much of the difference in yields between years. Except for 1934, there has been very little change in yields obtained by the medium and high yield groups.

TABLE 17. RELATION OF YIELD TO COST PER TON TO GROW, HARVEST AND DELIVER CANNING FACTORY TOMATOES

Yield	Yield per acre				Cost per ton			
	1934	1937	1938	1939	1934	1937	1938	1939
Low	4.5	4.8	7.6	7.4	$ 17	$ 16	$ 12	$ 11
Medium	7.9	9.1	11.3	11.1	11	11	9	9
High	12.6	15.7	16.2	15.5	7	8	7	7

FIGURE 5. RELATION OF YIELD PER ACRE TO COST PER TON TO GROW, HARVEST AND DELIVER CANNING FACTORY TOMATOES, 1934, 1937, 1938, 1939



Relation of Yield to Labor Requirements

The total man hours per acre to grow, harvest and deliver an acre of tomatoes increases as the yield per acre increases. The total man hours per ton, however, decreases markedly with higher yields. In 1939 the growers who got yields of less than 10 tons per acre averaged a total of 113 hours of man labor per acre and 15 hours per ton (table 18). The group which averaged 12.6 tons or more per acre used an average of 172 hours per acre but only 11 hours per ton. Man labor in the growing operations decreases even more rapidly with higher yields. The one-third with the highest yields per acre spent only 2.1 hours per ton growing or less than one-half as much as the one-third with the lowest yields.

TABLE 18. RELATION OF YIELD TO LABOR REQUIREMENTS
54 Accounts in Monroe, Orleans, and Niagara Counties, 1939

Yield in tons	Number of accounts	Average yield in tons	Total hours man labor per acre	Man hours per ton growing	Total hours man labor per ton
Less than 10	19	7.4	113	4.6	15.2
10 to 12.5	18	11.1	146	2.8	13.2
12.6 or more	17	15.5	172	2.1	11.1
All accounts	54	11.1	143	2.9	12.8

Table 19 indicates an inverse relationship between yield and total man labor per ton in each of the four years included in this report. Because of higher yields the variation in hours of man labor per ton between high and low yield groups has decreased considerably since 1934. In 1934 when yields averaged only 8.2 tons per acre and the low yield group only 4.5 tons per acre the total hours of man labor per ton varied from 28 hours per ton for the low yield group to 14 hours per ton for the group which obtained the highest yields per acre. In 1939 the high yield group averaged 11 hours per ton and the low yield group 15 hours. Some of the difference in labor requirements between years may also be explained by the difference in areas in which the growers were located. The 1934 records cover a much wider area than was included in the other three years.

TABLE 19. RELATION OF YIELD PER ACRE TO LABOR REQUIRED PER TON TO GROW, HARVEST AND DELIVER CANNING FACTORY TOMATOES

Yield	Yield per Acre				Hours of Labor per Ton			
	1934	1937	1938	1939	1934	1937	1938	1939
Low	4.5	4.8	7.6	7.4	28	19	16	15
Medium	7.9	9.1	11.3	11.1	18	14	13	13
High	12.6	15.7	16.2	15.5	14	12	11	11

Relation of Yield to Returns from Tomatoes

High yields of tomatoes gave the highest returns per acre and returns per hour of labor. Net returns in 1939 averaged $ -2 per acre for the one-third of the accounts with yields of less than 10 tons per acre and $73 for the 17 accounts with yields of 12.6 tons or more per acre (table 20). The average net return per acre for all accounts was $34.

TABLE 20. RELATION OF YIELDS TO RETURNS FROM TOMATOES
54 Accounts in Monroe, Orleans, and Niagara Counties, 1939

Yield in tons	Number of accounts	Average yield (tons)	Receipts per acre	Net return per acre	Returns per hour of labor
Less than 10	19	7.4	$ 83	$ - 2	$ 0.29
10 to 12.5	18	11.1	131	+34	0.51
12.6 or more	17	15.5	185	+73	0.72
All accounts	54	11.1	$130	$ +34	$ 0.52

Returns per hour of labor for the high yield group were about two and one-half times as high as for the low yield group. The returns per hour of labor averaged $.29 for the one-third of the accounts with lower yields and $.72 for the one-third of the accounts with higher yields. The average per hour return for all accounts was $.52.

Despite the variation in returns per hour of labor in the different years, the returns per hour have been two or more times higher for the high yield group than for the low yield group (table 21). In 1934 and 1937 when the yields were lower than during the last two years, the spread in returns per hour of labor between the low and high yield groups was greater than in 1938 and 1939. The return for all groups was also considerably lower because of the lower yields.

TABLE 21. RELATION OF YIELD PER ACRE TO RETURNS PER HOUR OF LABOR TO GROW, HARVEST, AND DELIVER CANNING FACTORY TOMATOES

Yield	Yield per Acre				Returns per Hour of Labor			
	1934	1937	1938	1939	1934	1937	1938	1939
Low	4.5	4.8	7.6	7.4	$0.08	$0.15	$0.36	$0.29
Medium	7.9	9.1	11.3	11.1	.39	.51	.59	.51
High	12.6	15.7	16.2	15.5	.61	.75	.81	.72

Relation of Acres of Tomatoes Grown to Costs

In 1939 the acreage of tomatoes grown varied from 2.0 acres to 30.0 acres per farm. The average per farm was 7.8 acres (table 22). No definite relation is shown between number of acres grown and yield per acre. The group with medium acreage of tomatoes had slightly lower yields and lower costs per acre but slightly higher costs per ton than the average of the other two groups. Cost per ton is very closely related to yield but the number of acres grown had very little effect on the yield or the cost to grow a ton of tomatoes.

TABLE 22. RELATION OF ACRES OF TOMATOES TO COSTS OF GROWING, HARVESTING, AND DELIVERING
54 Farms in Monroe, Orleans, and Niagara Counties, 1939

Acres of tomatoes per account	Number of accounts	Average acres of tomatoes	Average yield in tons	Total cost per acre	Total cost per ton
Less than 5	21	3.3	11.6	$ 101	$ 8.66
5 to 9	17	7.0	9.9	94	9.45
10 or more	16	14.5	11.6	98	8.42
All accounts	54	7.8	11.1	$ 97	$ 8.72

Table 23 shows yield and cost per ton for the low, medium, and high acreage groups for the four years for which results are available. Yield per acre varied more between the years than between low, medium or high acreage groups. Costs also varied more between years, depending on yield, than between the large or small acreage groups.

TABLE 23. RELATION OF NUMBER OF ACRES GROWN TO THE COST PER TON TO GROW, HARVEST AND DELIVER CANNING FACTORY TOMATOES

Number of acres	Yield per Acre				Cost per Ton			
	1934	1937	1938	1939	1934	1937	1938	1939
Low	8.4	10.0	12.3	11.6	$12.53	$12.47	$8.65	$8.66
Medium	8.2	10.4	11.7	9.9	11.58	11.03	8.54	9.45
High	7.8	7.8	11.5	11.6	11.48	12.01	8.78	8.42

Relation of Acres of Tomatoes Grown to Labor Requirements

Results from the 54 farms in 1939 indicated that there is no advantage in labor efficiency with larger acreages of tomatoes. Although the 16 accounts with the largest acreages did grow their tomaties with 7 or 8 hours less man labor per acre than those with small or medium acreages, they seemed to have no advantage

in total man hours per acre or per ton (table 24). The medium sized enterprises of 5 to 9 acres per farm averaged a total of only 132 man hours per acre as compared with the average of 143 hours but this group also had slightly lower yield. The total hours of labor per ton averaged 13 for all the 54 accounts.

TABLE 24. RELATION OF ACRES OF TOMATOES TO LABOR REQUIREMENTS
54 Farms in Monroe, Orleans, and Niagara Counties, 1939

Acres of tomatoes per account	Number of accounts	Average acres of tomatoes	Man hours growing per acre	Total man hours per acre	Total hours of labor per ton
Less than 5	21	3.3	36	141	12
5 to 9	17	7.0	37	132	13
10 or more	16	14.5	29	148	13
All accounts	54	7.8	32	143	13

Except for the results of 1934 the comparison of total man labor on different size enterprises indicates no advantage in labor efficiency with either a large or small acreage of tomatoes (table 25). In 1934, despite slightly higher average yields, it required 4 hours more labor on the smaller than on the larger enterprises to grow, harvest and deliver a ton of tomatoes. Yields in 1934 were low and the total man labor per acre quite high. Records in 1934 covered a much wider area than in the three later years. Also the growing season was very unfavorable. In 1937 yields also were relatively low but the total man hours per ton were from 3 to 6 hours less than in 1934. Results in 1937, 1938 and 1939 indicate no relation between size of enterprise and total hours man labor per ton. Total man hours in the last 3 years have varied from an average of 12 to 15 hours per ton among the small, medium and large acreage groups depending more on the year and yield than on size of enterprise.

TABLE 25. RELATION BETWEEN NUMBERS OF ACRES GROWN TO LABOR REQUIRED PER TON TO GROW, HARVEST, AND DELIVER CANNING FACTORY TOMATOES

Number of Acres	Yield per Acre				Hours of Labor per Ton			
	1934	1937	1938	1939	1934	1937	1938	1939
Low	8.4	10.0	12.3	11.6	22	15	13	12
Medium	8.2	10.4	11.7	9.9	20	14	13	13
High	7.8	7.8	11.5	11.6	18	15	13	13

Relation of Acres of Tomatoes Grown to Returns

Returns on the 54 farms in western New York in 1939 indicate no relationship between size of enterprise and receipts per acre, net returns per acre or returns per hour of labor. The average return per hour of labor was $.52 compared with $.56 for 21 smaller enterprises and $.55 for the larger enterprises (table 26). The total receipts per acre, net returns per acre and returns per hour of labor on the 17 farms with 5 to 9 acres of tomatoes were considerably below the average of either the small or large enterprises or the average of all 54 accounts. This can be accounted for by the lower yield of this group which averaged about 1.7 tons less than the average of either of the other groups.

TABLE 26. RELATION OF ACRES OF TOMATOES TO RETURNS
54 Accounts in Monroe, Orleans and Niagara Counties, 1939

Acres of tomatoes per account	Number of accounts	Average acreage of tomatoes	Receipts per acre	Net returns per acre	Returns per hour of labor
Less than 5	21	3.3	$ 142	$ 42	$ 0.56
5 to 9	17	7.0	112	18	0.43
10 or more	16	14.5	137	39	0.55
All accounts	54	7.8	$ 130	$ 33	$ 0.52

Results of the three previous years also indicate that there is no significant relation between size of enterprise and returns per hour of labor (table 27). Because a large part of the work must be done by hand, no advantage in returns per hour of labor attends the larger sized enterprise. But neither is there any disadvantage in yield or return from an increase in the acreage. Therefore, as long as acreage can be increased without reducing the yield or returns per hour of labor, many growers may find it desirable to have a relatively large acreage of tomatoes particularly as long as the returns per hour of labor are higher than on other alternative enterprises.

TABLE 27. RELATION BETWEEN NUMBER OF ACRES GROWN TO RETURNS PER HOUR OF LABOR TO GROW, HARVEST AND DELIVER CANNING FACTORY TOMATOES

Number of acres	Yield per acre				Returns per hour of labor			
	1934	1937	1938	1939	1934	1937	1938	1939
Low	8.4	10.0	12.3	11.6	$0.33	$0.45	$0.58	$0.56
Medium	8.2	10.4	11.7	9.9	.39	.50	.62	.43
High	7.8	7.8	11.5	11.6	.33	.44	.62	.55

Relation of Per cent No. 1's to Returns

The growers who sold on a graded basis in 1939 averaged 64 per cent No. 1's. They received $11.76 per ton of tomatoes and labor returns of $0.52 per hour (table 28). The growers whose crop graded 60 per cent or more No. 1's obtained yields averaging 3 tons more than the group whose crop graded less than 60 per cent No. 1's. Receipts per ton and returns per hour varied directly with the per cent No. 1's. The one-third of the growers who sold the lowest per cent No. 1's averaged 9.0 tons per acre, sold their tomatoes at an average of $10.89 per ton and averaged $0.38 per hour of labor. The one-third with the highest per cent No. 1's averaged 73 per cent No. 1's and yield of 11.9 tons per acre, sold their tomatoes at $12.81 per ton and averaged $0.60 per hour of labor.

TABLE 28. RELATION OF PER CENT NUMBER 1'S TO RETURNS FROM TOMATOES
54 Accounts in Monroe, Orleans and Niagara Counties, 1939

Per cent Number 1's	Number of accounts	Per cent Number 1's	Yield in tons	Receipts per ton	Returns per hour of labor
59 or less	16	55	9.0	$ 10.89	$ 0.38
60 to 68	15	63	12.1	11.60	0.54
69 or over	14	73	11.9	12.81	0.60
All graded	45	64	11.1	$ 11.76	$ 0.52
Flat rate	9	-	11.5	$ 11.48	$ 0.60
All accounts	54	64	11.1	$ 11.73	$ 0.52

Nine of the 54 growers sold their tomatoes flat rate and received approximately average yields and returns per ton. The returns per hour of labor for those selling flat rate averaged $.60 or the same as the group selling on a graded basis which sold 69 per cent or more No. 1's.

A comparison of the four years' results for 1934 and 1937-39 indicates that a high percentage of No. 1's accompanies high yields (table 29). Weather and soil conditions which are conducive to good yields apparently are favorable to production of a good quality canning tomato. Returns per hour of labor have regularly been higher for those growers who had higher percentage No. 1's. In all four years, the growers who sold their tomatoes at a flat rate per ton received better than average returns per hour of labor largely because of higher yields.

TABLE 29. RELATION OF PER CENT NO. 1'S TO RETURNS PER HOUR OF LABOR TO GROW, HARVEST AND DELIVER CANNING FACTORY TOMATOES

Per cent No. 1's	Yield per Acre				Returns per Hour of Labor			
	1934	1937	1938	1939	1934	1937	1938	1939
Low	6.4	7.9	10.6	9.0	$0.11	$0.41	$ 0.58	$0.38
Medium	7.9	7.2	11.6	12.1	.29	.40	.60	.54
High	9.8	10.5	12.2	11.9	.46	.47	.65	.60
Flat rate	7.8	18.0	13.4	11.5	.37	.81	.63	.60

Relation of Plants Used per Acre to Returns from Tomatoes

The 54 growers who kept accounts in 1939 averaged 3040 plants per acre (table 30). Most growers used an even 3000 plants. Only 8 growers used less than 3000. The group averaging more than 3000 plants per acre obtained a yield of 12.8 tons per acre as compared with the average of 11.1 tons. This group which used more than 3000 plants per acre averaged $.60 return per hour of labor or $.08 higher than the average of all accounts and $.10 per hour more than those who used 3000 plants or less per acre.

TABLE 30. RELATION OF PLANTS USED PER ACRE TO RETURNS FROM TOMATOES
54 Accounts in Monroe, Orleans and Niagara Counties, 1939

Plants used per acre	Number of accounts	Plants per acre		Yield in tons	Returns per hour of labor
		Total	Filled in after setting		
Less than 3000	8	2809	71	11.3	$ 0.50
3000	31	3000	36	10.3	0.50
More than 3000	15	3329	84	12.8	0.60
All accounts	54	3040	55	11.1	$ 0.52

The difference in average number of plants set was not due to the replacement of plants which had died. There was very little difference in number of plants "filled in" by the group which planted less than 3000 plants per acre and the group which planted more than 3000. On the average, 55 plants were "filled in" per acre by all growers.

In 1934 there was a greater variation in the number of plants used per acre than in any of the three later years. Ten growers who used less than 3000 plants per acre averaged 2230 and 61 growers using more than 3000 averaged 3516 plants per acre (table 31). In the last two years the proportion using less than 3000 plants per acre has decreased and the proportion using an even 3000 plants has increased. Each year the group using more than 3000 plants per acre

has obtained higher yields than those using an even 3000 or less. In 1938 and 1939 the yield per acre for those growers who planted fewer than 3000 plants averaged higher than for those planting an even 3000. However, there were only 9 growers in 1938 and 8 growers in 1939 in the former group as compared with 31 for both years in the latter group.

TABLE 31. RELATION OF NUMBER OF PLANTS PER ACRE TO THE YIELD PER ACRE OF CANNING FACTORY TOMATOES

Farms with number of plants	Average number plants				Yield per acre			
	1934	1937	1938	1939	1934	1937	1938	1939
Less than 3000	2230	2718	2768	2809	6.8	7.7	10.9	11.3
3000	3000	3000	3000	3000	8.2	9.1	10.5	10.3
More than 3000	3516	3206	3261	3329	8.5	10.4	13.6	12.8

Returns per hour of labor for all four years have been higher for those who used more than 3000 plants per acre as compared with those who used 3000 plants or less per acre (table 32).

TABLE 32. RELATION OF NUMBER OF PLANTS PER ACRE TO RETURNS PER HOUR OF LABOR TO GROW, HARVEST AND DELIVER CANNING FACTORY TOMATOES

Number of plants	Yield per acre				Returns per hour of labor			
	1934	1937	1938	1939	1934	1937	1938	1939
Less than 3000	6.8	7.7	10.9	11.3	$0.29	$0.42	$0.51	$0.50
3000	8.2	9.1	10.5	10.3	.33	.46	.63	.50
More than 3000	8.5	10.4	13.6	12.8	.37	.49	.65	.60

Relation of Manure Application to Yields and Returns in 1939

Thirty-six of the 54 growers applied manure in 1939. The average yield of tomatoes for the 18 growers applying 8 tons of manure or less was 11 tons per acre (table 33). The average yield for the 18 applying 9 tons or more per acre was 12 tons but among these the growers using over 12 tons of manure also spent more than the average amount for fertilizer. The growers who used heavier applications of manure obtained slightly higher returns per hour of labor. The group applying less than 8 tons per acre averaged returns of $.52 per hour of labor, those applying 9 to 11 tons received $.58 and those applying 12 tons or more received $.60.

TABLE 33. RELATION OF TONS OF MANURE APPLIED TO YIELDS AND RETURNS
54 Accounts in Monroe, Orleans, and Niagara Counties, 1939

Tons of manure applied per acre in 1939	Number of accounts	Average tons applied per acre, 1939	Total tons of manure charged per acre	Cost of fertilizer per acre	Average yield in tons	Returns per hour of labor
8 or less	18	4.2	2.5	$10.45	11.1	$0.52
9 to 11	13	9.7	4.6	10.03	12.2	.58
12 or more	5	12.9	6.2	12.26	12.1	.60
All accounts applying manure in 1939	36	6.5	3.4	$10.41	11.5	$ .54
Accounts applying no manure in 1939	18	-	0.6	$11.13	10.2	$ .49
All accounts	54	4.5	2.5	$10.63	11.1	$ .52

The 18 growers who applied no manure in 1939 had applied very little in previous years. They spent slightly more than average in fertilizer but obtained somewhat lower yields and slightly lower returns per hour of labor than the average of those who applied manure in 1939.

Relation of Fertilizer Expense to Yield and Returns

All growers used some commercial fertilizer in 1939. The acreage application for the 54 accounts was 653 pounds per acre at a cost of $10.63 (table 34). In addition 2½ tons of manure per acre were charged to the 1939 crop. When separated into three groups on basis of expenditure for fertilizer, the group spending $9 or less applied an average of 478 pounds of fertilizer and obtained yields of 9.8 tons and returns per hour of labor of $.44. The group which used $13 or more for fertilizer applied an average of 912 pounds and also used more than an average amount of manure. This group obtained average yields of 12.2 tons per acre and labor returns of $.54 per hour.

TABLE 34. RELATION OF FERTILIZER EXPENSE TO YIELD
54 Farms in Monroe, Orleans, and Niagara Counties, 1939

Cost of fertilizer per acre	Number of accounts	Average cost of fertilizer per acre	Pounds of fertilizer per acre	Tons of manure charged per acre	Average yield in tons	Returns per hour of labor
$9 or less	16	$ 6.59	478	2.1	9.8	$0.44
$10 to $12	21	10.02	601	2.1	11.4	.57
$13 or more	17	15.81	912	3.5	12.2	.54
All accounts	54	$10.63	653	2.5	11.1	$0.52

The four years' results show that the yield increased as the average cost and amount of fertilizer was increased (table 35). Growing conditions varied considerably during the four years but each year both yields and returns per hour increased with heavier expenditures for fertilizer. The rainfall during the 1934 and 1939 growing seasons was decidedly below normal. The 1937 and 1938 growing seasons were approximately normal.

TABLE 35. RELATION OF FERTILIZER EXPENSE PER ACRE TO RETURNS PER HOUR OF LABOR TO GROW, HARVEST AND DELIVER CANNING FACTORY TOMATOES

Cost of fertilizer per acre	Yield per acre				Returns per hour of labor			
	1934	1937	1938	1939	1934	1937	1938	1939
Low	7.4	8.1	11.0	9.8	$0.34	$0.43	$0.57	$0.44
Medium	8.2	8.5	10.5	11.4	.34	.44	.60	.57
High	9.9	11.4	13.2	12.2	.39	.51	.66	.54

Relation of Number of Cultivations to Returns from Tomatoes

Increased cultivations failed to improve either yields or returns in 1939. Of the 54 growers who kept accounts in 1939, five cultivated twice, 21 three times, 12 four times and 16 five or more times (table 36). Yields were very slightly higher and returns considerably higher than average for the 5 growers who cultivated but twice during the season. Both yields and returns per hour of labor were lower than average for the 16 growers who cultivated 5 or more times.

TABLE 36. RELATION OF NUMBER OF CULTIVATIONS TO RETURNS FROM TOMATOES 54 Accounts in Monroe, Orleans, and Niagara Counties, 1939

Number of cultivations	Number of accounts	Yield in tons	Total costs per acre	Returns per hour of labor
2	5	12.0	$ 102	$ 0.61
3	21	11.2	96	.51
4	12	11.3	101	.54
5 or more	16	10.5	94	.48
All accounts	54	11.1	$ 97	$ 0.52

In the three previous years for which accounts are available growers obtained slight increases in yield with increased number of cultivations (table 37). Returns per hour of labor also either increased slightly or else held its

own with more work applied in cultivations. With the exception of the 1939 yield and returns the results would indicate that though returns per hour of labor may not increase with more cultivations the grower can still spend more time in cultivating at the same rate per hour. As long as returns per hour are relatively good, a farmer may be better off to spend more time cultivating.

TABLE 37. RELATION OF NUMBER OF CULTIVATIONS TO RETURNS PER HOUR OF LABOR TO GROW, HARVEST AND DELIVER CANNING FACTORY TOMATOES

Number of cultivations	Yield per acre				Returns per hour of labor			
	1934	1937	1938	1939	1934	1937	1938	1939
Low	7.4	8.9	10.7	11.4	$0.31	$0.45	$0.61	$0.54
Medium	8.5	9.3	12.2	11.3	.37	.43	.62	.54
High	8.2	9.9	12.0	10.5	.37	.51	.61	.48

Relation of Hours of Hoeing and Weeding per Acre to Yields and Returns

Fourteen of the 54 growers in 1939 spent no time hoeing or weeding their tomatoes while 18 growers spent an average of 11 hours per acre (table 38). On the average 6 hours or slightly less than one-fifth of the growing labor was spent at this practice in 1939. In general, the growers who hoed and weeded their tomatoes in 1939 obtained slightly higher yields and substantially higher labor returns per acre than the 14 who did not hoe or weed. The group of 18 growers who spent 7 or more hours hoeing or weeding obtained average yields and netted returns of $.56 per hour of labor. The 14 growers who did not hoe or weed averaged 9.6 tons of tomatoes per acre and returns of $.44 per hour of labor.

TABLE 38. RELATION OF HOURS OF HOEING AND WEEDING PER ACRE TO RETURNS
54 Accounts in Monroe, Orleans, and Niagara Counties, 1939

Hours hoeing and weeding per acre	No. of acts.	Hours hoeing and weeding per acre	Yield in tons	Man hours growing per acre	Returns per hour of labor
None	14	0	9.6	29	$ 0.44
2 to 6	22	.3	11.8	31	.52
7 or more	18	11	11.3	36	.56
All accounts	54	6	11.1	32	$ 0.52

In the two previous years the relationship between hours of hoeing and weeding and yield and returns is much less distinct. In 1937 those growers who hoed or weeded obtained slightly better yields than the growers who did not spend any time at this practice but in 1938 no increase in yield resulted from the extra time at this work (table 39). Returns per hour of labor in 1938 were lowest for the group which spent the most time at hoeing and weeding. In 1937 the group which spent no time at hoeing and weeding obtained the lowest returns for their time. In both 1937 and 1938 those who spent an average amount received good yields and the highest returns per hour of labor. Hoeing and weeding labor

TABLE 39. RELATION OF HOURS OF HOEING AND WEEDING TO RETURNS PER HOUR OF LABOR TO GROW, HARVEST AND DELIVER CANNING FACTORY TOMATOES

Hours of hoeing and weeding	Yield per acre			Returns per hour of labor		
	1937	1938	1939	1937	1938	1939
None	8.4	12.8	9.6	$ 0.37	$ 0.63	$ 0.44
Medium	10.1	11.0	11.8	.57	.70	.52
High	9.4	11.5	11.3	.43	.50	.56

was not obtained separately in 1934.

Relation of "Filling In" to Yields and Returns

After completing the regular planting operations, approximately two-thirds of the growers in 1939 replaced the plants which had died. This practice of "filling in" had no effect on yields in 1939. The total cost per acre and per ton was slightly lower for the group which spent no time filling in but this advantage resulted in a return per hour of labor of only 3¢ above the 51¢ per hour received by the group which spent no time at this work (table 40).

TABLE 40. RELATION OF "FILLING IN" TO RETURNS FROM TOMATOES
54 Farms in Monroe, Orleans and Niagara Counties, 1939

Practice	Number of accounts	Acres per farm	Plants per acre	Yield (tons)	Total cost per acre	Plants filled in	Total cost per ton	Returns per hour of labor
Growers who "filled in"	34	6.7	3056	11.2	$ 100	111	$ 8.92	$ 0.51
Growers who did not "fill in"	20	9.7	3021	11.1	94	-	8.49	.54
All accounts	54	7.8	3040	11.1	$ 97	55	$ 8.72	$ 0.52

Analysis of 1937 and 1938 accounts indicates a slight increase in yield on farms where "filling in" the missing places was practiced (table 41). In general, increased costs of replanting absorbed the higher returns without increasing the return per hour of labor. But this does not mean that "filling in" does not pay. With relatively good returns per hour of labor a grower can afford to put in more hours at the same rate if the pressure of other work is not too great. On the average growers who "filled in" used more hours of labor but obtained as high returns per hour of labor as those who did not "fill in".

TABLE 41. RELATION OF "FILLING IN" TO RETURNS PER HOUR OF LABOR TO GROW, HARVEST AND DELIVER CANNING FACTORY TOMATOES

Practice	Yield per acre			Returns per hour of labor		
	1937	1938	1939	1937	1938	1939
"Filled In"	9.9	12.1	11.2	$ 0.48	$ 0.61	$ 0.51
Did not "Fill In"	8.8	10.5	11.1	.44	.62	.54

Method of Setting and Costs and Returns

Eleven of the 54 growers set their plants by hand in 1939 (table 42). The growers setting by hand averaged 5.3 acres per farm and spent 47 hours of labor on growing as compared with 8.4 acres per farm and 30 hours of growing labor for the growers who set by machine. There was no significant difference in yield, cost per ton, or returns per hour of labor between the growers who set by the two methods.

TABLE 42. METHOD OF SETTING AND COSTS AND RETURNS
54 Farms in Monroe, Orleans and Niagara Counties, 1939

Method of setting	Number of accounts	Acres per farm	Yield per acre	Setting costs per acre	Man hours growing per acre	Total cost per ton	Returns per hour of labor
By hand	11	5.3	11.4	$ 5.50	47	$ 8.55	$ 0.51
By machine	43	8.4	11.1	4.67	30	8.75	.53
All accounts	54	7.8	11.1	$ 4.79	32	$ 8.72	$ .52

Experience of the three previous years corresponds with the 1939 results. There was no relation between the method of planting and the yield or returns per hour of labor (table 43).

TABLE 43. RELATION OF METHOD OF SETTING TO RETURNS PER HOUR OF LABOR TO GROW, HARVEST AND DELIVER CANNING FACTORY TOMATOES

Method of setting	Yield per acre				Returns per hour of labor			
	1934	1937	1938	1939	1934	1937	1938	1939
By hand	7.8	11.0	13.5	11.4	$0.33	$0.47	$0.57	$0.51
By machine	8.7	9.0	11.4	11.1	.37	.46	.62	.53

Relation of Time of Planting to Quality, Yields and Returns

In 1939 the 20 growers who planted during May 26 to 28 obtained the highest yields but the 16 growers who planted before May 26th averaged highest per cent No. 1's. Both groups averaged returns of $.54 per hour of labor (table 44). The 18 growers who planted after the 28th of May obtained yields somewhat below average. The quality as measured by per cent No. 1's was also somewhat below average for this group as were the returns per hour of labor.

TABLE 44. RELATION OF TIME OF PLANTING TO YIELDS AND RETURNS
54 Farms in Monroe, Orleans and Niagara Counties, 1939

Time of planting	Number of accounts	Yield (tons)	Average per cent No. 1's	Returns per hour of labor
May 25 or earlier	16	11.0	67	$ 0.54
May 26-28	20	11.9	62	.54
May 29 or later	18	10.2	59	.48
All accounts	54	11.1	64	$ .52

Variable results are indicated by the experience in the three preceding years. In 1938, there was practically no difference in yield whether the tomatoes were transplanted slightly before or after the usual time. In 1937, the

growers who transplanted later than usual obtained the highest yields while in 1934 those who planted late obtained the lowest yields.

During the last two years the growing conditions were such that those who transplanted their tomatoes earlier than usual had the highest per cent No. 1's. In 1937 the growers who planted later than usual had the best quality and the highest yields. The relationship of time of planting to per cent No. 1's was not obtained in 1934.

TABLE 45. RELATION OF TIME OF TRANSPLANTING TO QUALITY AND YIELDS OF CANNING FACTORY TOMATOES

Time of transplanting	Yield per acre				Per cent No. 1's			
	1934	1937	1938	1939	1934	1937	1938	1939
	*	**	***	***				
Early	7.8	8.2	11.9	11.0		61	61	67
Usual	9.2	9.5	11.8	11.9		60	59	62
Late	7.2	10.7	11.3	10.2		65	56	59

	Early	Usual	Late
*	Before May 27	May 27-June 3	After June 3
**	May 23-29	May 30-June 4	June 4 or later
***	May 26 or earlier	May 27-29	May 30 or later

A.E. 306 re.

A COMPARISON OF YOUR TOMATO CROP WITH AVERAGES OF ALL ACCOUNTS

	Your crop		Western New York 54 accounts 1939	Western New York 64 accounts 1938
Acres of tomatoes			7.8	7.4
Tons per acre			11.1	11.7
	Total	Per Acre	Per Acre	Per Acre
Total Receipts*	$	$	$130.48	$149.46
Growing Costs:				
Use of land	$	$	$ 6.19	4.62
Manure			6.18	7.15
Green manure			0.68	0.81
Fertilizer			10.63	11.89
Plants			17.24	17.21
Plowing			2.94	2.68
Fitting			3.17	2.83
Fertilizing			0.89	0.95
Setting			4.79	4.95
Filling in			0.14	0.31
Cultivating			4.54	4.36
Hoeing and weeding			1.68	1.98
Other			1.38	1.52
Total Growing Costs	$	$	$ 60.45	$ 61.26
Harvesting and Selling Costs:				
Picking	$	$	$ 28.22	$ 30.96
Delivering			7.74	8.84
Other			0.60	0.29
Total Harvesting and Selling Costs	$	$	$ 36.56	$ 40.09
Total Growing and Harvesting	$	$	$ 97.01	$101.35
Gain or Loss	$	$	$+33.47	$+48.11

*Includes factory sales, market sales, and tomatoes used at home.

A.E. 306 re.

A COMPARISON OF YOUR TOMATO CROP WITH AVERAGES OF ALL ACCOUNTS

	Your crop	Western New York 54 accounts 1939	Western New York 64 accounts 1938
Acres of tomatoes per farm	_____	7.8	7.4
Tons of tomatoes per acre	_____	11.1	11.7
Plants per acre	_____	3040	3050
Per cent No. 1's	_____	64	61
Per cent No. 2's	_____	35	38
Per cent culls	_____	1	1
Average price per ton	$_____	$ 11.73	$ 12.77
Growing cost per ton	$_____	$ 5.43	$ 5.24
Harvesting and selling cost per ton	$_____	$ 3.29	$ 3.42
Total cost per ton	$_____	$ 8.72	$ 8.66
Gain or loss per ton	$_____	$ 3.01	$ 4.11
Pounds of fertilizer per acre	_____	653	720
Tons of manure* per acre	_____	2.5	3.0
Tons of manure applied per acre	_____	4.5	5.2
Cost per hour of man labor	$_____	$ 0.29	$ 0.30
Man hours per acre growing	_____	32.4	33.6
Man hours per acre picking	_____	100.4	103.0
Man hours per acre delivering	_____	9.7	10.8
Total man hours per acre	_____	142.5	147.4
Returns per hour of labor	$_____	$ 0.52	$ 0.63

* Includes 40 per cent of that applied in 1939; 30 per cent of that applied in 1938; 20 per cent of that applied in 1937; and 10 per cent of that applied in 1936.