June 1985

A.E. Res. 85-12

ENTERPRISE BUDGETS FOR POTATOES, WHEAT, CAULIFLOWER, PEACHES AND TABLE GRAPES ON LONG ISLAND, NEW YORK:

A Comparison of Costs, Returns and Labor Requirements

Mildred E. Warner

Department of Agricultural Economics
Cornell University Agricultural Experiment Station
New York State College of Agriculture and Life Sciences
A Statutory College of the State University
Cornell University, Ithaca, New York, 14853

FOREWORD

The crop budgets presented in this paper were developed as a part of the author's research for her Masters thesis, "Alternatives for Long Island Agriculture: The Economic Potential of Peaches and Table Grapes".

This project required much interdisciplinary cooperation. Farmers, extension agents, and researchers on Long Island, New York provided much of the necessary data. Joe Siezcka, Director of the Long Island Horticultural Research Laboratory, and Cooperative Extension Agents Jeanette Smith, Dale Moyer, Bill Sanok, and Tom Zabadal were especially helpful.

Drs. Warren Stiles and James Barstch of Cornell University and Drs. Bruce Reisch, Helmut Riedl, Roger Pearson, Robert Pool, and Robert Lamb, and Gary Howard at the New York State Agricultural Research Station in Geneva, New York provided expert advice on the production, pesticide programs, and storage of peaches and table grapes.

The author would like to thank members of her thesis committee, Drs. G.B. White, B.F. Stanton, and D.R. Lee for their reviews of the earlier drafts of this report. Cindy Farrell deserves special recognition for her excellent job of word processing.

Funds to support this project were provided by Hatch Project NY(C) 121403, "Economic Analysis of the Adjustment Potential for Suffolk County Agriculture".

Naturally, any remaining errors are the sole responsibility of the author.

Copies of this publication may be obtained from:

Office of Publications
Department of Agricultural Economics
Warren Hall
Cornell University
Ithaca, New York 14853-7801

TABLE OF CONTENTS

LIST OF TABLES

LIST OF TABLES continued

ENTERPRISE BUDGETS FOR POTATOES, WHEAT, CAULIFLOWER, PEACHES, AND TABLE GRAPES ON LONG ISLAND, NEW YORK: A COMPARISON OF COSTS, RETURNS, AND LABOR REQUIREMENTS

INTRODUCTION

Traditional Long Island agriculture is in a state of crisis. Urbanization pressures and groundwater contamination by pesticides are forcing traditional potato farmers to make changes in their farming system. Although potatoes still hold their importance as the largest agricultural land user on the Island, potato acreage has dropped by 50 percent in the last 13 years (U.S. Department of Commerce).

The need for a more ecologically sound system of agriculture is highlighted by the development of Colorado Potato Beetle resistance to pesticides and contamination of the groundwater by those same pesticides. Due to decreasing effectiveness of chemical controls, Long Island farmers are forced to practice crop diversification and rotation if they wish to survive in agriculture.

Enterprise budgets have been developed in order to determine the relative profitability of rotations of potatoes with vegetable and field crops, and diversification into fruit on Long Island potato farms. The purpose of this paper is to present, in detail, the enterprise budgets developed for potatoes, wheat, cauliflower, peaches, and table grapes on Long Island. These budgets were designed for use in a linear programming model of the transition from potatoes into peaches and table grapes on Long Island potato farms (A.E. Res. 85-13). It is hoped that they will prove useful to extension agents, farmers, and other researchers.

These budgets present costs, returns, and labor use in considerable detail. Pesticide programs are explicitly considered as are marketing, transportation, and storage costs. Labor is divided by skill level and activity so that growers can compare these budgets with their own practices to determine the appropriate costs and returns for their own farms.

This paper is organized as follows. The first section outlines the resource characteristics of the typical farm for which these budgets have been developed. Next, the method by which the budgets were developed is described. Then follow detailed descriptions of the budgets for rotated or continuous production of the annual crops of potatoes, wheat, and cauliflower. Budgets for the establishment and production of table grapes and peaches are presented in detail.

In conclusion, the labor requirements, marketing costs, and other production costs and net returns are compared for all crop combinations. Finally, a net present value analysis is used to compare the profitability of the perennial crops, peaches, and table grapes, with the annual cropping options of potatoes, wheat, and cauliflower.

RESOURCE CHARACTERISTICS OF A TYPICAL POTATO FARM

The budgets presented in this paper are based on the resource characteristics of a 150 acre potato farm as presented in the 1983 survey of Long Island farmers by Fohner (1983). Fixed costs and machinery replacement were not accounted for separately in the budgets but were taken out of the farm income as a whole. They are presented here in order to give the reader an idea of the resources upon which these budgets are based. Discrepancies between an individual's costs and returns and those presented in these budgets could be explained in part by different farm resource characteristics in land, buildings, machinery, and labor.

Building Complement and Fixed Costs

In these budgets, the returns from production are returns to fixed resources and management. Fixed costs have not been subtracted but it is important to represent them since they are substantial and must come out of net returns. The fixed costs include land rent, land and building taxes, insurance, and building repairs.

The building complement for the farm was composed of the following:

	1982-1984 New Cost
House for labor	$25,000
Shop, 30' by 40'	14,400
Equipment storage, 40'	26,600
Potato storage[1]	20,400
	$86,400

This complement was adapted from potato budgets for Long Island by Casler (1982). Insurance, taxes, and repairs were derived from percentages of new cost given by Wackernagel, et al. (1979):

Insurance = 1.5 percent of $86,400 =	$1,296
Taxes on buildings = 0.875 percent of $86,400 =	756
Repairs and maintenance = 2.0 percent of $86,400 =	1,728
	$3,780

If peaches and grapes were brought into production, the building complement would be augmented to include a cold storage facility for storing and precooling the fruit. The cost ($18,703) of building the unit

---

[1] In a 1981 survey of Long Island potato growers, Snyder (July 1982) estimated storage building costs at $0.18 per hundredweight. With 75 acres of potatoes and an average yield of 272 hundredweight per acre, the $0.18 per hundredweight storage building cost would yield $3,672 in yearly storage building costs. Assuming the yearly building cost to be 18 percent of the new value yields a new value of of $20,400 for potato storage.

could be met with intermediate term loans.[2]

Taxes and insurance would increase to reflect the additional value of the cold storage unit (Taxes [0.875 percent x $18,703 = $163.65] plus Insurance [1.5 percent x $18,703 = $280.55] equal total additional fixed costs of $444). Variable costs, electricity, and labor for all storage units (potatoes and fruit) were charged as costs of production in the crop budgets.

Another major component of fixed costs was land taxes and rent. It was assumed that half of the farm was rented land. An average rental rate of $75 per acre (Snyder, July 1982) yielded $5,625 in rent payments each year. Property taxes on the owned land were based on 1984 agricultural use value assessments for Long Island from the New York State Board of Equalization and Assessment. Agricultural use values were $510 per acre of cropland, $900 per acre of orchard, and $1,470 per acre of vineyard. Tax rates on real property in Suffolk County ranged from $9 to $33 per $1,000 of assessed value in 1981 (State of New York, 1982). The higher figure represents a 3.3 percent tax rate. This higher rate was used to estimate farmland taxes (Table 1).

Table 1
AGRICULTURAL USE VALUES AND TAX RATES FOR LONG ISLAND, 1984

	Assessed Agricultural Use Value	Taxes Paid*	Additional Over Cropland Base Tax
	- - - - - - - - - - - -	cost per acre	- - - - - - - - - -
Cropland	$ 510	$16.83	---
Orchards	900	29.70	$12.87
Vineyards	1,470	48.51	31.86

*Based on a 3.3 percent tax rate.

SOURCE: New York State Board of Equalization and Assessment, "Establishment of Final 1984 Agricultural Use Values", Albany, NY, 1984.

Land taxes were determined from agricultural use values. They were based on the cropland rate and totaled $1,263. The additional tax required for orchards and vineyards was considered a variable cost in the peach and grape budgets.

---

[2] For more detail on the cold storage requirements of peaches and table grapes, and the construction and operating costs of the cold storage unit, see the Appendix.

The total annual fixed costs were:

Rent	$ 5,625
Land taxes	1,263
Insurance	1,296
Building taxes	756
Repairs and maintenance	1,728
	$10,668

Annual fixed costs of $11,112 were charged after the cold storage facility was built. These costs were not included in the crop budgets because they did not vary with crop mix.

Machinery Complement

The machinery complement was adapted from the machinery complement used for the budgets built by Fohner (1983) and Lazarus (1983). One major change was that the irrigation system was assumed to be moveable pipe instead of a big gun system. This reflected Fohner's survey results showing 119 of the 122 farms which had irrigation to have this type. Moveable pipe makes sense in orchards and vineyards since it sprays less water on the leaf canopy than the big gun system thereby reducing the danger of fungal diseases in the foliage. Piping requirements and costs were taken from Dhillon (1979). The rest of the machinery complement remained the same except for major adjustments in the price of bulk bodies and the inclusion of a fertilizer spreader, a flatbed truck, and two pickup trucks. For expected life, average new costs, speed, and field efficiency data, see Table 2.

Another major change in the machinery complement was the addition of machinery specifically required for the grape and peach operations (Table 3). This complement was decided upon after discussions with researchers, extension agents, and farmers. Although many farmers use or adapt different types of machinery according to their own operational needs, this complement was designed with the idea that machinery could be used in both the orchard and the vineyard. This reflected the assumption that few farmers would invest in machinery that was not versatile enough to be used on more than one crop on a multiple enterprise farm.

Machinery Replacement

Although machinery replacement costs were not represented in the budgets, these costs had to be considered. Many farms today are in some sense overcapitalized. Farmers often complain that if they had to replace their machinery complement at today's prices, they would not be able to do so. High interest rates have encouraged farmers to make repairs on machinery which in other times they might have replaced. The uncertainties of the future of potato production on Long Island have resulted in most farmers using machinery far longer than would normally be considered an economically useful life. Purchase of used machinery has also become a common way of upgrading or maintaining the machinery complement.

Since used farm equipment prices are so variable, average new prices from the 1982 to 1984 period were used except where indicated (e.g., the case of bulk bodies which no one on Long Island buys new anymore). It was assumed that each year a farmer might set aside a certain amount of capital to use in replacing worn out or obsolete machinery. This figure was

Table 2
MACHINERY COMPLEMENT FOR TYPICAL LONG ISLAND POTATO FARM

Machine	Expected Life	Average New Cost 1982-1984	Speed (mph)	Field Efficiency
Tractor, 40 hp	12,000 hrs	$ 14,500	---	--
Tractor, 60 hp	12,000 hrs	17,900	---	--
Tractor, 100 hp	12,000 hrs	36,300	---	--
Rollover plow with clodbuster, 4-16" bottoms	2,500 hrs	9,500	4.0	0.8
Sprayer, 48' boom	3,000 hrs	13,500	4.5	0.5
Potato cultivator, 4-row	2,500 hrs	2,400	4.0	0.8
Potato planter, 4-row	1,500 hrs	15,000	4.0	0.65
Disk harrow, 13'	2,500 hrs	4,950	5.0	0.8
Potato harvester, 2-row	2,500 hrs	31,000	2.0	0.6
3 bulk bodies, 18' with truck (used)	10 yrs	30,000	---	--
Seed cutter		4,000	---	--
Grain drill, 18 x 7	1,000 hrs	5,100	4.0	0.7
Fertilizer spreader, PTO broadcaster w/banding attach.	1,200 hrs	800	3.0	0.7
Transplanter, 4-row	2,500 hrs	2,400	1.0	0.7
Cultivator, 4-row	2,500 hrs	3,000	4.0	0.8
2 wagons	20 yrs	5,000	---	--
Flatbed truck	15 yrs	19,500	---	--
Pickup truck (2)	6 yrs	21,500	---	--
Irrigation System				
Well	25 yrs	8,000	---	--
Turbine	12,000 hrs	7,500	---	--
6" main pipe permanently installed 3,300 ft. at $2.80/ft.	15 yrs	9,240	---	--
2" lateral pipe, uprisers & sprinklers, 13,300 ft. at $35/40 ft.	15 yrs	11,638	---	--
		$272,728		

SOURCES: Dhillon, Pritam S. "Cost of Producing Selected Fresh Market Vegetables in South Jersey", Department of Agricultural Economics and Marketing, New Jersey Ag. Expt. Sta., Rutgers, New Brunswick, New Jersey, August 1979.

Knoblauch, Wayne A., "Farm Machinery Economics", Department of Agricultural Economics, Cornell University, Ithaca, New York, 1982.

Lazarus, S.S., G.B. White, "The Economic Potential of Crop Rotations in Long Island Potato Production", A.E. Res. 83-20, Cornell University, Ithaca, New York, May 1983.

Table 3
ADDITIONAL MACHINERY NEEDED FOR GRAPE AND PEACH PRODUCTION

	Expected Life	1982-1984 Price	MPH	Field Efficiency
Orchard/Vineyard Air Blast Sprayer, 160 gallon tank, PTO	2,500 hrs	$ 7,275	2.5	0.8
Herbicide Sprayer, 100 gallon tank w/boom	20 yrs	1,230	2.5	0.8
Rotary Mower (mowing)	2,000 hrs	4,380	3.0	0.8
(brush chopping)		--	1.0	0.8
Small Disc	2,500 hrs	1,450	3.0	0.8
Trailer	20 yrs	673		
Post Driver	15 yrs	1,988		
Auger	15 yrs	1,350		
Orchard Pruning Guns, 2 at $317/each	10 yrs	634		
Air compressor	10 yrs	1,200		
50 ft. hoses, 2	10 yrs	100		
Couplers	10 yrs	30		
Hand Shears, 6 at $14/each	10 yrs	84		
Lopping Shears, 6 at $39/each	10 yrs	234		
Saws, 6 at $15/each	10 yrs	90		
Ave Alarms (2 noisemakers to scare birds)	5 yrs	600		
Ladders, 5 at $100/each	15 yrs	500		
		$21,818		

SOURCE: Various machinery supply companies, 1984.

Whitaker, D.B. and G.B. White, "Economic Profiles for Apple Orchards and Vineyards", A.E. Res. 82-48, Cornell University, Ithaca, New York, December 1982.

determined by taking the total replacement cost of the machinery complement, subtracting 10 percent for salvage, and dividing the remainder over a 15 year replacement period (Table 4).

Table 4
MACHINERY REPLACEMENT FUND

Estimated current replacement value of existing machinery complement	$272,728
New cost of additional machinery purchased for fruit operation	+ 21,818
Total Replacement Cost of Complete Machinery Complement	$294,546
10 percent salvage value	- 29,455
Total Needed for Machinery Replacement	$265,091
Replacement occurs over a 15 year period	÷ 15
Annual Contribution to Machinery Replacement Fund	$ 17,673

Machinery Variable Costs

Machinery variable costs were derived from hours of use, repair costs, and fuel costs according to the system outlined by Knoblauch in "Farm Machinery Economics".

Hours of use were determined through the economic engineering approach according to the following equation:

$$\frac{\text{Acres}}{\text{Hour}} = \frac{\text{Width (in. of ft.) x Speed (mph) x Field Efficiency (decimal)}}{\text{in. = 100 or ft. = 8.33}}$$

See example worksheet on Table 5.

The only cases where this approach was not used were in some of the orchard and vineyard operations where row width and machine width required portions of the field to be covered twice and others to be avoided.[3]

---

[3] The orchard mower which covers the sod middles between the tree rows illustrates this approach.
1 acre = 43,560 sq. ft. = 209' x 209'
20' by 20' spacing in the orchard = 10.5 rows per acre
20' row middle = 8' herbicide ban under trees + 12' sod row middles
72" mower width requires covering each row twice
2 passes x 10.5 rows x 209' = 4,389 linear feet/acre
3 mph operating speed x 5,280' per mile = 15,840' per hour
15,840' per hour ÷ 4,389' per acre = 3.61 acres per hour
3.61 acres per hour x 80% field efficiency = 2.89 acres per hour or 0.35 hours per acre

Table 5

Machine: ORCHARD/VINEYARD SPRAYER

Crops: ORCHARD/VINEYARD

FARM MACHINERY ECONOMICS

Cost of Using Machinery

Example Worksheet

1. Acres/Hour $\dfrac{\text{Width (ins.) } \overset{240^{a}}{108^{b}} \times \text{ Speed (m.p.h.) } 2.5 \times \text{ Field efficiency (decimal) } 0.8}{100}$	1. 4.8^{a} Acres 2.2^{b} Acres
2. Hours of use per year* = acres covered (12 sprays x 40 acres) 480 ÷ acres per hour (line 1) = 50 acres^{1} + 109.1 acres^{2}	2. 159.1 Hours
3. Total hours of use = hours of use per year (line 2) x years of use (10)	3. 1,591 Hours
4. Total repair costs of use for 1,591 (line 3) hours [Table 2]	4. 43%
5. Annual repair costs (line 4 (decimal) x manufacturer's list price $7,275 ÷ years (10)	5. 312.83 $/Year
6. Hourly repair costs (line 5 ÷ line 2 hours of use per year)	6. 1.97 $/Hour
7. Cost of fuel & lubricants/hr. = p.t.o. 40 x $\left[\begin{array}{l} :0690 \text{ for gasoline} \\ :0504 \text{ for diesel} \\ :0828 \text{ for LP gas} \end{array}\right]$ x $1.30/gallon	7. 2.62 $/Hour
8. Total cost per hour = (line 6 + 7)	8. 4.59 $/Hour
9. Total cost per acre = line 8 ÷ line 1	9. 0.96 $\$/\text{Acre}^{1}$ 2.09 $\$/\text{Acre}^{2}$

---

*Based on 20 acres of peaches and 20 acres of grapes.

[a] Peaches

[b] Grapes

Machinery variable costs depend greatly on the actual number of acres in each crop. These cost calculations were based on 40 acres of orchards and vineyards, 75 acres of potatoes, 25 acres of cauliflower, and 200 acres of field crops (cover crops plus 50 acres of wheat planted to harvest). See Tables 6 and 7 for machinery time requirements and variable costs.

The economic engineering approach was also used to determine labor requirements. The machinery time requirement was increased (usually by a multiplier of 1.1) to reflect the additional time spent by the worker in hooking up the machine and getting to and from the field. Although this approach did not yield a true reflection of any one farmer's time, it did insure that labor requirements for all crops were figured on the same basis. Labor requirements are given in Table 8.

Prices and Wage Rates

Input prices were determined by discussions with the major input suppliers on Long Island: the Long Island Cauliflower Association and Agway (Table 9).

Wage rates were taken from Snyder's study of wage rates on fruit farms in New York State in 1983. The wage rate for skilled, full-time labor was estimated at $5.15 per hour plus $0.55 for Social Security and Workmen's Compensation and $1.04 for benefits. The total variable cost to the grower was $6.74 per hour. The wage rate for unskilled labor was $3.88 per hour plus $0.42 for Workmen's Compensation and Social Security, and $0.06 for benefits. This brought the total variable cost for unskilled labor to $4.36 per hour. These rates were representative of wages described by Long Island growers in interviews in October 1984.

ANNUAL CROP BUDGETS

The budgets included in this model for the annual crops were based on the budgets designed by Lazarus and Fohner. They were revised to reflect current prices and grower practices. Through interviews with university, experiment station, and extension personnel, the fertilization and liming rates, pesticide programs, and some cultural practices were revised to more accurately reflect grower practices on the Island.

Considerable revision occurred in the areas of storage, marketing, and producer prices. Storage and marketing were sometimes left out of the previous budgets and while they were not major items, they had to be included in order to yield a more accurate comparison with fruit crops for which these factors were quite important. Considerable attention was given to clarifying the marketing outlet and the appropriate producer price. For example, the earlier potato budgets used the price paid for graded potatoes without including a charge for grading. Transportation and labor to carry the crop to market were also included in these revised budgets.

Separate budgets were developed for potatoes, wheat, and cauliflower grown in continuous production and in rotation. Two rotations with potatoes were analyzed. In one, a year of potatoes was followed by a double crop of wheat and cauliflower. In the other rotation, potatoes were followed by wheat and a rye cover crop. This option was given since labor

Table 6
MACHINERY TIME REQUIREMENTS

	Tractor Used	Width (inches)	Acres per Hour	Hours per Acre
Tractor, 100 hp			2.0	0.5
Tractor, 60 hp			2.0	0.5
Tractor, 40 hp			2.0	0.5
Rollover Plow 4-16" w/clodbuster	100	80	2.56	0.39
Sprayer, 48' boom	60	576	13.0	0.08
Potato Cultivator (4-row)	60	144	4.6	0.22
(modified & used to mark orchard & vineyard)			2.0	0.50
Potato Planter (4-row)	100	144	3.74	0.27
Irrigation - moveable pipe				0.83/in.
Disk Harrow, 13'	60	156	6.24	0.16
Potato Harvester, 2-row	100	72	0.86	1.16
18 ft. Bulk Body w/truck			0.86	1.16
Potato Seed Cutter			0.50	2.0
4-row Transplanter (field)	60	120	0.84	1.19
(vineyard)		108	0.72	1.39
Grain Drill	60	126	3.53	0.28
2 Wagons	60		3.31	0.30
Trailer	40		3.31	0.30
4-row Cultivator	60	120	3.84	0.26
Orchard/Vineyard Sprayer				
(orchard)	40	240	4.8	0.21
(vineyard)		108	2.2	0.45
Weed Sprayer w/boom				
(orchard)	40	240	4.8	0.21
(vineyard)		108	2.2	0.45
Fertilizer Spreader				
(orchard)	40	240	5.04	0.20
(vineyard)		108	2.27	0.44
(top dress)		480	10.08	0.10
(side dress)		143	3.0	0.33
Mower (orchard)	40	72	2.89	0.35
(brush chopping orchard) (2 passes)			1.01	1.98
(brush chopping vineyard) (2 passes)			0.89	2.28
Small Disc	40	72	2.64	0.38
Auger (set anchors, vineyard)	40		0.31	3.25
(planting peaches)			0.28	3.60
Post driver	40		0.10	10.00

Table 7
MACHINERY VARIABLE COSTS[a]

	Hourly Repair Costs ($)	Fuel & Lubricants ($)	Variable Cost/Hour ($)	Variable Cost/Acre[b] ($)
Tractor, 100 hp	1.82	covered under equipment	1.82	0.91
Tractor, 60 hp	0.90	covered under equipment	0.90	0.45
Tractor, 40 hp	0.64	covered under equipment	0.64	0.32
Rollover Plow, 4-16" w/clodbuster	3.24	8.19	11.43	4.46
Sprayer, 48' boom	12.10	3.93	16.03	1.23
Potato Cultivator, 4-row	0.98	3.93	4.91	1.07
Potato Planter, 4-row	3.00	6.55	9.55	2.55
Irrigation-moveable pipe	3.46	5.20	8.66	7.19
Disk Harrow, 13'	2.06	3.93	5.99	0.96
Potato Harvestor, 2-row	8.19	6.55	14.74	17.14
18' Bulk Body w/truck	2.48	3.93	6.41	7.45
Potato Seed Cutter	2.04	—	2.04	4.04
4-row transplanter (field)	0.64	3.93	4.57	5.44
(vineyard)				6.35
Grain drill	0.90	3.93	4.83	1.37
2 Wagons	0.66	3.93	4.59	1.39
Trailer	0.33	1.97	2.30	0.69
4-row cultivator	1.54	3.93	5.47	1.42
Post driver	0.56	2.62	3.18	31.80
Orchard/Vineyard Sprayer				
(orchard)	1.97	2.62	4.59	0.96
(vineyard)				2.09
Weed Sprayer w/boom				
(orchard)	0.15	2.62	2.77	0.58
(vineyard)				1.26
Fertilizer Spreader				
(orchard)	0.47	2.62	3.09	0.61
(vineyard)				1.36
(top dress)				0.31
(side dress)				1.03
Mower (orchard)	2.25	2.62	4.87	1.69
(brush chopping orchard, 2 passes)				9.64
(brush chopping vineyard, 2 passes)				10.94
Small Disc (vineyard)	0.57	2.62	3.19	1.21
Auger (peaches)	0.45	2.62	3.07	10.96
(grapes)				9.91
Pickup Truck[c]			0.28/mile	
Flatbed Truck[c]			0.64/mile	

---

[a] Based on a 150 acre farm with 40 acres in orchards and vineyards.

[b] Variable cost per acre calculated by dividing variable cost per hour by acres per hour (Table 6).

[c] Snyder, D.P., "Farm Cost Accounts", Department of Agricultural Economics, A.E. Res. 83-41, Cornell University, Ithaca, New York, 1983.

Table 8
LABOR HOURS PER ACRE BY ACTIVITY

Activity	Skilled	Unskilled
Plow	0.40	
Disk	0.17	
Cultivate	0.33	
Sidedress	0.33	
Spray	0.08	
Herbicide	0.12	
Drill Grain	0.28	
Topdress	0.20	
Haul Grain	0.30	
Irrigate	0.40	1.60
Cut Potato Seed	2.00	
Plant Potatoes	1.32	
Harvest Potatoes	2.40	5.20
Haul & Store Potatoes	1.00	
Load & Sell Potatoes	4.00	
Growing Cauliflower Transplants	5.00	
Pulling & Sorting Transplants	2.00	3.00
Transplant Cauliflower	2.00	4.50
Hoe & Weed Cauliflower		6.00
Tie Cauliflower		9.00
Harvest, Load & Haul Cauliflower	1.80	75.00
Sell Cauliflower	5.00	
Bed-Making Cauliflower	0.34	
Lime Cauliflower	0.30	
Spray Peaches	0.21	
Spray Grapes	0.45	
Herbicide Peaches	0.23	
Herbicide Grapes	0.50	
Fertilize Peaches	0.22	
Fertilize Grapes	0.48	
Lime Peaches	0.33	
Lime Grapes	0.72	
Mow Peaches	0.38	
Brush chop Peaches	2.20	
Brush chop Grapes	2.50	
Disk Grapes or Peaches	0.42	
Plant Cover Crop (grapes)	0.50	
Plant Grapes	4.59	
Replant Peaches	0.50	
Replant Grapes	1.00	
Layout Orchard & Vineyard	1.00	
Auger Holes Peaches	4.00	
Haul & Plant Peaches	2.00	
Paint Trees	2.00	

SOURCE: Derived from Machinery Time Requirements, Table 6, and unpublished budgets for Long Island field and vegetable crops by George Fohner, Department of Agricultural Economics, Cornell University, Ithaca, New York, 1983.

Table 9
INPUT PRICES, LONG ISLAND, NEW YORK, 1984

Seed	Price ($)
Grape Vines	1.75 each
Peach Trees	3.40 each
Potato Seed	10.50 cwt.
Cauliflower Seed	58.00 lb.
Rye	5.00 bu.
Wheat	8.40 bu.
Fescue	0.80 lb.
Perennial Rye Grass	1.05 lb.
Oats	5.76 bu.

Fertilizer	
10-10-10	200 ton
10-20-10	258 ton
Amonium Nitrate	240 ton
"Cauliflower Special" (6-12-6)	196 ton
Calcium Nitrate	210 ton
Sul-Po-Mag	188 ton
Dolomitic Lime (applied)	40 ton
Bagged Lime	64 ton
Hydrated Lime	135 ton

Herbicides	
Dual 8E	126.00 2.5 gl.
2, 4-D	10.15 gl.
Treflan 4EC	30.15 gl.
Lorox 50WP	5.90 lb.
Surflan 75WP	10.75 lb.
Premerge 3 50% EC	9.75 gl.
Princep 80WP	3.10 lb.
Paraquat (2 lb./gl.)	44.00 gl.
Sinbar 80WP	18.30 lb.
Karmex 80WP	4.05 lb.
Roundup 36%	88.50 gl.
Lexone 50 WP	19.95 lb.
Nonionic Surfactant	13.20 gl.
Dinoseb (4 lb./gl.)	9.90 gl

Insecticides	
Thiodan 3EC	23.90 gl.
Thiodan 50% WP	4.00 lb.
Diazinon 50% WP	6.80 lb.
Dipel 2X	14.10 lb.
Parathion 15% WP	0.85 lb.
Parathion 8EC	23.40 gl.
Imidan 50% WP	2.75 lb.
Sevin 50% WP	1.90 lb.
PBO (8 lbs./gl.)	56.00 qt.
Rotenone (.39 lbs./gl.)	20.75 gl.

Fungicides	Price ($)
Spreader Sticker	13.00 gl.
Captan 50% WP	1.50 lb.
Ferbam 75% WP	2.00 lb.
Sulfur 95% WP	0.30 lb.
Superior Oil	3.15 gl.
Benlate 50% WP	12.70 lb.
Bayleton 50% WP	50.70 lb.
Ronilan 50% WP	18.00 lb.
Maneb 8% pot. dust	0.29 lb.
Dithane M22 (4 lbs./gl.)	8.95 gl.
Dithane M45 (3.8 lbs./gl.)	8.12 gl.
Dithane M45 dust	1.58 lb.
Terraclor 75 WP	3.40 lb.
Pro Gib 3.91%	24.40 20 oz.
Ridomil MZ 58	7.05 lb.

Other	
Latex paint	8.00 gl.
Twine	1.54 lb.
Wire	2.10 lb.
1 Quart Tills	0.06 each
20 lb. Lug Master (& assembly)	1.35 each
30 lb. Plastic Lug	4.50 each
Wooden 3/8 bu. boxes	4.00 each
2 Quart Bag	0.096 each
3/4 Bushel Box	1.00 each
Cauliflower Crates	1.50 each
Custom combine	28.00 acre
Diesel	1.30 gl.
Commercial Shipping	
Cauliflower	0.65 crate
Peaches	0.50 3/4 bu. box
Grapes	0.50 20 lb. lug
Electricity	0.14 kilowat hour

SOURCE: Various Farm Input Suppliers, Long Island, 1984.

demands to harvest peaches and grapes in late summer and early fall might compete with labor demands for cauliflower production. The double cropping of wheat and cauliflower in the rotation would yield more income per acre than a single crop of wheat and is recommended by the Long Island Horticultural Research Station. Only wheat and cauliflower were represented in the model since they could serve as proxies for double crops of small grains (wheat or rye) followed by cole crops (cabbage, cauliflower or brocolli).

Soybeans were not considered since they have had extremely low yields (15 bushels per acre) regardless of the soil pH in experimental plots. Field corn was not considered because of its low income potential although there could be a local market for it as a feed grain for the Long Island duck farms. Oats might have a potential market in the growing number of horse farms on the Island but since they mature later than the wheat and rye, double cropping with cole crops would be sacrificed (Siezcka, 1984). Malting barley was not included because the malt houses in Buffalo and Rochester are too far away and Long Island's summers too wet to avoid discoloration of the kernel during maturity which in turn would cause discoloration of the beer (Siezcka, 1984; Pardee, 1984).

Potatoes

The potato budget reflects potato farmers' practices as of the 1984 season. The insecticide program assumed that the farmer was using a combination of products to control the Colorado Potato Beetle: Thiodan in combination with Parathion, and Rotenone in combination with P.B.O. (Table 10). Kryocide, the insecticide approved for use in 1984, was not included since its use was approved for one year only. An average of 10 insecticide and 12 fungicide sprays per season reflects local practice as witnessed by Siezcka and Moyer (1984). This was down from the 12 insecticide sprays assumed by Lazarus and Fohner.

Due to the banning of Vydate, a very expensive material, the insecticide costs were much lower in this budget than in previous ones by Lazarus and Fohner ($199 versus more than $300). It is unclear what future trends in insecticide costs will be, but increasing costs and decreasing effectiveness of spray programs seems possible. Potatoes in rotated fields showed a decrease of two sprays (from 10 to 8) and a cost savings of $38.72 over continuous potatoes.[4]

The total savings of rotated potatoes over continuous potatoes was $51.44 per acre. This reflected the savings in insecticide costs and in the costs of planting the rye cover crop. Since wheat followed rotated potatoes and was allowed to mature, the costs of planting rye were taken out of the wheat returns. For continuous potatoes, the costs of planting the rye cover crop were taken out of the potato returns.

Yield figures reflect the five year average yield for Long Island potatoes (272 hundredweight per acre) as reported in "New York Agricultural Statistics". Based on a discussion with one of the larger packers on Long Island, Agway, it was assumed that 87 percent of the harvest (237 hundredweight) was U.S. No. 1 Size A potatoes and 13 percent (35 hundredweight) was Size B. Dirt and culls delivered to the packer had no value. Size B

---

[4] A.E. Res. 85-13 shows the sensitivity of potato acreage to changes in cultural practices and insecticide costs.

Table 10
POTATO SPRAY PROGRAM

				Pounds Active Ingredient	
	Product	Rate Per Acre	Total/ Season	Per Spray	Total
FUNGICIDES					
Seed disinfection	Maneb 8%	21 lb	21 lb	----	1.68
10 applications	Mancozeb flowable (3.8 lbs/gl)	1.7 qt	4.25 gl	1.6	16.15
2 applications	Ridomil MZ58	1.5 lb	3.0 lb	0.87	1.74
6 applications	Spreader sticker	0.5 pt	0.375 gl	---	---
INSECTICIDES (continuous potatoes)					
5 applications	Thiodan 3EC	2.67 pt	1.67 gl	1.0	5.0
	Parathion 8EC	1.0 pt	0.625 gl	1.0	5.0
5 applications	Rotenone (.39 lb/gl)	2.67 qt	3.34 gl	0.26	1.3
	PBO (8 lb/gl)	0.5 pt	0.31 gl	0.5	2.5
INSECTICIDES (rotated potatoes)					
4 applications	Thiodan 3EC	2.67 pt	1.34 gl	1.0	4.0
	Parathion 8EC	1.0 pt	0.5 gl	1.0	4.0
4 applications	Rotenone (.39 lb/gl)	2.67 qt	2.67 gl	0.26	1.04
	PBO (8 lb/gl)	0.5 pt	0.25 gl	0.5	2.0
HERBICIDES					
Weed control	Dual 8E	1.5 pt	0.189 gl	---	1.51
	Lorox 50WP	2.0 lb	2.0 lb	---	1.0
Vine killer	Dinoseb (4 lb/gl)	3.0 qt	0.75 gl	---	3.0
	Nonionic surfactant	16 oz	0.125 gl	---	---

SOURCES: Moyer, Dale, Suffolk County Cooperative Extension Service, Riverhead, NY, Fall 1984.

New York State College of Agriculture and Life Sciences, "Cornell Recommendations for Commercial Vegetable Production", Ithaca, NY, 1983.

potato prices are not reported, but Agway estimated a grower price of about $1.00 per hundredweight (Weil, 1984).

Bulk prices paid by packers are reported by the Federal-State Market News Service, and the five year season average price (1979-1983) was $5.96 per hundredweight. This price was $1.09 lower than the five year season average price for U.S. No. 1 Grade A potatoes (graded, 50 pound sacks) and $0.38 lower than the season average price for all potatoes as reported in "New York Agricultural Statistics". This $0.38 differential reflects the costs of grading, packing, transporting, and marketing for the packer.

It was assumed that any potato grower who switched to fruit crops would no longer do his own packing since packing potatoes and picking grapes compete for labor at the same time of the year. Thus, the grower price used in this model was the bulk price received by growers from packers -- a lower price than the selling price for graded potatoes.

Variable storage costs of $0.18 per hundredweight were taken from an analysis of Long Island potato storage costs in 1981 by Snyder (July 1982). Labor needs for harvesting and storing were revised to reflect levels reported by Snyder in his 1981 survey of Long Island potato growers.

Budgets and labor requirements for continuous and rotated potatoes follow in Tables 11 through 14.

Winter Wheat

Because potatoes are a land extensive operation and fruit crops are a land intensive operation, it was assumed that any potato grower who switched into peaches and grapes would not plant his entire acreage to fruit. Land extensive crops which require low investments of capital, labor, management, and pest control would be the preferred complement to a fruit operation.

Rye and wheat are field crops which have been grown on Long Island for quite some time. Rye is used in the traditional potato rotation carried out by farmers on the South Fork. This rotation involves two years of potatoes followed by one year of rye. For land conservation, all fields on Long Island are planted in rye cover crops so that they will not be left bare in winter. Generally, these cover crops are turned under in the spring before planting cauliflower and potatoes. Recent research suggests that rotations out of potatoes for even one year can reduce the Colorado Potato Beetle populations enough to save the farmer two sprays in the following potato season (Wright, et al., 1983). Thus, sound ecological evidence, plus expectations of increased demands on labor, management, and capital by the peach and grape operations, justify consideration of field crops.

Rye and wheat are practically identical in their production requirements. However, wheat is superior to rye in both prices and yields. Statewide average yields for wheat and rye over the last five years showed a 26 percent yield advantage of wheat over rye (43 bushels per acre versus 32 bushels per acre respectively). The five year average price per bushel of wheat was nine percent higher than that of rye ($3.51 per bushel versus

Table 11

CONTINUOUS POTATO BUDGET

	Unit	Price	Quantity	Total
Receipts:				
87% Size A	cwt	5.96	237	$1,412.52
13% Size B	cwt	1.00	35	35.00
Total Receipts				$1,447.52[a]
Expenses:				
Seed:				
Potatoes	cwt	10.50	21	$220.50
Rye (cover crop)	bu	5.00	2	10.00
Fertilizer:				
Nitrogen	lb		175	
Phosphorous	lb		350	
Potassium	lb		175	
Fertilizer 10-20-10	ton	258.00	0.875	225.75
Chemicals:				
Fungicide				61.75
Insecticide				198.73
Herbicide				30.40
Other Items:				
Storage (variable costs)	cwt	0.18	272	48.96
Transport (1.7 loads x 2 hours each) one load = 160 cwt	hrs	6.41	3.4	21.79
Grading and marketing charge reflected in price differential				
Machinery Variable Cost:				101.37
TOTAL VARIABLE COSTS PER ACRE				$919.25
NET RETURNS PER ACRE				$528.27

---

[a] Weighted average price is $5.32.

Table 12

CONTINUOUS POTATOES

Machinery Variable Costs and Labor Hours per Acre

Labor Hours

Operation	Mach. V.C. $/acre	Jan Feb March	April	May	June		July		August		Sept.		October		Nov/Dec
					SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	
Cut Seed	4.04	1.00	1.00												
Plow	4.46	0.20	0.20												
Herbicide	1.23	0.60	0.60												
Fertilize	0.29	0.10	0.10												
Disk	0.96	0.09	0.08												
Plant	2.55	0.66	0.66												
Cultivate (2)	2.14			0.33	0.33										
Hill Rows	1.07				0.33										
Spray (12)	14.76				0.32		0.32		0.32						
Irrigate (4)	28.76				0.80	3.20	0.40	1.60	0.40	1.60					
Vine Killing	1.23										0.12				
Harvest	17.14										1.20	2.60	1.20	2.60	
Haul & Store (2 bulk bodies)	14.90										0.50		0.50		
Load & Sell		1.00									1.00		1.00		1.00
Disc Harrow (Rye)	0.96														0.17
Grain Drill (Rye)	1.37														0.28
Trac 100hp (1.82hrs)	3.31														
Trac 60hp (2.38hrs)	2.14														
Trac 40hp (0.10hrs)	0.06														
Totals	101.37														

Total Labor Hours

Total	Jan. Feb. March	April	May	June		July		August		Sept.		October		Nov/Dec
				SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	
28.41	3.65	2.64	0.33	1.78	3.20	0.72	1.60	0.72	1.60	2.82	2.60	2.70	2.60	1.45
16.81	skilled													
11.60	unskilled													

*SK = skilled, UN = unskilled.

Table 13

ROTATED POTATO BUDGET

	Unit	Price	Quantity	Total
Receipts:				
87% Size A	cwt	5.96	237	$1,412.52
13% Size B	cwt	1.00	35	35.00
Total Receipts				$1,447.52[a]
Expenses:				
Seed:				
Potatoes (no cover since wheat follows as double crop)	cwt	10.50	21	$220.50
Fertilizer:				
Nitrogen	lb		175	
Phosphorous	lb		350	
Potassium	lb		175	
Fertilizer: 10-20-10	ton	258.00	0.875	225.75
Chemicals:				
Fungicide				61.75
Insecticide				160.01
Herbicide				30.40
Other Items:				
Storage (variable costs)	cwt	0.18	272	48.96
Transport (1.7 loads x 2 hours each) one load = 160 cwt	hrs	6.41	3.4	21.79
Grading and marketing charge reflected in price differential				
Machinery Variable Cost:				98.65
TOTAL VARIABLE COSTS PER ACRE				$867.81
NET RETURNS PER ACRE				$579.71

---

[a] Weighted average price is $5.32.

Table 14

ROTATED POTATOES

Machinery Variable Costs and Labor Hours per Acre

Labor Hours

Operation	Mach. V.C. $/acre	Jan Feb March	April	May	June		July		August		Sept.		October		Nov/Dec
					SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	
Cut Seed	4.04	1.00	1.00												
Plow	4.46	0.20	0.20												
Herbicide	1.23	0.60	0.60												
Fertilize	0.29	0.10	0.10												
Disc	0.96	0.09	0.08												
Plant	2.55	0.66	0.66												
Cultivate (2)	2.14			0.33	0.33										
Hill Rows	1.07				0.33										
Spray (12)	14.76				0.32		0.32		0.32						
Irrigate (4)	28.76				0.80	3.20	0.40	1.60	0.40	1.60					
Vine Killing	1.23										0.12				
Harvest	17.14										1.20	2.60	1.20	2.60	
Haul & Store (2 bulk bodies)	14.90										0.50		0.50		
Load & Sell		1.00									1.00		1.00		1.00
Trac 100hp (1.82hrs)	3.31														
Trac 60hp (1.94hrs)	1.75														
Trac 40hp (0.10hrs)	0.06														
Totals	98.65														

Total Labor Hours

Total	Jan. Feb. March	April	May	June		July		August		Sept.		October		Nov/Dec
				SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	
27.96	3.65	2.64	0.33	1.78	3.20	0.72	1.60	0.72	1.60	2.82	2.60	2.70	2.60	1.00
16.36	skilled													
11.60	unskilled													

*SK = skilled, UN = unskilled.

$3.19 per bushel respectively). It was assumed that wheat would be preferred to rye and only a budget for wheat was developed.

On Long Island, wheat growers have an additional yield advantage. They grow soft, red winter varieties such as Hart and Tyler which range in yield from 40 to 70 bushels per acre with average yields of about 50 bushels per acre (Moyer, 1984; Rowehl, 1984). Even more important is the strong demand for kosher wheat on the Island. Approximately 30 to 40 percent of the wheat harvested on Long Island is sold as kosher wheat. Whereas, the average price on Long Island for commercial wheat is around $3.30 to $3.35 per bushel, the price for kosher wheat runs as high as $4.25 to $4.50 per bushel.

Since most farmers on Long Island have their wheat custom combined and sell it directly to the combiner who takes care of storage, marketing, and transport, the average price assumed in the wheat budget was lower than the season average price reported in "New York Agricultural Statistics". The farmer price for commercial wheat was assumed to be $3.05 and for Kosher wheat, $3.60. It was assumed that 40 percent of the harvest was sent to the kosher market.

Two budgets for wheat were included. One was for rotated wheat and the other for wheat produced in monoculture. The returns over selected variable costs for rotated wheat were 53 percent higher ($81.36) than the returns for continuous wheat ($53.01). This was a reflection of the higher variable costs for producing wheat in monoculture ($110.49 vs. $82.14).[5] Details of the budgets and labor requirements for rotated and continuous wheat appear in Tables 15 and 16.

Cauliflower

Cauliflower is another very important crop on Long Island. Harvested acreage was 1,800 acres in 1983, up from 1,200 acres in 1974. Many potato farmers also grow cauliflower in small amounts because of its high value. The labor requirements for cauliflower are quite substantial and this prevents large acreages from being devoted to the crop.

Most of the cauliflower produced on Long Island is marketed through an auction block for cauliflower and cabbage in Riverhead. This budget assumed that growers market approximately 60 percent of their crop through the auction and 40 percent through the Hunts Point Terminal Market in New York City (Sanok, 1984).

Average Long Island yields were determined from the five year season average as reported in "New York Agricultural Statistics" (115 hundred-

---

[5] Wheat planted after potatoes benefits from the residual phosphorous and potassium from the potato crop. When wheat is planted in previously fallow fields, both lime and phosphorous and potassium fertilizers are needed. Machinery variable costs are also higher for continuous wheat since the field must be plowed as well as disced. Thus, fertilizer, lime, machinery, and labor requirements are all higher for continuous wheat.

Table 15

CONTINUOUS WHEAT BUDGET

	Unit	Price	Quantity	Total
Receipts:				
60% Commercial	bu	3.05	30	$ 91.50
40% Kosher	bu	3.60	20	72.00
Total Receipts				$163.50[a]
Expenses:				
Seed: Wheat	bu	8.40	3	$ 25.20
Fertilizer:				
Nitrogen	lb		60	
Phosphorous	lb		20	
Potassium	lb		20	
Fertilizer: 10-10-10	ton	200.00	0.1	20.00
Amonium Nitrate	ton	240.00	0.06	14.40
Lime:	ton	40.00	0.25	10.00
Chemicals: Herbicide 2,4-D (0.5 lb A.I.)	gal	10.15	0.125	2.17
Custom Machinery: Combine				28.00
Machinery Variable Cost				11.62
TOTAL VARIABLE COSTS PER ACRE				$110.49
NET RETURNS PER ACRE				$ 53.01

Machinery Variable Costs and Labor Hours Per Acre

Operation	Mach V.C. $/acre	Labor Hours		
		April	July	October
Plow	4.46			0.40
Disc Harrow	0.96			0.17
Top Dress	0.58	0.20		0.20
Grain Drill	1.37			0.28
Spray	1.23	0.12		
Haul	1.39		0.30	
Tractor 60hp (1.02 hours)	0.92			
Tractor 100 hp (0.39 hours)	0.71			
Totals	11.62			

Total Labor Hours

Total	April	July	October
1.67	0.32	0.30	1.05

All skilled

---

[a] Weighted average price is $3.27.

Table 16

ROTATED WHEAT BUDGET

	Unit	Price	Quantity	Total
Receipts:				
60% Commercial	bu	3.05	30	$ 91.50
40% Kosher	bu	3.60	20	72.00
Total Receipts				$163.50[a]
Expenses:				
Seed: Wheat	bu	8.40	3	$25.20
Fertilizer:				
Nitrogen	lb		60	
Fertilizer:				
Amonium Nitrate	ton	240.00	0.09	21.60
Chemicals: Herbicide 2, 4-D (0.5 lb A.I.)	gal	10.15	0.125	1.27
Custom Machinery: Combine				28.00
Machinery Variable Cost				6.07
TOTAL VARIABLE COSTS PER ACRE				$82.14
NET RETURNS PER ACRE				$81.36

Machinery Variable Costs and Labor Hours Per Acre

	Mach V.C.	Labor Hours		
Operation	$/acre	April	July	October
Disc Harrow	0.96			0.17
Grain Drill	1.37			0.28
Top Dress	0.29	0.20		
Spray	1.23	0.12		
Haul	1.39		0.30	
Tractor 60 hp (0.92)	0.83			
Totals	6.07			

Total Labor Hours

Total	April	July	October
1.07	0.32	0.30	0.45

All skilled

[a] Weighted average price is $3.27.

weight or 348 crates per acre). Price data were obtained from the Federal-State Market News Service's records of the Long Island Cauliflower Association's (LICA) auction prices, and Hunts Point Terminal Market prices for Long Island cauliflower. The five year season average price for each was used ($7.69 per crate for LICA and $8.44 per crate for terminal market). The price growers receive at the terminal market was assumed to be 15 percent lower than the season average price to reflect the commission charged for use of that market. An additional $0.40 handling charge per crate reduced the effective producer price at the terminal market to $6.77 per crate (Pflueger, 1985).

Marketing costs were included in the budget and reflect both the substantial cost of containers ($522 per acre) and the transport charges for shipping cauliflower to Riverhead and to Hunts Point, New York (Glover, 1984).

Labor requirements for fall cauliflower vary from study to study. In past budgets by Fohner and Lazarus and White, labor hours for growing transplants or marketing the crop after harvest were not included. They assumed that transplants could be bought and listed a charge for the plants. In this study, labor hours and other costs for growing transplants were included. These costs were based on technical recommendations ("Cornell Recommends for Commercial Vegetable Production, 1983"; Sanok, 1984) and on a survey of nine Long Island farms growing cauliflower in 1982 (Snyder, August 1983).

Pesticide use (Table 17) and fertilization and liming rates were based on technical recommendations from Cornell and extension personnel (Sanok, 1984; Siezcka, 1984). Since cauliflower needs a slightly higher soil pH (6.0 - 6.8) than potatoes immediately, the use of the more expensive hydrated lime was included in the budget. Tables 18 and 19 contain more detailed information on the costs, returns, and labor requirements for cauliflower.

PERENNIAL CROP BUDGETS

Choice of Peaches and Table Grapes

Many fruits could have been analyzed for their viability as cropping alternatives for Long Island potato farmers. Table grapes and peaches were ultimately chosen because it seemed that they offered the strongest potential of becoming major crops on Long Island. Justification for this lay mainly in the fact that acreage in peaches and grapes was increasing faster than acreage in any other fruit on the Island. Both fruits appeared to have large market potential and to lend themselves to production on a larger scale.

Another reason for focusing on peaches and table grapes was because no study had been done on the economic viability of these two fruits in New York State. One purpose of this study was to fill that data gap. Although apples, pears, and cherries exist on the Island, they comprise a much smaller acreage than peaches. Wine grapes comprise the vast majority of grape acreage on the Island but were not included because of the feared glut on the wine grape market and because it was felt that the labor and

Table 17
CAULIFLOWER SPRAY PROGRAM

	Product	Rate/2000m^2	Pounds Active Ingredient
SEEDBED PREPARATION			
June	Captan 50WP	0.69 lb	0.35
	Terraclor 75WP	0.69 lb	0.52
	Diazinon 50WP	3.0 oz	0.09
	Treflan 4EC	1.0 oz	0.03
Follow-up spray	Maneb 4 lb/gl	0.15 qt	0.15
	Diazinon 50WP	3.0 oz	0.09
		Rate/Acre	
Herbicides			
July 1	Treflan 4EC	1.0 qt	1.0
INSECTICIDES & FUNGICIDES			
July 15	Diazinon 50WP	2.0 lb	1.0
August 1	Thiodan 3EC	1.33 qt	1.0
August 7	Thiodan 3EC	1.33 qt	1.0
	Maneb 4 lb/gl	2.4 qt	2.4
	Spreader sticker	2.0 oz	---
August 14	Dipel 2x	0.5 lb	0.5
August 28	Tiodan 3EC	1.33 qt	1.0
	Spreader sticker	2.0 oz	---
September 7	Dipel 2x	0.5 lb	0.5
	Maneb 4 lb/gl	2.4 qt	2.4
	Spreader sticker	2.0 oz	---
September 14	Dipel 2x	0.5 lb	0.5

SOURCES: New York State College of Agriculture and Life Sciences, "Cornell Recommendations for Commercial Vegetable Production", Ithaca, NY, 1983.

Sanok, Bill, Personal Communication, Suffolk County Cooperative Extension Service, Riverhead, NY, Fall 1984.

Table 18

CAULIFLOWER BUDGET

	Unit	Price	Quantity	Total
Receipts:				
60% Auction Block	crate	7.69	209	$1,607.21
40% Terminal	crate	6.77[a]	139	941.03
Total Receipts				$2,548.24[b]
Expenses:				
Seed: Cauliflower	lb	58.00	0.25	$ 14.50
Fertilizer:				
Nitrogen	lb		160	
Phosphorous	lb		240	
Potassium	lb		120	
Magnesium	lb		36	
Boron	lb		6	
Fertilizer:				
"Cauliflower Special" 6-12-6 with Mg & Boron	ton	196.00	1.0	196.00
Amonium Nitrate	ton	240.00	0.06	14.40
Lime: Hydrated Lime	ton	135.00	0.50	67.50
Chemicals:				
Fungicide				13.46
Insecticide				61.34
Herbicide				7.84
Other Items:				
Crates	crate	1.50	348	522.00
Transport to Terminal Market	crate	0.65	139	90.35
Transport to Auction Block (200 crates per load)	mi	0.64	50	32.00
Machinery Variable Cost				81.95
TOTAL VARIABLE COSTS PER ACRE				$1,101.34
NET RETURNS PER ACRE				$1,446.90

---

[a] Season average price is $8.44 - 15 percent commission - $0.40 per crate handling charge = $6.77.

[b] Weighted average price is $7.32 per crate.

Table 19
CAULIFLOWER

Machinery Variable Costs and Labor Hours Per Acre

Labor Hours

Operation	Mach. V.C. $/acre	Jan Feb March	April	May	June		July		August		Sept.		October		Nov/Dec
					SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	
Growing Transplants	3.00				5.0										
Pulling & Sorting Transplants							2.0	3.0							
Plow	4.46				0.4										
Herbicide	1.23						0.12								
Lime	1.33						0.3								
Fertilizer-Topdress	0.94						0.2								
Bed Making (disc)	0.96						0.34								
Transplant	5.44						2.0	4.5							
Fertilizer-Sidedress	1.15								0.33						
Cultivate (2)	2.84								0.66						
Hoe & Weed (2)										6.0		6.0			
Irrigate (5)	35.95						0.4	1.6	0.80	3.2	0.80	3.2			
Spray (7)	8.61						0.16		0.24		0.16				
Tie												4.5		4.5	
Harvest, Load & Haul	8.26										0.60	25.0	0.9	37.5	12.8
Sell											1.0		3.0		1.0
Disc Harrow	0.96														0.17
Plant Rye	1.37														0.28
Trac 100hp (0.39hrs)	0.71														
Trac 60hp (4.85hrs)	4.37														
Trac 40hp (0.58hrs)	0.37														
Totals	81.95														

Total Labor Hours

Total	Jan. Feb. March	April	May	June		July		August		Sept.		October		Nov/Dec
				SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	
134.46				5.40		7.32	9.10	2.03	9.20	2.56	38.7	3.90	42.0	14.25
35.46	skilled													
99.00	unskilled													

*SK = skilled, UN = unskilled.

marketing requirements of table grapes would fit in with the trend toward more diversified farming and direct marketing.

Small fruits such as blueberries, blackberries, raspberries, and strawberries were not studied because it was felt that the market potential of these fruits would be limited. Most farmers who grow these fruits only devote small acreages to them (less than five acres). In addition, the harvest labor requirements of these fruits is often met through pick-your-own operations which appear to be at a saturation point on the Island. Thus, it seemed ill-advised to anticipate increased acreages.[6]

Problems In Building Budgets For Crops New To An Area

Despite the expansion of peaches and grapes on Long Island, there are relatively few commercial producers with mature vineyards and orchards. Cooperative extension agents knew of 12 commercial peach growers and four commercial table grape growers. With this small a sample, it would be unadvisable to build budgets based on the practices of the "average" farmer.

A problem with all crop budgets is that there is no such thing as the average farmer. Every farm is different and the cultural practices, inputs, yields, and marketing outlets are different as well. The object, then, is to try to build a budget that is as representative as possible with stated assumptions so that a farmer can note the areas of difference between the budget and his own practice.

Because peaches and table grapes are relatively new to Long Island, much time was spent with researchers at Cornell University and at the New York State Agricultural Experiment Station in Geneva, New York to seek a concensus on recommended cultural practices, fertilization and liming rates, pesticide programs, and yield expectations. The correct cultural practices are based on years of research and practical experience and, in the case of these perennial fruit crops, much research still needs to be done.

Decisions on these cultural practices can be quite important in determining the economic viability of a crop. An example of this is the case of cane girdling in table grapes. Cane girdling is the practice of ringing or cincturing the bark on the trunk or the fruit cane. It is a practice widely used in California to increase berry size. The ringing causes the levels of carbohydrate sugars and plant hormones to increase in the area above the wound (Winkler, et al., 1974). Recent experimental work in the Himrod variety has shown the largest increases in berry size to occur under treatments where cane girdling was included (Zabadal, 1984). Since the New York seedless varieties tend to have a small berry size, the benefits from cane girdling could be quite significant in helping farmers penetrate the chain store market and compete with the larger California berries. The costs in labor, however, are quite high -- estimated at 35 hours per acre.

Another important area where data was lacking was in determining

---

[6] It turned out that table grape production would not support large acreages either but it was included to fill the data gap described earlier.

yields for the different varieties. Experimental yields were available for many of the peach and grape varieties recommended for Long Island but experimental yields and actual farmer yields are often quite different. Many farmers on Long Island have very young orchards and are still experimenting with different cultural practices that have a strong effect on yields.

Reliance on budgets developed by other researchers in other states was also unsatisfactory because many failed to specify the source of their dollar figures in sufficient detail for another to reproduce their results. This was especially true in the areas of labor use and pesticide programs. Hand labor requirements in fruit production are very high and objective measures, such as the economic engineering approach discussed earlier, are not applicable unless one performs time and motion studies on various orchard and vineyard operations. In those studies that specified time spent pruning, thinning, and harvesting, the variance in time was quite high. An even higher variance could be expected among farmers.

Many studies reported labor figures as custom charges. This approach may be valid for budgets which measure costs of production without respect to labor needs. However, in a study where constraints on labor availability are considered, the actual time required to perform these operations needs to be determined.

Actual pesticide use was another area that often lacked sufficient detail in many published budgets. Often these budgets simply assigned a dollar value for chemicals or sometimes a break down of the chemical costs into charges for fungicides, herbicides, and insecticides. Groundwater contamination on Long Island, as one of the major motivations for this study, required something more specific than pesticide costs to be considered. In fact, the use of specific products had to be ascertained since it is particular chemicals that leech into groundwater, not the spray program as a whole.[7]

A final area that was often left out of published budgets was a detailed discussion of marketing outlets. Clearly this is crucial in determining the profitability of a particular crop. It is also highly variable depending on each farm situation. However, some estimate of the costs of containers, storage, and transport would at least help to make the returns estimated in these budgets closer to what a farmer might actually expect to receive. In fruit crops, containers, storage, and transport can represent a very large proportion of variable costs.

Methods Used To Develop Peach And Grape Budgets For Long Island

After reviewing published budgets for peaches and grapes from many states and talking with pomologists and viticulturalists at Cornell and at

---

[7] See A.E. Res. 85-11, "An Environmental Risk Index to Evaluate Pesticide Programs in Crop Budgets" by M.E. Warner, for a detailed description of the potential risk to groundwater of the pesticide programs presented for these crops.

the New York State Agricultural Experiment Station, tables describing cultural practices, pesticide programs, fertilization rates, hand labor requirements, and the appropriate machinery complement were developed and circulated for comment to researchers, extension agents, and farmers on Long Island.

During the week of October 8, 1984, nine peach growers and four grape growers (including one who specializes in vineyard establishment) were interviewed at their farms. In the interviews, questions about the crop mix (varieties, yields, and acreage), growing practices (fertilization and liming), pesticide programs (number of sprays and materials), labor needs (for hand operations), labor characteristics (source, wage rate, and activities by labor type), marketing (container, outlet, price range, storage, and transport), and machinery complement were covered.

Since the interview process was informal and the answers given often unique to each farm situation, no statistical manipulation of the survey results was attempted. Instead the responses were used to modify the budget assumptions already developed so that they were more reflective of what local farmers actually do. One area where there was considerable agreement among farmers was in the area of direct retail and direct wholesale prices. These price data were used to estimate the appropriate producer price for each market channel.

BUDGETS FOR TABLE GRAPES

Varieties and Yields

Over the last few years, several new seedless, dessert quality table grapes have been developed at the New York State Agricultural Research Station in Geneva, New York. These are crosses between the hardy American seeded varieties and the seedless Vitis Vinifera varieties. Varieties are now available for red, white, and blue colored berries whose production extends over a seven week period, from mid-August to early October (on Long Island). Research at Geneva in the 1982 and 1983 season showed many of these varieties to be storable until Thanksgiving or even Christmas (Reisch and Roberts, 1983). For a description of the varieties and their storage characteristics, see Table 20.

The cluster and berry size for these varieties is smaller than that of the California seedless varieties so cultural manipulation of fruit size through cane girdling, cluster thinning, and application of giberrellic acid is necessary.

Experimental yield data from the New York State Agricultural Experiment Station are available for most of these varieties. Naturally, these yields are higher than what most Long Island farmers actually harvest. The New York State average yield for all grapes is four tons per acre and the range falls between three and seven tons. In this study, it was assumed that the maximum harvested yield for seedless table grapes was three tons per acre (Reisch, 1984). This reflects the higher quality control needed in selecting table grapes for market.

In the first year the yield would be zero. In the second year the

Table 20
POTENTIAL SEEDLESS TABLE GRAPE VARIETIES FOR TESTING ON LONG ISLAND

	Color	Gibberellic Acid	Storage Quality[a]	Harvest	Yield[b]
					tons/acre
Interlaken	White	Yes	Excellent(X)	Mid Aug	3-4
Canadice	Red	No	Good(X)	Late Aug	5-6
Himrod	White	Yes	Fair(T)	Late Aug	3-4
Suffolk Red	Red	Yes	Excellent	Early Sept	3-4
Vanessa Seedless	Red	?	Good (T)	Mid Sept	3-4
Lakemont	White	Yes	Good	Mid Sept	4-5
Glenora*	Blue	Yes	Good (X)	Mid Sept	2-4
Remaily Seedless*	White	Yes	Good (T)	Early Oct	4-5

[a] Storage quality and yield data based on experiments at Cornell and Geneva in 1982 and 1983. X means grapes were stored until Christmas. T means grapes were stored until Thanksgiving.

[b] Geneva mean yield 1982 and 1983.

*Long Island Horticultural Research Lab experimental plots suggest that these varieties may not perform well on Long Island.

SOURCES: Reisch, Bruce & Mary-Howell Roberts; "Table Grape Yield - Training System - Variety Trial Results Obtained in 1982-83" unpublished report, Department of Pomology and Viticulture, New York State Agricultural Experiment Station, Geneva, New York, 1983.

Reisch, Bruce; Personal Communication, New York State Agricultural Experiment Station, Geneva, New York, 1984.

Pool, Robert; Personal Communication, New York State Agricultural Experiment Station, Geneva, New York, 1984.

crop would be held light by heavy pruning in order to increase vine vigor. The third year would yield only a partial harvest of 1.5 tons per acre. From year four onward, an average yield of three tons per acre was assumed (Reisch, 1984). An average cull rate of 15 percent of the fruit reduced the marketable harvest to 5,100 pounds per acre per year.

Cultural Practices and Chemical Usage

There is disagreement about the best cultural practices for table grapes on Long Island. Some of the areas of disagreement include the need to hill up vines, clean cultivation or use of sod row middles in the vineyard rows, cane girdling and cluster thinning, trellis and training systems, and fertilization and liming rates. After trying to reach a consensus with the experts, the cultural practices behind these budgets were verified through interviews with table grape growers on Long Island (Table 21).

Many farmers do not fertilize their grapes because petiole samples have shown no need to do so. The same is the case with liming although some growers are talking of liming in the future. For the sake of budgeting, it was assumed that only nitrogen fertilizer would be needed and that it would be applied at the rate of 50 pounds actual per year. Because Long Island soils are high in phosphorous and potassium, no additional applications of these fertilizers were budgeted. Lime was budgeted at three tons the year of planting and two tons every fifth year thereafter.

Many say that irrigation is not needed after the third year in vineyards since the grape's roots penetrate so deep. Some growers, however, have suggested that irrigation is necessary to increase fruit size before harvest if rains are scarce. Four irrigations were budgeted for each of the first three years but only two per year in the years thereafter.

The pest control program is extremely important in grapes for dessert use since their appearance must be flawless. A heavy spray program involving a seven day schedule from May to mid-June, a 10 day schedule to mid-July, and a 14 day schedule through August was planned. This involved 11 sprays for disease control, four for insect control, and two sprays of Gibberellic Acid to increase fruit size. This yielded a total of 13 sprays since most of these products could be sprayed together.

Long Island vineyards are more similar to vineyards in the mid-Atlantic states than upstate New York. Phomopsis, black rot, and powdery mildew are the major diseases in the mature vineyards while downy mildew and powdery mildew are the more serious concerns in the nonbearing vineyards (Pearson, 1984).

Common insect pests include the grape berry moth, the grape leaf borer, and the grape root borer. For the latter, there is no legitimate, registered control; for the others, carbaryl, the most commonly used insecticide on grapes, is recommended. For the nonbearing vineyard, the leaf and stem eaters are the major concern (rose chafer, European corn borer, and Japanese beetle) (Riedl, 1984). For the disease and insect spray programs, see Tables 22 and 23.

Table 21
ASSUMPTIONS BEHIND TABLE GRAPE BUDGETS FOR LONG ISLAND

Vine Spacing	8 feet between vines, 9 feet between rows, 605 vines per acre
Liming	Vineyard will be planted in old potato field pH 4.1-5.0 with high phosphorous and potash levels. Three tons dolomitic lime applied before planting. Two additional tons every five years.
Fertilization	Since Long Island soils are high in phosphorous, no additional applications will be budgeted. Nitrogen at 20 pounds first year, and 50 pounds actual per acre (150 pounds of Ammonium Nitrate) per year will be applied in the Spring for subsequent years.
Cultural Practices	No subsoiling or soil fumigant for nematodes Nitrogen broadcast in spring Vines planted with cauliflower transplanter Vineyard cultivated 4 times per year - early spring, June, July, and August Herbicide applied twice a year to weeds in vine rows 30" wide Brush chopped with rotary mower (2 passes) Mature vines sprayed 13 times per year Nonbearing vines sprayed 4 times per year Gibberellic acid applied once at boom and once at shatter to those varieties that benefit from it Several varieties planted to extend harvest from mid-August to early October Vines are hilled up every 2 years using small disc Trellis will be a 3 wire cordon system Noisemakers used to control birds Average yield 3 tons per acre. 15% of fruit culled at harvest. Irrigation 4 times per year for first 2 years, twice a year thereafter - with moveable pipe system Plow under cover crop of rye in spring before planting grapes. Plant subsequent cover crops of oats 2 bushels per acre in August of each year, disc under in spring

SOURCES: Farmer Interviews, Long Island, New York, 1984.

Jordan, T.D., R.M. Pool, T.J. Zabadal, and J.P. Tomkins, "Cultural Practices for Commercial Vineyards", New York State College of Agriculture and Life Sciences, Cornell University Cooperative Extension Misc. Bul. 111, Ithaca, New York.

Research and Extension personnel in Penn Yan, Geneva, and Riverhead, New York.

Table 22
SPRAY PROGRAM FOR NONBEARING TABLE GRAPE VINEYARD
Years 1 & 2

	Product	Rate/Acre	Pounds Active Ingredient
June 10	Dithane M45 flowable (3.8 lb/gl)	2.0 qt	1.9
	Sulfur 95% WP*	4.0 lb	3.8
	Sevin 50% WP	2.0 lb	1.0
	Spreader sticker	4.0 oz	---
July 1	Dithane M45 (3.8 lb/gl)	2.0 qt	1.9
	Bayleton 50% WP	2.0 oz	0.06
	Sevin 50% WP	2.0 lb	1.0
	Spreader sticker	4.0 oz	---
July 22	Dithane M45 (3.8 lb/gl)	2.0 qt	1.9
	Sulfur 95% WP*	4.0 lb	3.8
August 11	Dithane M45 (3.8 lb/gl)	2.0 qt	1.9
	Bayleton 50% WP	2.0 oz	0.06

*For those varieties that are sulfur sensitive, Bayleton will be used instead.

SOURCES: Pearson, Roger, Personal Communication, New York State Agricultural Experiment Station, Geneva, NY, 1984.

Smith, Jeanette, Personal Communication, Suffolk County Cooperative Extension Service, Riverhead, NY, 1984.

Zabadal, Thomas, Personal Communication, Cooperative Extension Service, Penn Yan, NY, 1984.

Table 23
SPRAY PROGRAM FOR BEARING TABLE GRAPE VINEYARD

	Product	Rate/Acre	Pounds A.I.
May 15	Ferbam 76% WP	1.5 lb	1.14
	Captan 50% WP	2.0 lb	1.0
	Spreader sticker	4.0 oz	---
May 22	Ferbam 76% WP	1.5 lb	1.14
	Captan 50% WP	2.0 lb	1.0
	Spreader sticker	4.0 oz	---
May 29	Ferbam 76% WP	1.5 lb	1.14
	Sulfur 95% WP	4.0 lb	3.8
	Captan 50% WP	2.0 lb	1.0
June 6	Dithane M45 flowable (3.8 lb/gl)	2.5 qt	2.4
	Sulfur 95% WP	4.0 lb	3.8
Midbloom	Gibberellic acid 20ppm		
	ProGib 3.91%	8.2 oz	8.9 gr
Postbloom			
June 13	Dithane M45 flowable (3.8 lb/gl)	2.5 qt	2.4
	Bayleton 50% WP	2.0 oz	0.06
	Sevin 50% WP	4.0 lb	2.0
	Spreader sticker	4.0 oz	---
Shatter	Gibberellic acid 40ppm		
	ProGib 3.91%	16.3 oz	17.9 gr
June 23	Dithane M45 flowable (3.8 lb/gl)	3.4 qt	3.2
	Sulfur 95% WP	4.0 lb	3.8
	Sevin 50% WP	4.0 lb	2.0
	Spreader sticker	4.0 oz	---
Midsummer			
July 2	Dithane M45 flowable (3.8 lb/gl)	3.4 qt	3.2
	Bayleton 50% WP	2.0 oz	0.06
July 12	Manzate D flowable (4 lb/gl)	1.4 qt	1.4
	Benlate 50% WP	1.0 lb	0.5
	Sevin 50% WP	4.0 lb	2.0
	Spreader sticker	4.0 oz	---
July 26	Manzate D flowable (4 lb/gl)	1.4 qt	1.4
	Bayleton 50% WP	2.0 oz	0.06
Preharvest			
Aug. 10	Manzate D flowable (4 lb/gl)	1.4 qt	1.4
	Benlate 50% WP	1.0 lb	0.5
	Ronalin 50% WP	1.5 lb	0.75
	Sevin 50% WP	4.0 lb	2.0
	Spreader sticker	4.0 oz	---
Aug. 24	Manzate D flowable (4 lb/gl)	1.4 qt	1.4
	Bayleton 50% WP	2.0 oz	0.06
	Ronalin 50% WP	1.5 lb	0.75
	Spreader sticker	4.0 oz	---

SOURCES: New York State College of Agriculture and Life Sciences, "1984 Grape Pest Control", Cooperative Extension Publication, Cornell University, Ithaca, NY, 1984.

Pearson, Roger, Personal Communication, New York State Agricultural Experiment Station, Geneva, NY, 1984.

Riedl, Helmut, Personal Communication, New York State Agricultural Experiment Station, Geneva, NY, 1984.

Herbicides are applied in the vineyard in early spring and then a follow up spray follows in July (Table 24). The vineyard is cultivated four times and hilled up once and these practices aid in weed control (Howard, 1984).

Since actual pesticide use is so important on Long Island, due to problems with groundwater contamination, these spray programs were checked against grower practices in the informal interviews held in October 1984. It was found that most growers spray their mature vineyards from 8 to 12 times per season. The products assumed in the budgeted spray programs were typical. Insects were not a major problem and many growers had not found a need to incorporate insecticide sprays into their control program. Likewise, many did not spray their nonbearing vineyards more than twice each season. The estimates of insect control were retained because it can be expected that as more grapes are grown on the Island, more insect problems will appear. The high frequency of sprays in the nonbearing vineyards was also retained since it is ill-advised to neglect young vineyards.

Labor Requirements and Trellis System

Labor requirements, especially those for hand labor, were very difficult to determine. Many studies were reviewed and an average of the times reported for each activity was derived. These numbers were then reviewed by extension agents, researchers, and Long Island growers and revised accordingly.[8] Values were chosen on the basis of frequency of agreement (Table 25). Clearly, individual growers will find considerable differences in their own labor needs for these activities depending on the skill and speed of their workers.

The trellis system budgeted in this study was a three wire cordon system. Several researchers at the New York State Agricultural Experiment Station recommended use of a system with a single arm over which the vines could be hung for ease of picking (Zabadal, 1984; Reisch, 1984). However, others felt that this would not be advisable (Pool, 1984). At present, Long Island growers do not use the single arm system. One grower has a three wire cordon, another a two wire cordon, and another has a wide top trellis. A three wire cordon was budgeted but it must be noted that a single arm system would increase costs by almost $1,000 per acre for the angle brackets, bolts, and nuts. Labor needs for construction would increase by approximately 17 hours per acre (Markin and White, 1982).

Labor requirements for trellis construction varied considerably from study to study and from farm to farm. One farmer reported a figure of 20 hours per acre for construction and another reported 80 hours. Published studies varied between 23 and 75 hours per acre. The hours chosen for this study were adapted from the study by Kirpes and Folwell (1982) because they most closely matched the times given by several Long Island farmers. The labor requirements and costs of trellis construction are presented in Table 26.

---

[8] The ranges on the hand labor requirements reported in published studies and by farmers were: pruning, 18-56 hours; tying, 18-42 hours; suckering and flower removal, 3-8 hours, shoot positioning, 0-20 hours, cluster thinning and cane girdling, 27-80 hours.

Table 24
HERBICIDE PROGRAM FOR TABLE GRAPE VINEYARD

	Product	Rate/Acre*	Pounds A.I.	Times of Application
1 & 2 Year Old Vineyard	Oryzalin (Surflan 75WP)	1.0 lb	0.75	Early spring
	Paraquat (2 lb/gl)	0.15 qt	0.08	Follow-up spray
	Surfactant	0.15 qt		
3+ Year Old Vineyard	Simazine (Princep 80WP)	0.6 lb	0.48	Early spring
	Oryzalin (Surflan 75WP)	1.0 lb	0.75	Early spring
	Roundup 36%	0.3 qt	0.25	Follow-up spray

*This rate reflects 1/3 of the rate per acre since only the area under the vines is sprayed (1/3 of acreage).

SOURCES: Howard, Gary, Personal Communication, New York State Agricultural Experiment Station, Geneva, NY, 1984.

New York State College of Agriculture and Life Sciences, "1984 Grape Pest Control", Cooperative Extension Publication, Cornell University, Ithaca, NY, 1984.

Table 25

HAND LABOR REQUIREMENTS FOR TABLE GRAPES[a]

	Labor Hours Per Acre	
	Skilled	Unskilled
Winter Pruning - 2nd year	5.0	
3rd year	18.0	
4th year on	30.0	
Tying - 1st year	5.0	
2nd year	7.0	
3rd year	12.0	
4th year on	19.0	
Suckering & Flower Removal - 2nd year	8.0	
3rd year	8.0	
4th year on	6.0	
Shoot Positioning - 2nd year	10.0	
3rd year	15.0	
4th year on	20.0	
Cluster Thinning & Cane Binding - 3rd year	27.0	
4th year on	35.0	
Harvesting (100 lbs./hour)[b]- 3rd year	2.6	22.9
4th year on	5.1	45.9
Load, Haul, & Store (250 boxes/hour) - 3rd year	2.6	
4th year on	5.1	
Direct Retail Marketing (1/2 prod.) - 3rd year	4.85	
4th year on	9.7	
Direct Wholesale Marketing (1/2 prod.) - 3rd year	1.22	
4th year on	2.43	

---

[a] Based on review of published grape budgets and interviews with Long Island, New York grape growers.

[b] Based on harvested production of 2,550 pounds per acre in year 3 and 5,100 pounds per acre in year 4 and on.

Table 26
TRELLIS CONSTRUCTION AND MAINTENANCE

3-Wire Cordon System

Construction Costs	Price/Unit	Quantity	Total Cost
Line posts: 3" wide, 8' long	$3.45 each	240	$ 852.00
End posts: 4"wide, 8'long	$3.55 each	16	55.20
Anchors	$5.50 each	16	88.00
No. 11 crimped high-tensil galvan. steel wire (9,800 ft.)	$59.50/cwt.	380 lbs.	226.10
No. 11 straight galvanized steel wire (4,900 ft.)	$45.95/cwt.	186 lbs.	85.47
Staples	$26.50/50 lbs.	8 lbs.	4.24
		Total Cost	$1,311.01
Maintenance Costs			
Replacement posts, wire, etc.			$4.00

Labor Requirements	Machinery Used	Machine Hours	Labor Hours
Establishment:			
Spread end posts	40 hp, trailer	0.92	1.11
Set end posts	40 hp, post driver	3.0	3.63
Set anchors	40 hp, auger	3.25	3.93
Spread line posts	40 hp, trailer	0.92	1.11
Set line posts	40 hp, post driver	10.00	12.10
String, tack & tighten wire (3 wires)	40 hp, trailer	6.00	12.00
		Total	33.88
Maintenance			
Fix anchors, replace or tighten wire	40 hp, trailer	0.5	1.0

SOURCES: Kirpes, Daniel J. and Raymond J. Folwell, "Establishment and Production Costs, Concord Grape Vineyards, 1982", Farm Business Management Reports, Cooperative Extension Bulletin 0875, Washington State University, Pullman, Washington, 1982.

Farmer Interviews, Long Island, New York, October 1984.

Various Farm Input Suppliers, New York, 1984.

Marketing and Transportation Costs For Table Grapes

Two marketing channels were considered for table grapes: direct retail marketing through farmers markets and farm stands, and direct wholesale marketing to chain stores. Returns in the budgets were based on the assumption that half the production went into each channel.

Transportation costs and container costs were higher for grapes marketed through the direct wholesale channel but labor costs were lower. These differences in packaging and transport were reflected in the producer price. The average price of $0.50 per pound for direct wholesale grapes and $1.00 per pound for direct retail grapes was reduced to $0.37 per pound and $0.95 per pound respectively (Table 27).[9] Table 28 presents more detail on storage, marketing and transport costs, and marketing labor requirements.

Table 27
EFFECTIVE PRODUCER PRICES FOR TABLE GRAPES

Direct Wholesale Price		Direct Retail Price	
Price	$10.00/20 lb. lug	Price	$20.00/20 lb. lug
Container	- 2.07	Container	- 0.72
Transport	- 0.50	Transport	- 0.26
Effective Price	$ 7.43/lug $ 0.37/lb.	Effective Price	$19.02/lug $ 0.95/lb.

It was assumed that 20 percent of production would be stored until Thanksgiving or Christmas. For this part of the crop, sulfur dioxide tablets will be needed. Controlled atmosphere storage helps maintain the quality of some grape varieties. In operations which are devoted totally to grape production, the cold storage room can be fumigated. Since peaches cannot be exposed to sulfur dioxide and since it is dangerous to humans, SO_2 packets inside polyethylene bags can be used to provide a controlled atmosphere environment for the grapes alone.

Detailed descriptions of the costs and returns and labor requirements of table grape production follow in Tables 29 through 36.

---

[9] One dollar per pound was the average retail price received by Long Island growers at farm stands and farmers' markets. A wholesale price of $10 per 20 pound lug was lower than the average price received by California Thompson seedless grapes in the New York City terminal market but was reflective of the average price received by Long Island producers who used the chain store market.

Table 28
MARKETING COSTS: TABLE GRAPES

	Unit Cost	No./Acre	Cost/Acre
Containers			
Direct Retail Marketing			
30 lb. plastic lug (reused every year)	4.50	34	$153.00
One quart tills	0.06	1,530	91.80
			244.80
Direct Wholesale Marketing			
Master curtain-coated 20 lb. lug	1.15	127.5	146.63
Assembly	0.20		25.50
One quart tills	0.06	1,530	91.80
			263.93
Grand Total Container Cost Per Acre in Mature Vineyard			$355.73
Controlled Atmosphere Storage			
SO_2 packet, 2 per lug	0.20	102	$ 20.04
Polyethylene bags, 1 per lug	0.10	51	5.01
Electricity for precooling & storage[a] (1/20 of total per acre)			45.28
Total Storage Costs Per Acre			$ 70.33
Transportation			
Direct retail marketing			
Pickup truck			
127.5 boxes per load	0.28/mi.	120 miles	$ 33.60
Direct Wholesale Marketing			
Ship out commercially	0.50/lug	127.5 lugs	63.75
Grand Total Transport Costs Per Acre			$ 97.35

	Hours/Acre
Marketing Labor	
Direct Retail Marketing (127.5 lugs = 1 load)	
Load & unload	1.2
Driving	2.5
Selling	6.0
	9.7
Direct Wholesale Marketing (127.5 lugs = 1/3 load)	
Load & unload	1.08
Driving	0.75
Selling	0.60
	2.43

---

[a] 1/20 of total cold storage operating costs. See Appendix, Table A-3.

SOURCES: Nass, Mel, Personal Communication, Venture Vineyards, Lodi, New York, August 1984.

Various Input Suppliers, Long Island, New York, 1984.

Table 29

TABLE GRAPE BUDGET: Year 1

	Unit	Price	Quantity	Total
Expenses:				
Seed:				
Vines	vine	1.75	605	$1,058.75
Oats	bu	5.76	2	11.52
Fertilizer:				
Nitrogen	lb		20	
Fertilizer:				
Amonium Nitrate	ton	240.00	0.03	7.20
Lime:				
Dolomitic lime (includes application)	ton	40.00	3	120.00
Chemicals:				
Fungicide				31.32
Insecticide				8.41
Herbicide				12.92
Other Items:				
Establish Trellis				1,311.01
Twine	lb	1.54	2	3.08
Wire	lb	2.10	2	4.20
Additional Taxes				31.86
Machinery Variable Cost				142.57
TOTAL VARIABLE COSTS PER ACRE				$2,742.84

Table 30

FIRST YEAR TABLE GRAPES

Machinery Variable Costs and Labor Hours per Acre

Labor Hours

Operation	Mach. V.C. $/acre	Jan Feb March	April	May	June		July		August		Sept.		October		Nov/Dec
					SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	
Plow	4.46	0.40													
Disc	0.96	0.17													
Herbicide/followup	2.49	0.12					0.50								
Fertilizer (after planting)	1.36			0.48											
Mark Vineyard	1.07		1.00												
Plant Vines	6.35		2.30	2.29											
Spread End Posts	4.22		1.11												
Set End Posts	9.54		3.63												
Set Anchors	9.91			3.93											
Spread Line Posts	4.22			0.55	0.56										
Set Line Posts	31.80			6.05	6.05										
String Tack & Tighten Wire	4.59				4.00										
Spray (4x)	8.36				0.45		0.90		0.45						
Cultivate (3x more)	3.63				0.42		0.42		0.42						
Tying							5.00								
Plant Cover	1.21								0.50						
Irrigate (4x)	28.76			2.00	0.40	1.60	0.40	1.60	0.40	1.60					
Hill up	1.21												0.42		
Trac 40hp (24.68hrs)	15.80														
Trac 60hp (2.13hrs)	1.92														
Trac 100hp (0.39hrs)	0.71														
Totals	142.57														

Total Labor Hours

Total	Jan. Feb. March	April	May	June		July		August		Sept.		October		Nov/Dec
				SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	
50.12	0.69	8.04	15.30	11.88	1.60	7.22	1.60	1.77	1.60			0.42		
45.32	skilled													
4.80	unskilled													

*SK = skilled, UN = unskilled.

Table 31

TABLE GRAPE BUDGET: Year 2

	Unit	Price	Quantity	Total
Expenses:				
Seed:				
Replacement vines	vine	1.75	6	$ 10.50
Oats	bu	5.76	2	11.52
Fertilizer:				
Nitrogen	lb		50	
Fertilizer:				
Amonium Nitrate	ton	240.00	0.076	18.24
Chemicals:				
Fungicide				31.32
Insecticide				8.41
Herbicide				12.92
Other Items:				
Twine	lb	1.54	2	3.08
Wire	lb	2.10	2	4.20
Additional Taxes				31.86
Machinery Variable Cost				70.00
TOTAL VARIABLE COSTS PER ACRE				$202.05

Table 32

SECOND YEAR TABLE GRAPES

Machinery Variable Costs and Labor Hours per Acre

Labor Hours

Operation	Mach. V.C. $/acre	Jan Feb March	April	May	June		July		August		Sept.		October		Nov/Dec
					SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	
Winter Pruning		5.00													
Tying			7.00												
Disc in Cover	1.21		0.42												
Fertilize	1.36		0.48												
Herbicide/Followup	2.52		0.50				0.50								
Replace Lost Vines			1.00												
Spray (4x)	8.36				0.45		0.90		0.45						
Shoot Positioning					10.00										
Flower & Sucker Removal					8.00										
Cultivate (3x)	3.63				0.42		0.42		0.42						
Plant Cover	1.21								0.50						
String 2nd Wire	4.59			4.00											
Irrigate	28.76				0.40	1.60	0.80	3.20	0.40	1.60					
Hill Up Vines	1.21												0.42		
Brush Chop	10.94	2.50													
Trac 40hp (9.7 hrs)	6.21														
Totals	70.00														

Total Labor Hours

Total	Jan. Feb. March	April	May	June		July		August		Sept.		October		Nov/Dec
				SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	
51.38	7.50	9.40	4.00	19.27	1.60	2.62	3.20	1.77	1.60			0.42		
44.98	skilled													
6.40	unskilled													

*SK = skilled, UN = unskilled.

Table 33

TABLE GRAPE BUDGET: Year 3

	Unit	Price	Quantity	Total
Receipts:				
Direct Wholesale Market	lb	0.50	1,275 lbs	$ 637.50
Direct Retail Market	lb	1.00	1,275 lbs	1,275.00
(yield: 1.5 tons x 0.85 (15% cull rate) = 2,550 lbs.)				
Total Receipts				$1,912.50
Expenses:				
Seed:				
Replacement vines	vine	1.75	6	$ 10.50
Oats	bu	5.76	2	11.52
Fertilizer:				
Nitrogen	lb		50	
Fertilizer:				
Amonium Nitrate	ton	240.00	0.076	18.24
Chemicals:				
Fungicide				192.72
Insecticide				33.26
Herbicide				19.25
Other Items:				
Containers: Retail Pick[a]	30 lb lug	4.50	34	153.00
Pack	1 qt till	0.06	765	45.90
Wholesale	20 lb lug	1.35	64	86.40
(Pick & Pack)	1 qt till	0.06	765	45.90
Transport: Retail	load	33.60	0.5	16.80
Wholesale	20 lb lug	0.50	64	32.00
Storage Variable Cost				57.81
Twine	lb	1.54	2	3.08
Wire	lb	2.10	2	4.20
Additional Taxes				31.86
Machinery Variable Cost				99.03
TOTAL VARIABLE COSTS PER ACRE				$ 861.47
NET RETURNS PER ACRE				$1,051.03

---

[a] One time purchase only.

Table 34

THIRD YEAR TABLE GRAPES

Machinery Variable Costs and Labor Hours per Acre

Labor Hours

Operation	Mach. V.C. $/acre	Jan Feb March	April	May	June		July		August		Sept.		October		Nov/Dec
					SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	
Winter Pruning		18.00													
Brush Chop	10.94	2.50													
Tie			12.00												
Disc in Cover	1.21		0.42												
Fertilize	1.36		0.48												
Herbicide/Followup	2.52		0.50				0.50								
Replace Lost Vines			1.00												
Spray (13)	27.17			1.35	2.25		1.35		0.90						
Shoot Positioning					15.00										
Suckering					8.00										
Cluster Thinning & Cane Girdling							27.0								
String 3rd Wire	4.59			4.00											
Cultivate (3x)	3.63				0.42		0.42		0.42						
Plant Cover	1.21								0.50						
Irrigate (4x)	28.76				0.40	1.60	0.80	3.20	0.40	1.60					
Harvest - Haul, Load & Store	5.97								1.20	5.80	3.20	14.4	0.80	2.70	
Market									1.27		3.30		1.00		0.50
Hillup Vines	1.21												0.42		
Trac 40hp (16.35hrs)	10.46														
Totals	99.03														

Total Labor Hours

Total	Jan. Feb. March	April	May	June		July		August		Sept.		October		Nov/Dec
				SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	
139.60	20.50	14.40	5.35	26.07	1.60	30.07	3.20	4.69	7.40	6.50	14.40	2.22	2.70	0.50
110.30	skilled													
29.30	unskilled													

*SK = skilled, UN = unskilled.

Table 35

MATURE TABLE GRAPE BUDGET: Years 4-14

	Unit	Price	Quantity	Total
Receipts:				
Direct Wholesale Market	lb	0.50	2,550 lbs	$1,275.00
Direct Retail Market	lb	1.00	2,550 lbs	2,550.00
(yield: 3 tons x 0.85 (15% cull rate) = 5,100 lbs.)				
Total Receipts				$3,825.00
Expenses:				
Seed:				
Replacement vines	vine	1.75	6	$ 10.50
Oats	bu	5.76	2	11.52
Fertilizer:				
Nitrogen	lb		50	
Fertilizer:				
Amonium Nitrate	ton	240.00	0.076	18.24
Lime: Dolomitic lime (years 5 & 10 only)	ton	64.00	2	(128.00)*
Chemicals:				
Fungicide				192.72
Insecticide				33.26
Herbicide				19.25
Other Items:				
Trellis Repair				4.00
Containers Retail	1 qt till	0.06	1,530	91.80
Wholesale	20 lb lug	1.35	127.5	172.13
	1 qt till	0.06	1,530	91.80
Transport Direct Retail	load	33.60	1	33.60
Direct Wholesale	20 lb lug	0.50	127.5	63.75
Storage Variable Cost				70.33
Twine	lb	1.54	2	3.08
Wire	lb	2.10	2	4.20
Additional Taxes				31.86
Machinery Variable Costs				87.58 ($90.05)*
TOTAL VARIABLE COSTS PER ACRE				$ 939.62 (1,070.09)*
NET RETURNS PER ACRE				$2,885.38 (2,754.91)*

*Numbers in parentheses are costs and net returns for years 5 and 10 when lime is applied.

Table 36

MATURE TABLE GRAPES

Machinery Variable Costs and Labor Hours per Acre

Labor Hours

Operation	Mach. V.C. $/acre	Jan Feb March	April	May	June		July		August		Sept.		October		Nov/Dec
					SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	
Winter Prune		30.00													
Brush Chop	10.94	2.50													
Tie			19.00												
Disc in Cover	1.21		0.42												
Lime (years 5&10)	(2.04)		(0.72)												
Fertilize	1.36		0.48												
Herbicide/followup	2.52		0.50				0.50								
Replace Lost Vines			1.00												
Spray (13x)	27.17			1.35	2.25		1.35		0.90						
Shoot Positioning					20.00										
Suckering					6.00										
Cluster Thin & Cane Girdle							35.0								
Repair Trellis	1.15			1.00											
Cultivate (3x)	3.63				0.42		0.42		0.42						
Plant Cover	1.21								0.50						
Irrigate (2x)	14.38						0.40	1.60	0.40	1.60					
Harvest, Haul, Load & Store	11.70								2.60	11.70	6.40	28.80	1.20	5.40	
Market									3.00		6.00		2.00		1.13
Hill Up Vines	1.21												0.42		
Trac 40hp(17.35hrs)	11.10														
(Tractor 40hp 18.01 hrs. years 5 & 10)	(11.53)														
Totals	87.58 (90.05)														

Total Labor Hours

Total	Jan. Feb. March	April	May	June		July		August		Sept.		October		Nov/Dec
				SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	
196.66	32.50	21.40	2.35	28.67		37.67	1.60	7.82	13.30	12.40	28.80	3.62	5.40	1.13
(197.38) 147.56	skilled (148.28)													
49.10	unskilled													

*SK = skilled, UN = unskilled.
Numbers in parentheses refer to differences in years 5 and 10.

BUDGETS FOR PEACHES

Varieties and Yields

Long Island's mild winters and close proximity to large urban markets make it an ideal location for peach production. Peach acreage has been increasing steadily in recent years so that now peaches are the major tree fruit on the Island.

There are many yellow and white fleshed peach varieties. Sixteen varieties were found most commonly in the Long Island orchards surveyed in October 1984 (Table 37). This mixture of varieties leads to a harvest period of approximately 10 weeks extending from early July through mid-September. Heaviest production occurs in early and mid-August. Growers store their peaches up to a month in some cases and this insures even greater flexibility in marketing.

Yield data for peach production on Long Island was extremely hard to find. The problem with peaches is that production is highly variable depending on damage from spring frosts. This was demonstrated by a study of yields carried out in New Jersey from 1978 to 1982. The average production per tree over nine varieties rose from 61 pounds (1.27 bushels) in the third year to 150 pounds (3.13 bushels) in the fifth year, only to drop again to 69 pounds (1.44 bushels) in the sixth year due to a frost. In the seventh year, mean production had only risen to 135 pounds (2.8 bushels) and the standard deviation was very high (68.2 pounds) (Miller and Vorsa, 1983).

Data from the 1980 "New York Orchard and Vineyard Survey" showed Suffolk County with production of 4,639,304 pounds from approximately 35,332 trees of bearing age. This gave an average yield of 131.3 pounds or 2.73 bushels per tree.

These estimates were checked against growers' yields in the interviews of Long Island peach growers held in October 1984. The yields for three year old trees ranged from 0.5 to 1.0 bushel per tree. Four year old tree yields ranged from 1.3 to 2.3 bushels per tree and for five year old trees and older, the range was two to four bushels per tree. Those growers with older orchards reported the lower yields and said that in the earlier years they had had higher production. It is known that problems with perennial canker limit the life of a peach orchard to about 12 years.

In these budgets, it was assumed that peach yields would be one bushel per tree for three year old trees, two bushels per tree for four year old trees, and three bushels per tree for five year old trees and older. With a density of 108 trees per acre, a cull rate of 15 percent reduced the marketable harvest to 91.8 bushels (4,406 pounds) per acre in the third year, 183.6 bushels (8,812 pounds) per acre in the fourth year, and 275.4 bushels (13,219 pounds) per acre in the remaining years.

Cultural Practices and Chemical Usage

Fortunately, there was not as much disagreement among researchers or between researchers and farmers on the appropriate cultural practices for peaches as there was over the cultural practices for grapes. One major

Table 37
SOME POSSIBLE PEACH VARIETIES FOR LONG ISLAND

Variety	Diameter	Red Color (percent)	Productivity*	Approximate Ripening Date
Candor	—	—	—	early July
Camden	—	—	—	early July
Sunhaven	2 3/4	90	3.0	mid-July
Raritan Rose	2 1/2	80	3.3	early August
Redhaven	2 5/8	90	4.2	early August
Golden Jubilee	2 5/8	40	4.0	early August
Triogem	2 5/8	75	3.8	mid-August
Halehaven	2 1/2	85	3.8	mid-August
Canadian Harmony	2 5/8	85	3.4	mid-August
Loring	2 3/4	60	2.9	late August
Glohaven	2 5/8	90	3.7	late August
Madison	2 1/2	50	4.5	early Sept.
Cresthaven	2 7/8	70	3.7	early Sept.
Jersey Queen	2 3/4	35	2.5	mid-Sept.
Elberta	2 3/4	30	2.8	mid-Sept.
Redskin	2 5/8	40	3.3	mid-Sept.

*Productivity is measured on a scale of 0 to 5 where trees were rated from 0 for no crop to 5 for a very full crop. These figures represent an average over several years at the New York State Agricultural Experiment Station, Geneva, New York.

SOURCES: Lamb, Robert C. and David E. Terry, "Peach and Nectarine Varieties for New York State", Plant Sciences, No. 34, May 1973.

Rutgers, The State University, "Commercial Tree Fruit Production Recommendations for New Jersey", Ext. Bul. 407-6, New Brunswick, NJ, 1980.

Stiles, Warren, Personal Communication, Cornell University, Department of Pomology, Ithaca, New York, summer 1984.

difference from grapes is the use of sod row middles rather than clean cultivation. Although some farmers allow the 12 foot row middles to grow with weeds, these budgets reflect the establishment costs of permanent sod covers. This increases soil organic matter and reduces erosion and the danger of breaking tree roots from frequent cultivations.

The eight foot strip underneath the tree canopy is kept clean with herbicides. This is necessary in order to decrease competition for water and nutrients between the grass and the trees. The herbicide program was based on technical recommendations which were modified to reflect farmer practice on Long Island (Table 38).

To raise the soil pH from the acid range generally found on potato and cauliflower land, it was assumed that four tons of dolomitic (high magnesium) lime were applied before planting. An additional one and one half tons of lime would be applied every other year thereafter. These rates correspond with actual liming rates of Long Island growers.

Fertilization rates were based on recommendations from New Jersey since Long Island closely resembles that state in climate and growing conditions. The fertilizer is broadcast in the first year to aid in the establishment of the sod row middles. In later years, it is banded near the trees only. Although fertilization of the sod is recommended, no growers on Long Island do it. Only nitrogen, potassium, and magnesium are applied. The high soil phosphorous levels and the additional phosphorous released through liming make additional applications unnecessary. Fertilization rates and other cultural practices are outlined in Table 39.

Insect and disease control are very important in peach orchards. The major disease problems on Long Island are brown rot and cytospora canker. These can be controlled with a regular spray program (every 7 to 14 days). An average of 13 sprays per season in bearing orchards (six in nonbearing orchards) was assumed in these budgets and this corresponds with local grower practice. An additional way to control cytospora canker is to paint tree trunks with white latex before January. This helps avoid cracking of the trunks from dramatic daily ranges in temperature. Although this practice is not presently being followed on Long Island, its importance in prolonging the life of the orchard caused it to be included here (Stiles, 1984).

The major peach insects are the peach borers (greater and lesser), the oriental fruit moth, and the tarnished plant bug. Trees are dipped in Thiodan at the nursery prior to planting in order to reduce the danger of infestation of new orchards with the peach tree borers. To control these insects in the orchard, the budgets assumed four sprays in nonbearing orchards and seven sprays in the bearing orchards (Riedl, 1984) (Tables 40 and 41). As in the case of table grapes, the frequency and type of products used in these spray programs were based on technical recommendations and modified to reflect grower practice.

Labor Requirements

Estimating labor requirements for the various activities involved in peach growing was a difficult task. Since published budgets were available from South Carolina, Georgia, Louisiana, Michigan, Ontario, and the Niagara

Table 38
HERBICIDE PROGRAM FOR PEACHES

	Product	Rate/Acre*	Pounds A.I.	Times of Application
Planting Year	Oryzalin (Surflan 75WP)	1.0 lb	0.75	Early spring
	Dinoseb (Premerge 3) 50% EC (4 lb/gl)	1.0 qt	1.0	
2+ Year Old Orchard	Simazine (Princep 80WP)	0.42 lb	0.33	(use low rate because sandy soils)
	Oryzalin (Surflan 75WP)	1.0 lb	0.75	
	Paraquat (2 lb/gl)	0.3 qt	0.15	Early spring
	Nonionic surfactant	2.7 oz		

*This rate reflects 1/3 of the rate per acre since only the area under the vines is sprayed (1/3 of acreage).

SOURCES: New York State College of Agriculture and Life Sciences, "Cornell Recommends for Commercial Tree Fruit Production", Cornell University, Ithaca, NY, 1983.

Stiles, Warren, Personal Communication, Department of Pomology, Cornell University, Ithaca, NY, summer 1984.

Table 39
ASSUMPTIONS BEHIND PEACH BUDGETS FOR LONG ISLAND

Tree Spacing: 20 feet by 20 feet, 108 trees per acre

Liming: 4 tons dolomitic lime per acre before planting
1 1/2 tons per acre every other year thereafter

Fertilization: Planting Year: Nitrogen 22 pounds, (rate 0.1 lb./tree doubled for sod establishment)
2nd - 5th years: Nitrogen - 43.2 pounds (rate 0.4 lb./tree)
Potassium - 27 pounds (rate 0.25 lb./tree)
6th - 10th years: Nitrogen - 108 pounds (rate 1 lb./tree)
Potassium - 54 pounds (rate 0.5 lb./tree)

All fertilization rates are in pounds actual per acre.

Cultural Practices: No subsoiling or soil fumigant for nematodes
Trees planted with auger
Lime custom applied in first year, applied by fertilizer spreader in established orchard
Fertilizer applied in band by spreader
Herbicide applied once in spring in band under trees, follow-up spot treatments with paraquat
Sod mowed 5 times per year
Brush chopped with rotary mower (2 passes)
Bearing trees sprayed 13 times per year
Nonbearing trees sprayed 6 times per year
Trunks painted with latex every other year
Many varieties planted to extend harvest over a 10 week period: early July to mid-September
Average yield 3.0 bushels per tree. 15 percent of fruit culled
Perennial rye grass, 20 pounds per acre, and fescue, 10 pounds per acre, planted in row middles
Irrigation by moveable pipe system from potato operation
Orchard marked off for planting with converted cultivator - 2 men - one to drive, one to move stakes
2% of trees lost each year. Trees are replanted up to 5th year of orchard life - not thereafter.

SOURCES: Farmer Interviews, Long Island, New York, 1984.

New York State College of Agriculture and Life Sciences, "Cornell Recommendations for Commercial Tree Fruit Production, 1983", Cornell University, Ithaca, New York, 1983.

Rutgers, The State University, "Commercial Tree Fruit Production Recommendations for New Jersey, 1980", Extension Bulletin 407-6, New Brunswick, New Jersey, 1980.

Stiles, Warren, Personal Communication, Department of Pomology, Cornell University, Ithaca, New York, Summer 1984.

Table 40
NONBEARING PEACH TREE SPRAY PROGRAM (FIRST TWO YEARS)

	Product	Rate per 100 Gallons	Pounds A.I.
Dormant			
Early spring	Ferbam 76% WP	1.5 lb	1.14
	Superior oil 60-70 second viscosity	3.0 gl	---
Early Bloom			
May 10	Captan 50% WP	2.0 lb	1.0
Shuck Split			
June 1	Captan 50% WP	2.0 lb	1.0
	Parathion 15% WP	1.0 lb	0.15
First Cover			
June 15	Sulfur 95% WP	6.3 lb	6.0
	Parathion 15% WP	1.0 lb	0.15
Second Cover			
July 7	Captan 50% WP	2.0 lb	1.0
	Parathion 15% WP	1.0 lb	0.15
August 1*	Parathion 15% WP	1.0 lb	0.15

*The borer spray on August 1 will not be included in the first year since the trees will have been dipped in Thiodan prior to planting.

SOURCES: Riedl, Helmut, Personal Communication, New York State Agricultural Experiment Station, Geneva, NY, summer 1984.

Rutgers, The State University, "Commercial Tree Fruit Production Recommendations for New Jersey, 1980", Ext. Bul. 407-6, New Brunswick, NJ.

Table 41
BEARING PEACH TREE SPRAY PROGRAM

	Product	Rate per 100 Gallons	Total	Pounds A.I.
			125 gl/ac	
Dormant late November	Ferbam 76% WP	1.5 lb	1.9 lb	1.44
	Superior oil 60-70 second viscosity	3.0 gl	3.75 gl	--
Pink Spray				
April 13	Benlate 50% WP	6.0 oz	7.5 oz	0.23
	Captan 50% WP	2.0 lb	2.5 lb	1.25
	Thiodan 50% WP	1.0 lb	1.25 lb	0.63
April 23	Benlate 50% WP	8.0 oz	10.0 oz	0.31
	Sulfur 95% WP	3.0 lb	3.75 lb	3.56
May 5	Captan 50% WP	2.0 lb	2.5 lb	1.25
Blossom Spray			200 gl/ac	
May 15	Sulfur 95% WP	4.2 lb	8.4 lb	8.0
May 30	Benlate 50% WP	6.0 oz	0.75 lb	0.38
	Captan 50% WP	2.0 lb	4.0 lb	2.0
Fruit Set Spray				
June 10	Sulfur 95% WP	4.2 lb	8.4 lb	8.0
	Parathion 15% WP	2.0 lb	4.0 lb	0.6
June 25	Captan 50% WP	2.0 lb	4.0 lb	2.0
	Imidan 50% WP	1.25 lb	2.5 lb	1.25
Summer Sprays				
July 10	Sulfur 95% WP	4.2 lb	8.4 lb	8.0
	Parathion 15% WP	2.0 lb	4.0 lb	0.6
July 25	Benlate 50% WP	6.0 oz	0.75 lb	0.38
	Captan 50% WP	2.0 lb	4.0 lb	2.0
	Sevin 50% WP	2.0 lb	4.0 lb	2.0
Preharvest Sprays				
August 15	Captan 50% WP	2.0 lb	4.0 lb	2.0
	Sevin 50% WP	2.0 lb	4.0 lb	2.0
August 30	Captan 50% WP	2.0 lb	4.0 lb	2.0
Postharvest Borer Spray				
Late September	Thiodan 50% WP	1.5 lb	3.0 lb	1.5

SOURCES: New York State College of Agriculture and Life Sciences, "Cornell Recommends for Commercial Tree Fruit Production", Cornell University, Ithaca, NY, 1983.

Riedl, Helmut, Personal Communication, New York State Agricultural Experiment Station, Geneva, NY, summer 1984.

Rutgers, The State University, "Commercial Tree Fruit Production Recommendations for New Jersey, 1980", Ext. Bul. 407-6, New Brunswick, NJ, 1980.

Stiles, Warren, Personal Communication, Department of Pomology, Cornell University, Ithaca, NY, summer 1984.

region of New York, it seemed that a review of the literature could provide ready answers to the question of labor requirements. However, as in the case of grapes, there was considerable disagreement among studies. Some of this disagreement could be explained by a closer investigation of the machinery complement. For example, in South Carolina it took only 0.7 hours to lay out and plant an acre of peach trees with a mechanical planter (Bauer, 1978). In Ontario it took 16 hours to do the same operation by hand (McKibbon, 1980).

On Long Island, most growers use an auger to make the holes for planting peaches. Despite the use of similar machinery, planting times varied from 6 to 12 hours per acre. With estimates of two minutes to auger each hole, one minute to haul and plant each tree, and one hour to lay out the orchard, approximately seven hours would be needed to plant an acre of peach trees.

Labor requirements for hand operations were even more difficult to determine. Pruning estimates ranged from 18 to 40 hours per acre for mature orchards. Thinning ranged from 20 to 108 hours. Since these hand labor requirements are so important, Long Island growers were interviewed to determine pruning and thinning times. Both pruning and thinning times increased with tree age to about 20 minutes per tree for pruning (36 hours per acre) and 30-60 minutes for thinning (54 hours per acre).

The average harvest speed for Long Island growers was four bushels per hour (69 hours per acre for a mature orchard). Hauling, cooling, and grading were estimated at 7.5 bushels per hour (37 hours per acre for a mature orchard) (Table 42).

Marketing and Transportation Costs For Peaches

Two marketing channels were considered for peaches. Direct retail marketing through farmers' markets or other farm stands, and direct wholesaling to chain stores. As in the case of grapes, the returns in the budgets were based on the assumption that half the production went into each channel.

Unlike the case for grapes, the marketing costs for the two channels were not terribly different. Container costs were actually higher for direct retail peaches but transportation costs were lower. Labor, of course, was almost three times as high for peaches marketed through direct retailing (Table 43).

The difference in packing and transportation costs was reflected in the producer price. The average retail price of $0.50 per pound and the average wholesale price of $0.30 per pound were reduced to $0.46 per pound and $0.26 per pound respectively (Table 44).[10]

Detailed descriptions of the costs and returns and labor requirements of peach production follow in Tables 45 through 56.

---

[10] These prices were based on average prices received by Long Island growers at their farm stands. The wholesale price of $0.30 per pound ($10.80 per 3/4 bushel) is slightly higher than the $0.27 per pound five year average price at the New York City Terminal Market and is used to approximate what a Long Island chain store price would be for tree ripened local peaches.

Table 42
HAND LABOR REQUIREMENTS FOR PEACHES[a]

	Minutes Per Tree	Hours Per Acre	
		Skilled	Unskilled
Pruning:			
1st & 2nd years	3	5.4	
3rd year	6	10.8	
4th year	10	18.0	
5th year on	15	27.0	
Thinning:			
3rd year	15	2.7	24.3
4th year	20	3.6	32.4
5th year on	30	5.4	48.6
Harvesting:[b]			
3rd year		2.3	20.7
4th year		4.6	41.4
5th year on		6.9	62.1
Hauling, Cooling, & Grading			
3rd year		2.57	9.79
4th year		4.9	19.6
5th year on		7.4	29.6
Direct Retail Marketing (1/2 production)			
3rd year		3.89	
4th year		7.75	
5th year on		11.64	
Direct Wholesale Marketing (1/2 production)			
3rd year		1.01	
4th year		2.01	
5th year on		3.02	

---

[a] Based on review of published peach budgets and interviews with Long Island, New York peach growers.

[b] Based on harvested production (after culling) of 92 bushels per acre in year 3, 183 bushels per acre in year 4, and 275 bushels per acre thereafter. Harvest rate: 4 bushels per hour.

Table 43
MARKETING COSTS: PEACHES

	Unit Cost	No./Acre	Total Cost
Picking Containers[a]			
3/8 bushel wooden boxes	$4.00	147	$588.00
Packing Containers			
Direct Retail			
2 quart bags with handle	0.96	2,203	211.49
Direct Wholesale			
3/4 bushel boxes	1.00	183	183.00
Grand Total Container Costs Per Acre			$394.49
Storage			
Electricity for Precooling & Storage[b]			
(1/20 of total per acre)			$ 45.28
Total Variable Storage Costs Per Acre			$ 45.28
Transportation			
Direct Retail Marketing			
Pickup truck			
153 3/4 bu. boxes/load,	0.28 mile	120 miles	$ 33.60
1.2 loads/acre			40.32
Direct Wholesale Marketing			
Ship commercially	0.50/3/4 bu.	183	91.50
Grand Total Transport Cost Per Acre			$131.82
Marketing Labor			
Direct Retail Marketing (1.2 loads)			
Load & unload (150 bu./hour)			1.44
Driving			3.00
Packing & selling			7.20
			11.64
Direct Wholesale Marketing (183 boxes = 0.4 load)			
Load & unload (150 bu./hour)			1.44
Driving			1.00
Selling			0.72
			3.02

---

[a] These boxes are purchased in year 3 and used throughout the life of the orchard.

[b] 1/20 of total cold storage operating costs. See Appendix A, Table A-3.

SOURCES: Farmer Interviews, Long Island, New York, October 1984.
Various Input Suppliers, Long Island, New York, 1984.

Table 44
EFFECTIVE PRODUCER PRICES FOR PEACHES

Direct Wholesale Price		Direct Retail Price	
Price	$10.80 per 3/4 bushel	Price	$1.50 per 2 qt. bag
Container	- 1.00	Container	-0.10
Transport	- 0.50	Transport	-0.02
Effective Price	$9.30 per 3/4 bushel $ 0.26 per pound*	Effective Price	$1.38 per 2 qt. bag $0.46 per pound**

*3/4 bushel = 36 pounds.

**2 quarts = 3 pounds.

Table 45

PEACH BUDGET: Year 1

	Unit	Price	Quantity	Total
Expenses:				
Seed:				
Trees	tree	3.40	108	$367.20
Perennial Rye Grass	lb	1.05	20	21.00
Fescue	lb	0.80	10	8.00
Fertilizer:				
Nitrogen	lb		22	
Fertilizer:				
Calcium Nitrate	ton	210.00	0.07	14.70
Lime: Dolomitic lime (includes application)	ton	40.00	4	160.00
Chemicals:				
Fungicide				23.34
Insecticide				2.55
Herbicide				13.19
Other Items:				
Latex Paint	gal	8.00	1	8.00
Additional Taxes				12.87
Machinery Variable Cost				73.05
TOTAL VARIABLE COSTS PER ACRE				$703.90

Table 46

PEACHES - YEAR ONE

Machinery Variable Costs and Labor Hours per Acre

Labor Hours

Operation	Mach. V.C. $/acre	Jan Feb March	April	May	June		July		August		Sept.		October		Nov/Dec
					SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	
Plow	4.46	0.40													
Disc	0.96	0.17													
Mark Orchard	1.07		1.00												
Auger Holes	10.96		4.00												
Haul & Plant Trees	4.13		2.00												
Topdress Fertilizer	0.61	0.22													
Herbicide (band)	0.58	0.23													
Irrigate (4x)	28.76		2.00	2.00	0.40	1.60	0.40	1.60							
Hill Up	1.21		0.42												
Spray (5x)	4.80		0.21	0.21	0.42		0.21								
Prune				9.00											
Plant Sod	1.21		0.50												
Mow (4x)	6.76				0.38		0.38		0.38		0.38				
Paint Trunks															2.00
Trac 100hp (0.39hrs)	0.71														
Trac 60hp (2.46hrs)	2.21														
Trac 40hp (7.22hrs)	4.62														
Totals	73.05														

Total Labor Hours

Total	Jan. Feb. March	April	May	June		July		August		Sept.		October		Nov/Dec
				SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	
30.51	1.02	10.13	11.21	1.20	1.60	0.99	1.60	0.38		0.38				2.00
27.31	skilled													
3.20	unskilled													

*SK = skilled, UN = unskilled.

Table 47

PEACH BUDGET: Year 2

	Unit	Price	Quantity	Total
Expenses:				
Seed:				
Replacement Trees	tree	3.40	2	$ 6.80
Fertilizer:				
Nitrogen	lb		43.2	
Potassium	lb		27	
Magnesium	lb		13.5	
Fertilizer:				
Amonium Nitrate	ton	240.00	0.07	16.80
Sul-Po-Mag	ton	188.00	0.06	11.28
Chemicals:				
Fungicide				23.34
Insecticide				3.40
Herbicide				15.61
Other Items:				
Additional Taxes				12.87
Machinery Variable Cost				57.97
TOTAL VARIABLE COSTS PER ACRE				$148.07

Table 48

PEACHES - YEAR TWO

<u>Machinery Variable Costs and Labor Hours per Acre</u>

Labor Hours

Operation	Mach. V.C. $/acre	Jan Feb March	April	May	June		July		August		Sept.		October		Nov/Dec
					SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	
Herbicide (band)	1.16	0.23					0.23								
Prune		4.50	4.50												
Topdress Fertilizer	0.61	0.22													
Brush Chop	9.64		2.20												
Mow (5x)	8.45			0.38	0.38		0.38		0.38		0.38				
Irrigate (4x)	28.76			2.00	0.40	1.60	0.40	1.60	0.40	1.60					
Spray (6x)	5.76		0.21	0.21	0.42		0.21		0.21						
Replace Trees			0.50												
Trac 40hp (5.61hrs)	3.59														
Totals	57.97														

Total Labor Hours

Total	Jan. Feb. March	April	May	June		July		August		Sept.		October		Nov/Dec
				SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	
23.54	4.95	7.41	2.59	1.20	1.60	1.22	1.60	0.99	1.60	0.38				
18.74	skilled													
4.80	unskilled													

*SK = skilled, UN = unskilled.

Table 49

PEACH BUDGET: Year 3

	Unit	Price	Quantity	Total
Receipts:				
Direct Retail	lb	0.50	2,203	$1,101.50
Direct Wholesale	lb	0.30	2,203	660.90
(Yield: 108 bu. x 0.85 (15% cull rate) = 91.8 bu. x 48 lbs/bu. = 4,406 lbs.)				
Total Receipts				$1,762.40
Expenses:				
Seed:				
Replacement Trees	tree	3.40	2	$ 6.80
Fertilizer:				
Nitrogen	lb		43.2	
Potassium	lb		27.0	
Magnesium	lb		13.5	
Fertilizer:				
Amonium Nitrate	ton	240.00	0.07	16.80
Sul-Po-Mag	ton	188.00	0.06	11.28
Lime: Dolomitic Lime	ton	64.00	1.5	96.00
Chemicals:				
Fungicide				83.01
Insecticide				57.69
Herbicide				15.61
Other Items:				
Latex Paint	gl	8.00	1	8.00
Storage Variable Costs				45.28
Containers Picking Boxes[a]	box	4.00	147	588.00
Containers Packing Retail[b]	2 qt bag	0.096	734	70.46
Wholesale[c]	3/4bu box	1.00	61	61.00
Transport Retail	load	33.60	0.4	13.44
Wholesale	3/4 bu	0.50	61	30.05
Additional Taxes				12.87
Machinery Variable Cost				74.99
TOTAL VARIABLE COSTS PER ACRE				$1,191.28
NET RETURNS PER ACRE				$ 571.12

---

[a] One time purchase only.

[b] Two quarts = three pounds.

[c] 3/4 bushel = 36 pounds.

Table 50

PEACHES - YEAR THREE

Machinery Variable Costs and Labor Hours per Acre

Labor Hours

Operation	Mach. V.C. $/acre	Jan Feb March	April	May	June		July		August		Sept.		October		Nov/Dec
					SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	
Herbicide	1.16	0.23					0.23								
Prune		6.00	6.00	6.00											
Topdress Fertilizer	0.61	0.22													
Apply Lime (1.5 fert. time)	0.92	0.33													
Brush Chop	9.64			2.20											
Mow (5x)	8.45			0.38	0.38		0.38		0.38		0.38				
Irrigate (4x)	28.76			2.00	0.40	1.60	0.40	1.60	0.40	1.60					
Spray (13x)	13.54		0.42	0.63	0.42		0.42		0.42		0.21				0.21
Replace Trees			0.50												
Thin					2.70	24.3									
Harvest							0.62	5.64	1.05	9.41	0.63	5.65			
Haul, Grade & Store	5.62						0.67	2.67	1.10	4.45	0.80	2.67			
Market							1.33		2.22		1.35				
Paint Trees															2.00
Trac 40hp (9.83hrs)	6.29														
Totals	74.99														

Total Labor Hours

Total	Jan. Feb. March	April	May	June		July		August		Sept.		October		Nov/Dec
				SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	
103.60	6.78	6.92	11.21	3.90	25.9	4.05	9.91	5.57	15.46	3.37	8.32			2.21
44.01	skilled													
59.59	unskilled													

*SK = skilled, UN = unskilled.

Table 51

PEACH BUDGET: Year 4

	Unit	Price	Quantity	Total
Receipts:				
Direct Retail	lb	0.50	4,406	$2,203.00
Direct Wholesale	lb	0.30	4,406	1,321.80
(Yield: 216 bu. x 0.85 (15% cull rate) = 183.6 bu. x 48 lbs./bu. = 8,812 lbs.)				
Total Receipts				$3,524.80
Expenses:				
Seed:				
Replacement Trees	tree	3.40	2	$ 6.80
Fertilizer:				
Nitrogen	lb		43.2	
Potassium	lb		27.0	
Magnesium	lb		13.5	
Fertilizer:				
Amonium Nitrate	ton	240.00	0.07	16.80
Sul-Po-Mag	ton	188.00	0.06	11.28
Chemicals:				
Fungicide				83.01
Insecticide				57.69
Herbicide				15.61
Other Items:				
Storage Variable Costs				45.28
Containers Packing Retail	2 qt bag	0.096	1,469	141.02
Wholesale	3/4bu box	1.00	122	122.00
Transport Retail	load	33.60	0.8	26.88
Wholesale	3/4bu box	0.50	122	61.00
Additional Taxes				12.87
Machinery Variable Cost				81.08
TOTAL VARIABLE COSTS PER ACRE				$ 681.32
NET RETURNS PER ACRE				$2,843.48

Table 52
PEACHES - YEAR FOUR

Machinery Variable Costs and Labor Hours per Acre

Labor Hours

Operation	Mach. V.C. $/acre	Jan Feb March	April	May	June		July		August		Sept.		October		Nov/Dec
					SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	
Herbicide	1.16	0.23					0.23								
Prune		9.00	9.00	9.00											
Topdress Fertilizer	0.61	0.22													
Brush Chop	9.64			2.20											
Mow (5x)	8.45			0.38	0.38		0.38		0.38		0.38				
Irrigate (4x)	28.76			2.00	0.40	1.60	0.40	1.60	0.40	1.60					
Spray (13x)	13.54		0.42	0.63	0.42		0.42		0.42		0.21				0.21
Replace Trees			0.50												
Thin					3.60	32.4									
Harvest							1.25	11.29	2.10	18.82	1.25	11.29			
Haul, Cool & Grade	11.25						1.34	5.35	2.22	8.90	1.34	5.35			
Market							2.60		4.46		2.70				
Trac 40hp (11.98hrs)	7.67														
Totals	81.08														

Total Labor Hours

Total	Jan. Feb. March	April	May	June		July		August		Sept.		October		Nov/Dec
				SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	
159.27	9.45	9.92	14.21	4.80	3.40	6.62	18.24	9.98	29.32	5.88	16.64			0.21
61.07	skilled													
98.20	unskilled													

*SK = skilled, UN = unskilled.

Table 53

PEACH BUDGET: Year 5

	Unit	Price	Quantity	Total
Receipts:				
Direct Retail	lb	0.50	6,609	$3,304.50
Direct Wholesale	lb	0.30	6,609	1,982.70
(Yield: 324 bu. x 0.85 (15% cull rate) = 275.4 bu. x 48 lbs./bu. = 13,218 lbs.)				
Total Receipts				$5,287.20
Expenses:				
Seed:				
Replacement Trees	tree	3.40	2	$ 6.80
Fertilizer:				
Nitrogen	lb		43.2	
Potassium	lb		27.0	
Magnesium	lb		13.5	
Fertilizer:				
Amonium Nitrate	ton	240.00	0.07	16.80
Sul-Po-Mag	ton	188.00	0.06	11.28
Lime: Dolomitic Lime	ton	64.00	1.5	96.00
Chemicals:				
Fungicide				83.01
Insecticide				57.69
Herbicide				15.61
Other Items:				
Latex Paint	gl	8.00	1.0	8.00
Storage Variable Costs				45.28
Containers Packing Retail	2 qt bag	0.096	2,203	211.49
Wholesale	3/4bu box	1.00	183	183.00
Transport Retail	load	33.60	1.2	40.32
Wholesale	3/4bu box	0.50	183	91.50
Additional Taxes				12.87
Machinery Variable Cost				89.52
TOTAL VARIABLE COSTS PER ACRE				$ 969.17
NET RETURNS PER ACRE				$4,318.03

Table 54

PEACHES - YEAR FIVE

Machinery Variable Costs and Labor Hours per Acre

Labor Hours

Operation	Mach. V.C. $/acre	Jan Feb March	April	May	June		July		August		Sept.		October		Nov/Dec
					SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	
Herbicide	1.16	0.23					0.23								
Prune		12.00	12.00	12.00											
Topdress Fertilizer	0.61	0.22													
Apply Lime(1.5 fert)	0.92	0.33													
Brush Chop	9.64			2.20											
Mow (5x)	8.45			0.38	0.38		0.38		0.38		0.38				
Irrigate (4x)	28.76			2.00	0.40	1.60	0.40	1.60	0.40	1.60					
Spray (13x)	13.54		0.42	0.63	0.42		0.42		0.42		0.21				0.21
Replace Trees			0.50												
Thin					5.40	48.6									
Harvest							1.88	16.93	3.14	28.23	1.88	16.94			
Haul, Grade & Store	16.98						2.02	8.07	3.36	13.45	2.02	8.08			
Market							3.90		6.66		4.10				
Paint Trees															2.00
Trac 40hp (14.78hrs)	9.46														
Totals	89.52														

Total Labor Hours

Total	Jan. Feb. March	April	May	June		July		August		Sept.		October		Nov/Dec
				SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	SK*	UN*	
229.00	12.78	12.92	17.21	6.60	50.20	9.23	26.60	14.36	43.28	8.59	25.02			2.21
83.90	skilled													
145.10	unskilled													

*SK = skilled, UN = unskilled.

Table 55

MATURE PEACH BUDGET: Years 6-12

	Unit	Price	Quantity	Total
Receipts:				
Direct Retail	lb	0.50	6,609	$3,304.50
Direct Wholesale	lb	0.30	6,609	1,982.70
(Yield: 324 bu. x 0.85 (15% cull rate) = 275.4 bu. x 48 lbs./bu. = 13,218 lbs.)				
Total Receipts				$5,287.20
Expenses:				
Fertilizer:				
Nitrogen	lb		108	
Potassium	lb		54	
Magnesium	lb		27	
Fertilizer:				
Amonium Nitrate	ton	240.00	0.16	38.40
Sul-Po-Mag	ton	188.00	0.12	22.56
Lime: Dolomitic Lime (years 7, 9, & 11 only)	ton	64.00	1.5	(96.00)*
Chemicals:				
Fungicide				83.01
Insecticide				57.69
Herbicide				15.61
Other Items:				
Storage Variable Costs				45.28
Containers Packing Retail	2 qt bag	0.096	2,203	211.49
Wholesale	3/4bu box	1.00	183	183.00
Transport Retail	load	33.60	1.2	40.32
Wholesale	3/4bu box	0.50	183	91.50
Additional Taxes				12.87
Latex Paint (years 7, 9, & 11 only)	gl	8.00	1	(8.00)*
Machinery Variable Cost				88.41 (89.52)*
TOTAL VARIABLE COSTS PER ACRE				$ 890.14 (995.25)*
NET RETURNS PER ACRE				$4,397.06 (4,291.95)*

*Numbers in parentheses refer to costs and net returns in years 7, 9, and 11 when lime is applied and trees are painted.

Table 56
MATURE PEACHES - YEARS 6-12

Machinery Variable Costs and Labor Hours Per Acre

		Labor Hours													
Operation	Mach. V.C. $/acre	Jan Feb March	April	May	June SK*	June UN*	July SK*	July UN*	August SK*	August UN*	Sept. SK*	Sept. UN*	October SK*	October UN*	Nov/Dec
Herbicide	1.16	0.23					0.23								
Prune		12.00	12.00	12.00											
Topdress Fertilizer	0.61	0.22													
Lime (years 7, 9 & 11)	(0.92)	(0.33)													
Brush Chop	9.64			2.20											
Mow (5x)	8.45			0.38	0.38		0.38		0.38		0.38				
Irrigate (4x)	28.76			2.00	0.40	1.60	0.40	1.60	0.40	1.60					
Spray (13x)	13.54		0.42	0.63	0.42		0.42		0.42		0.21				0.21
Thin					5.40	48.6									
Harvest							1.88	16.93	3.14	28.23	1.88	16.94			
Haul, Grade & Store	16.98						2.02	8.07	3.36	13.45	2.02	8.08			
Market							3.90		6.66		4.10				
Paint Trees (years 7, 9 & 11)															(2.0)
Trac 40hp (14.48hrs)	9.27														
(14.78 hrs. years 7, 9 & 11)	(9.46)														
Totals	88.41 (89.52)														

Total Labor Hours

Total	Jan. Feb. March	April	May	June SK*	June UN*	July SK*	July UN*	August SK*	August UN*	Sept. SK*	Sept. UN*	October SK*	October UN*	Nov/Dec
226.17	12.45	12.42	17.21	6.60	50.20	9.23	26.60	14.36	43.28	8.59	25.02			0.21
(228.50)														
81.07	skilled													
(83.40)														
145.10	unskilled													

*SK = skilled, UN = unskilled.
Numbers in parentheses refer to differences in years 7, 9, and 11.

CONCLUSIONS

Costs and Returns

A comparison of the costs and returns per acre for all crops showed clearly that mature peaches and table grapes offered the greatest return over variable costs of any crop (Table 57). The return per acre from peaches was twice that from table grapes and the establishment costs were 44 percent lower over the first three years ($2,985 for peaches versus $5,335 for grapes). Therefore, peaches can be expected to be the more attractive of the two fruit crops.

Table 57
COMPARISONS OF COSTS AND RETURNS PER ACRE, ALL CROPS, LONG ISLAND

	Gross Returns	Selected Variable Costs	Skilled Labor Costs	Unskilled Labor Costs	Total Variable Costs	Net Returns
Continuous potatoes	$1,448	$ 919	$113	$ 51	$1,083	$ 365
Rotated potatoes	1,448	868	110	51	1,029	419
Continuous wheat	164	111	11	0	122	42
Rotated wheat	164	82	7	0	89	75
Cauliflower	2,548	1,101	239	432	1,772	776
Peaches-Year 1	0	704	184	14	902	-902
Year 2	0	148	126	21	295	-295
Year 3	1,762	1,191	337	260	1,788	-26
Year 4	3,525	681	412	428	1,521	2,004
Year 5*	5,287	969	565	633	2,167	3,120
Years 6, 8, 10, 12	5,287	890	546	633	2,069	3,218
Years 7, 9, 11, 13	5,287	995	562	633	2,190	3,097
Table Grapes - Year 1	0	2,743	305	21	3,069	-3,069
Year 2	0	202	303	28	533	-533
Year 3	1,913	862	743	128	1,733	179
Years 4, 6*-9, 11-14	3,825	940	994	214	2,148	1,677
Years 5, 10	3,825	1,070	999	214	2,283	1,542

*Breakeven point.

Among the annual crops, cauliflower was by far the most profitable with potatoes and wheat following. In the case of both potatoes and wheat, growing the crop in rotation yielded a higher return (for the year when potatoes were grown) than growing the crop in monoculture. Although wheat had the lowest returns per acre, it also had the lowest variable costs and the lowest labor requirements of any of the crops. Thus, it would not be surprising to see farmers use wheat as a substantial land user while devoting a smaller acreage to the more intensive but highly valued fruit and vegetable crops.

Although peaches, grapes, and cauliflower offered the largest returns per acre, they also had the highest variable cost of production. Stress on the grower's operating capital reserves could be doubled since the total variable costs of production were around $2,000 per acre for these crops as opposed to $1,000 per acre for potatoes and $100 per acre for wheat.

Net Present Value Analysis

In order to adequately assess the profitability of peaches and grapes, it is essential to discount future income to net present values. Clearly, a dollar received today is worth more than a dollar received 15 years from now. In addition, the higher establishment costs for grapes over peaches could be counter-balanced by the longer life of the vineyard.

To get a better comparison of the profitability of peaches and grapes, the net return income stream for each crop was discounted (Tables 58 and 59). The average life of a peach orchard was assumed to be 12 years and the vineyard was discounted over 25 years. Implicit in this analysis was the assumption that the orchard and vineyard would be replaced at the end of the average life and the cycle would start again.

The net returns used in these calculations were slightly lower than those found in Table 57 because the investments in new machinery (years one and two) and cold storage (year three) were taken out as a cost.[11] The discount rate used was seven percent (real rate) based on an assumption of five percent expected inflation and 12 percent nominal interest rates.

---

[11] The investment costs in new machinery ($21,818) and cold storage ($18,703) were evenly divided between peaches and grapes and spread over 20 acres of each. The additional costs per acre were divided over the first three years of orchard or vineyard life and were $302 per acre for the first year, $244 per acre for the second year, and $468 per acre for the third year.

Table 58
NET PRESENT VALUE (NPV) OF TABLE GRAPES

Year	Net Returns	Discount Factor*	Present Value of Annual Net Returns	Cummulative NPV of Net Returns
1	$-3,371	0.9346	$-3,151	$-3,151
2	-777	0.8734	-679	-3,830
3	-288	0.8163	-235	-4,065
4	1,677	0.7629	1,279	-2,786
5	1,542	0.7130	1,099	-1,687
6	1,677	0.6663	1,117	-570
7	1,677	0.6227	1,044	474
8	1,677	0.5820	976	1,450
9	1,677	0.5439	912	2,362
10	1,542	0.5083	784	3,146
11	1,677	0.4751	797	3,943
12	1,677	0.4440	745	4,688
13	1,677	0.4150	696	5,384
14	1,677	0.3878	650	6,034
15	1,542	0.3624	559	6,593
16	1,677	0.3387	568	7,161
17	1,677	0.3166	531	7,692
18	1,677	0.2959	496	8,188
19	1,677	0.2765	464	8,652
20	1,542	0.2584	398	9,050
21	1,677	0.2415	405	9,455
22	1,677	0.2257	379	9,834
23	1,677	0.2109	354	10,188
24	1,677	0.1971	331	10,519
25	1,542	0.1842	284	10,803

The net present value at 7% discount rate is \$10,803. The equivalent in annual payments at 7% interest is \$10,803 ÷ 11.6536** = \$927.

---

*Discount rates from Lee, Boehlje, et al., 1980.

$V^n = \frac{1}{(1+i)^n}$ Present value of \$1 in year n at compound interest.

**$a_{\overline{n|}\,i} = \frac{1-(1+i)^{-n}}{i}$ Present value of \$1 per annum for n years at compound interest.

Table 59
NET PRESENT VALUE (NPV) OF PEACHES

Year	Net Returns	Discount Factor*	Present Value of Annual Net Returns	Cummulative NPV Net Returns
1	$-1,204	0.9346	$-1,125	$-1,125
2	-539	0.8734	-471	-1,596
3	-494	0.8163	-403	-1,999
4	2,004	0.7629	1,529	-470
5	3,120	0.7130	2,225	1,755
6	3,218	0.6663	2,144	3,899
7	3,097	0.6227	1,929	5,828
8	3,218	0.5820	1,873	7,701
9	3,097	0.5439	1,684	9,385
10	3,218	0.5083	1,636	11,021
11	3,097	0.4751	1,471	12,492
12	3,218	0.4440	1,429	13,921

The net present value at 7% discount rate = $13,921. The equivalent in equal annual payments at 7% interest is $13,921 ÷ 7.9427 = $1,753.

*Discount rates from Lee, Boehlje, et al., 1980.

$V^n = \frac{1}{(1+i)^n}$ Present value of $1 in year n at compound interest.

**$a_{\overline{n|}\,i} = \frac{1-(1+i)^{-n}}{i}$ Present value of $1 per annum for n years at compound interest.

Although both peaches and grapes showed a positive annual net present value of net returns in the fourth year, the cummulative net present value of net returns did not reach a breakeven point until the fifth year for peaches and the seventh year for grapes. When the discounted stream of unequal annual net returns for peaches and grapes was discounted to determine the equivalent equal annual payment, peaches again proved their profitability over grapes by yielding an equal annual payment ($1,753) almost twice as large as that of grapes ($927).[12]

Although the equivalent equal annual payment for grapes was lower than that for peaches, Table 60 indicates that it was higher than that for any other crop combination in the model. Those rotations with cauliflower came the closest to grapes for average annual payments but were not more profitable.

---

[12] These figures do not reflect true profit in an economic sense because machinery depreciation and some fixed costs have not been included.

Table 60
AVERAGE ANNUAL NET RETURNS, ALL CROPS, LONG ISLAND

Crop Combination	Average Annual Net Return
Continuous potatoes	$ 365
Potatoes followed by wheat and rye	247
Potatoes followed by wheat and cauliflower	635
Continuous wheat	42
Continuous cauliflower	776
Cauliflower double cropped with wheat	851
Table grapes	927
Peaches	1,753

In both current and discounted dollars the profitability of peaches and grapes over cauliflower, potatoes, and wheat has been demonstrated. Thus, if labor requirements for peaches and grapes could be met, their profitability would encourage their production.

Labor Requirements

Increased capital requirements were not the only increased cost of producing cauliflower, peaches, and grapes. Labor requirements also increased dramatically. Labor requirements jumped from around 29 hours per acre in potatoes to 135 hours per acre in cauliflower, 197 hours per acre in grapes and up to 229 hours per acre in peaches. These dramatic increases in labor requirements should have serious implications on the amount and type of labor employed on the farm. Labor scarcity should also play a role in limiting the acreage devoted to these three labor intensive crops. Here again, production of wheat with its requirement of one to two hours of labor per acre should help to balance out the labor needs while still cultivating the entire 150 acre farm.

In regard to skilled versus unskilled labor, both cauliflower and peaches have the advantage over grapes in that the majority of their labor requirement can be met through unskilled labor. For grapes, many of the time consuming cultural operations require operator and skilled labor. Winter pruning could be done by unskilled labor but the labor flows on Long Island provide unskilled labor from March through November -- not in the winter.[13]

Although total labor required in production of grapes was less than in peaches, labor required to establish the vineyards in the first two years was almost twice as high. This was explained largely by the need to establish the trellis system which contributed to the higher establishment costs for grapes. See Table 61 for more details on labor use by season, type, and crop.

In some ways, combining production of peaches and grapes could serve

---

[13] See A.E. Res. 85-13 for a description of the limitations placed on crop mix as a result of labor scarcity.

to even out labor use over the year since pruning occurs in the winter months, a time of labor surplus on a typical potato farm. However, labor needs would increase dramatically in the spring, summer, and fall with the need for thinning peaches, cane girdling grapes, and harvesting of both peaches and grapes.

Table 61
COMPARISONS OF LABOR USE BY SEASON AND TYPE, ALL CROPS, LONG ISLAND

	Skilled						
	Winter Jan-Mar	Spring Apr-June	Summer July-Sep	Fall Oct-Dec	Total	Unskilled June-Oct	Grand Total
Continuous potatoes	3.7	4.8	4.3	4.2	17.0	11.6	28.6
Rotated potatoes	3.7	4.8	4.3	3.7	16.5	11.6	28.1
Continuous wheat	---	0.3	0.3	1.1	1.7	---	1.7
Rotated wheat	---	0.3	0.3	0.5	1.1	---	1.1
Cauliflower	---	5.4	11.9	18.2	35.5	99.0	134.5
Grapes-Year 1	0.7	35.1	9.0	0.4	45.2	4.8	50.0
Year 2	7.5	32.7	4.4	0.4	45.0	6.4	51.4
Year 3	20.5	45.8	41.3	2.7	110.3	29.3	139.6
Years 4, 6-9, 11-14	32.5	52.4	57.9	4.8	147.6	49.1	196.7
Years 5 & 10	32.5	53.2	57.9	4.8	148.4	49.1	197.5
Peaches-Year 1	1.0	22.5	1.8	2.0	27.3	3.2	30.5
Year 2	5.0	11.2	2.6	0.0	18.8	4.8	23.6
Year 3	6.8	22.0	13.0	2.2	44.0	59.6	103.6
Year 4	9.5	28.9	22.5	0.2	61.1	98.2	159.3
Year 5	12.8	36.7	32.2	2.2	83.9	145.1	229.0
Years 6,8, 10,12	12.5	36.7	32.2	0.2	81.6	145.1	226.7
Years 7,9, 11,13	12.8	36.2	32.2	2.2	83.4	145.1	228.5

Marketing Costs

Labor for marketing and the cost of containers also would increase with the production of cauliflower, peaches, and grapes. In fact, marketing costs as a percentage of total variable costs were highest for cauliflower, because of the high costs of cauliflower crates. For peaches and grapes, marketing costs represented almost 30 percent of total variable costs as compared to potatoes where marketing costs represented only 9 to 10 percent (Table 62). This difference was explained in part by the fact that potatoes were sold to a broker who then did the grading and marketing. Thus, the actual cost of marketing potatoes as represented in the $0.38 price differential for graded versus bulk potatoes was higher but still only represented 17 percent ($201) of total variable costs.[14]

Table 62
STORAGE AND MARKETING COSTS PER ACRE BY CROP

	Storage	Containers	Transportation	Labor	Total	% of Total Variable Costs
Potatoes (sold to broker)	$49	$ --	$ 22	$27	$ 98	9-10
Cauliflower	--	522	122	34	678	38
Peaches (mature orchard)	45	395	132	99	670	31-32
Grapes (mature vineyard)	70	356	97	82	605	27-28

Containers were by far the largest component of marketing costs with transportation following in importance. Clearly the ability to reuse containers, through steady contracts with chain stores (pick up last week's containers at next week's delivery) and more direct consumer marketing (selling in plastic bags), could lower this substantial cost of marketing.

In conclusion, these budgets indicate that grapes and peaches are more profitable per acre than potatoes or cauliflower and, thus, might offer a viable alternative to Long Island potato growers who wish to diversify. Rotation of potatoes with a double crop of wheat and cauliflower also appears to be highly profitable. Despite the lower net returns from the rotation of potatoes with wheat and rye, this rotation might prove to be an attractive complement to fruit production because of its lower capital and labor requirements. Ultimately, the constraints on pesticide contamination, labor availability, and cash flow will determine whether Long Island potato farmers will make the transition to increased rotation of potato fields and diversification on their farms.

---

[14] The price differential of $0.38 x 272 hundredweight yield per acre = $103. This raised the total variable cost figure to $1,186 ($1,083 + $103) and the marketing portion of that cost to $201 ($103 + $98) or 17 percent.

SELECTED BIBLIOGRAPHY

Anderson, Stewart, Personal Communication, Federal-State Market News Service, Riverhead, NY, December 1983.

Barstch, James, Personal Communication, Department of Agricultural Engineering, Cornell University, Ithaca, New York, October 1984.

Bauer, Larry L., Jere A. Brittain, and George L. Watkins, "Costs of Producing Peaches in South Carolina", South Carolina Experiment Station, Clemson University, A.E. and Rural Soc. Report., A.E. 399, Clemson, SC, March 1978.

Casler, George, unpublished potato budgets for Long Island, Department of Agricultural Economics, Cornell University, Ithaca, NY, 1982.

Cassone Refrigerated Trailers, Personal Communication, Concaman, NY, November 1984.

Dhillon, Pritam S., "Costs of Producing Selected Fresh Market Vegetables in South Jersey", Department of Agricultural Economics, Bulletin B-853, Rutgers, The State University of New Jersey, New Brunswick, NJ, August 1979.

Federal-State Market News Service, New York State Department of Agriculture and Markets and U.S. Department of Agriculture, Agricultural Marketing Service, "Marketing Long Island Cauliflower Crop", Riverhead, NY, 1979-1983.

Federal-State Market News Service, New York State Department of Agriculture and Markets and U.S. Department of Agriculture, Agricultural Marketing Service, "Marketing New York (Upstate and Long Island) and New Jersey Potatoes", Riverhead, NY, 1979-1983.

Federal-State Market News Service, New York State Department of Agriculture and Markets and U.S. Department of Agriculture, Agricultural Marketing Service, "New York City Fresh Fruit and Vegetable Wholesale Market Prices", Bronx, NY, 1979-1983.

Fohner, George, unpublished budgets for wheat, cauliflower, and potatoes, Department of Agricultural Economics, Cornell University, Ithaca, NY, 1983.

Fohner, George, unpublished survey of farm businesses in Suffolk County, NY, Department of Agricultural Economics, Cornell University, Ithaca, NY, 1983.

Fred, Leonard, Personal Communication, Bally Engineered Structures, Bally, PA, October 1984.

Glover, Leander, Personal Communication, Riverhead, NY, October 1984.

Howard, Gary, Personal Communication, Department of Pomology and Viticulture, New York State Agricultural Experiment Station, Geneva, NY, summer 1984.

Jordan, T.D., R.M. Pool, T.J. Zabadal, and J.P. Tompkins, "Cultural Practices for Commercial Vineyards", New York State College of Agriculture and Life Sciences, Cornell University, Misc. Bul. 111, Ithaca, NY, no date.

Kirpes, Daniel J. and Raymond J. Folwell, "Establishment and Production Costs, Concord Grape Vineyards, 1982", Cooperative Extension Bulletin 0875, College of Agriculture, Washington State University, Pullman, WA, November 1982.

Knoblauch, Wayne A., "Farm Machinery Economics", Department of Agricultural Economics, Cornell University, Ithaca, NY, 1982.

Lamb, Robert C. and David E. Terry, "Peach and Nectarine Varieties for New York State", Plant Sciences, No. 34, New York State Agricultural Experiment Station, Geneva, NY, May 1973.

Lazarus, S.S. and G.B. White, "The Economic Potential of Crop Rotations in Long Island Potato Production", A.E. Res. 83-20, Cornell University, Ithaca, NY, May 1983.

Lee, Warren F., Michael D. Boehlje, Aaron G. Nelson, and William G. Murray, Agricultural Finance, Iowa State University Press, Ames, IA, 1980, pp. 413-416, 421-424.

Markin, A.R. and G.B. White, "Economics of Conversion to the Geneva Double Curtain Training System of 'Concord' Grapes", Journal of American Society of Horticultural Science, Vol. 107, No. 6, 1982, pp. 1117-1123.

Miller, Leslie, A. and Linda B. Vorsa, "Five Year Peach Variety Evaluation Summary, Ancora Research Orchard, Camden County, New Jersey", Camden County Cooperative Extension Service, Camden County, NJ, 1983.

Moyer, Dale, Personal Communication, Suffolk County Cooperative Extension Service, Riverhead, NY, fall 1984.

Mudd, David, Personal Communication, Southold, NY, October 1984.

McKibbon, E.D., "The Cost of Establishing a Peach Orchard in Ontario", Ontario Ministry of Agriculture and Food, Economics Branch, Economic Information, Toronto, Canada, 1980.

Nass, Mel, Personal Communication, Venture Vineyards, Lodi, NY, August 1984.

New York Crop Reporting Service, New York State Department of Agriculture and Markets, and U.S. Department of Agriculture, Statistical Reporting Service, "New York Agricultural Statistics", Albany, NY, 1980-1983.

New York Crop Reporting Service, New York State Department of Agriculture and Markets, and U.S. Department of Agriculture, Statistical Reporting Service, "New York Orchard and Vineyard Survey", Albany, NY, 1975, 1980.

New York State Board of Equalization and Assessment, "Establishment of Final 1984 Agricultural Use Values", Albany, NY, April 1984.

New York State College of Agriculture and Life Sciences, "1983 Cornell Recommendations for Commercial Tree-Fruit Production", Cornell University, Ithaca, NY, 1983.

New York State College of Agriculture and Life Sciences, "Cornell Recommends for Commercial Vegetable Production, 1983", Cornell University, Ithaca, NY, 1983.

New York State College of Agriculture and Life Sciences, "1985 Cornell Recommends for Field Crops", Cornell University, Ithaca, NY, 1985.

New York State College of Agriculture and Life Sciences, "1984 Grape Pest Control", Cooperative Extension Publication, Cornell University, Ithaca, NY, 1984.

Pardee, William, Personal Communication, Department of Agronomy, Cornell University, Ithaca, NY, fall 1984.

Pearson, Roger, Personal Communication, Department of Plant Pathology, New York State Agricultural Experiment Station, Geneva, NY, summer 1984.

Pflueger, M.E., Personal Communication, Federal-State Market News Service, Hunts Point Market, Bronx, NY, winter 1985.

Pool, R.M., Personal Communication, New York State Agricultural Experiment Station, Geneva, NY, summer 1984.

Reisch, Bruce, Personal Communication, Department of Pomology and Viticulture, New York State Agricultural Experiment Station, Geneva, NY, summer 1984.

Reisch, Bruce and Mary-Howell Roberts, "Table Grape Yield-Training System-Variety Trial Results Obtained in 1982-1983", unpublished report, New York State Agricultural Experiment Station, Geneva, NY, 1983.

Riedl, Helmut, Personal Communication, Department of Entomology, New York State Agricultural Experiment Station, Geneva, NY, summer 1984.

Rowehl, Robert, Personal Communication, Mattituck, Long Island, NY, fall 1984.

Rutgers, The State University of New Jersey, "Commercial Tree Fruit Production Recommendations for New Jersey, 1980", Cooperative Extension Service Bulletin, 407-G, New Brunswick, NJ, 1980.

Sanok, William, Personal Communication, Suffolk County Cooperative Extension Service, Riverhead, NY, October 1984.

Siezcka, Joseph, Personal Communication, Long Island Horticultural Research Lab., Riverhead, NY, fall 1984.

Smith, Jeanette, Personal Communication, Suffolk County Cooperative Extension Service, Riverhead, NY, summer 1984.

Snyder, D.P., "Cost of Production Update for 1981 (Long Island Potatoes)", A.E. Res. 82-20, Cornell University, Ithaca, NY, July 1982.

Snyder, D.P., "Cost of Production Update for 1982 (Long Island Cauliflower)", A.E. Res. 83-30, Cornell University, Ithaca, NY, August 1983.

Snyder, D.P., "Cropland Rental Rates in New York State, 1981", A.E. Res. 82-5, Cornell University, Ithaca, NY, January 1982.

Snyder, D.P., "Farm Cost Accounts", A.E. Res. 83-41, Cornell University, Ithaca, NY, December 1983.

State of New York, Overall Real Property Tax Rates for Fiscal Year Ended in 1981, Office of State Comptroller, Albany, NY, 1982.

Stiles, Warren, Personal Communication, Department of Pomology, Cornell University, Ithaca, NY, summer 1984.

United States Department of Commerce, Bureau of the Census, Census of Agriculture, State and County Data (New York), Washington, D.C., 1978 and 1982.

Wackernagel, F.W., R.A. Milligan, and W.A. Knoblauch, "An Economical Analysis of Northern New York Dairy Farm Enterprises: Freestall Housing System", A.E. Res. 79-25, Cornell University, Ithaca, NY, November 1979.

Warner, Mildred E., "A Multiperiod Linear Programming Model of Diversification into Fruit on Long Island Potato Farms", A.E. Res. 85-13, Cornell University, Ithaca, NY, June 1985.

Warner, Mildred E., "Alternatives for Long Island Agriculture: The Economic Potential of Peaches and Table Grapes", M.S. Thesis, Department of Agricultural Economics, Cornell University, Ithaca, NY, 1985.

Warner, Mildred E., "An Environmental Risk Index to Evaluate Pesticide Programs in Crop Budgets", A.E. Res. 85-11, Cornell University, Ithaca, NY, June 1985.

Weil, Gary, Personal Communication, Agway Coop, Riverhead, NY, October 1984.

Wells, John M., A.H. Bennett, and Phillip W. Hale, "Harvesting and Handling Peaches", in Feree M.E. and P.F. Bertrand, ed. Peach Growers Handbook, G.E.S. Handbook No. 1, Cooperative Extension Service, University of Georgia, Athens, GA, February 1983.

Whitaker, Daniel B. and Gerald B. White, "Economic Profiles for Apple Orchards and Vineyards", A.E. Res. 82-48, Cornell University, Ithaca, NY, December 1982.

Winkler, A.J., J.A. Cook, W.M. Kliewer, and L.A. Lider, General Viticulture, University of California Press, Berkeley, CA, 1974.

Yerger, Ray, Personal Communication, Bally Engineered Strucures, Bally, PA, October 1984.

Zabadal, Tom J., Personal Communication, Cooperative Extension Service, Finger Lakes Grape Program, Penn Yan, NY, 1984.

APPENDIX

Estimating Storage Requirements For Peaches And Grapes

Cold storage facilities are needed for precooling and short term storage of peaches and grapes. Precooling fruit (bringing it down from the temperature at harvest to 32°F) can double shelf life by reducing respiration which slows down the ripening process. This should be done within 24 hours of harvest (the faster the better) and before the fruit is shipped out to market.

There are several methods of precooling fruit. Hydrocooling peaches is very popular in southern states because heat transfer from peaches to water is far superior to heat transfer from peaches to air. Generally, 15 to 20 minutes are needed to cool peaches if the water is at 35°F. Forced air cooling is becoming increasingly popular, especially for grapes. This process takes three to four hours but avoids water contact with the fruit. Room cooling (without forced air) takes overnight but has the advantage that the fruit can be stored in the same room where it is cooled (Wells, et al., 1983). On Long Island, room cooling is the most common type of storage.

Storage requirements for a farm producing peaches and grapes were calculated on the basis of 20 acres of peaches and 20 acres of grapes.[1] Precooling needs were based on the assumption of an average harvested production of 257 bushels of peaches per acre and 5,100 pounds of grapes per acre. The harvest season for peaches was assumed to be from early July to mid-September with heaviest production in early to mid-August. The harvest period for grapes spread from mid-August to early October with more grapes being harvested in mid-September.

Cubic feet storage requirements for peaches and grapes were based on recommendations by Cornell engineer James Barstch (1984). It was assumed that two loads of peaches and grapes would be brought in each week (i.e., fruit would remain in storage for an average of 3.5 days before being shipped). Precooling loads were then calculated for both peaches and grapes (Table A-1).

The needed capacity for the peak precooling weeks in mid-September could be met with a prefabricated storage facility of exterior dimension 12 feet by 20 feet by 10 feet. Short term storage would be available for peaches up until the peak precooling loads of mid-September when both peaches and grapes are being harvested. Short term storage of grapes would be allowed up until Christmas on some varieties.

The cost of constructing the storage facility was determined by conversations with personnel at Bally Engineered Structures, a company which specializes in the provision of prefabricated cold storage buildings (Table A-2). It was assumed that this facility could be located inside the potato storage facility or some other existing farm structure so that the costs of an outdoor roof and the 15 percent efficiency loss due to exposure to sunlight could be avoided.

---

[1] This was in keeping with the assumptions used to determine machinery variable costs.

Some farmers on Long Island use old refrigerated truck bodies for their cold storage facilities. Rental rates for a facility of the same capacity as the one previously described would be $3,250 for five months. It would clearly make more sense to purchase a structure. The cost of purchasing a truck would be several thousand dollars less than the cost of the prefabricated structure, but would be less efficient due to its exposure to sunlight (Cassone, 1984).

Electricity use is a very important concern on Long Island with the rates of Long Island Lighting Company increasing every year. Electricity use was based on a rough operating time estimate of 16 hours per day in the period from July 7 through October 7 for precooling, and 10 hours per day from October 8 to December 22 for short term storage. A charge of $0.14 per kilowat hour was assessed based on average rates reported by Long Island farmers in the interviews held in October 1984. If the Shoreham nuclear facility does not operate, these rates could increase drastically in the future. Some farmers already have their own electric generators to protect themselves from temporary power outages and windmills will become more popular if electricity rates continue to increase. Table A-3 presents estimated electricity costs.

Table A-1
COLD STORAGE REQUIREMENTS
(based on 20 acres of peaches and 20 acres of grapes)

Storage Requirements

Peaches: Harvest season early July to mid-September. Production: 2.8 bushels/tree, heaviest in early and mid-August.

2.8 bu./tree x 108 trees x 0.85 (15% cull rate) = 257 bushels/acre.

[257 bu./acre x 20 acres] ÷ 22 [10 week harvest x 2 loads/week (2 weeks with 50% more production)] = 233.6 bushels

1.25 ft^3/bu. + extra for overhead, aisles, boxes, etc., = 3 ft^3/bushel

233.6 bushels x 3 cubic feet/bushel = 701 ft^3

Grapes: Harvest season mid-August to early October, heaviest in mid-September. Production: 3 tons/acre.

3 tons/acre x 0.85 (15% cull rate) x 20 acres = 51 tons total

51 tons ÷ 8 (6 week harvest [2 weeks with double production] = 6.4 tons

6.4 tns/week ÷ 2 loads/week = 3.2 tns/load = 320-20 lb boxes

1.5 ft^3/20 lb box + extra for overhead, aisles, boxes, etc. = 2.2 ft^3/20 lb box

320 boxes x 2.2 ft^3 = 704 ft^3

Precooling Loads

1st week July - 4th week July, 701 cubic feet
1st week August - 2nd week August, 1,052 cubic feet
3rd week August - 1st week September, 1,405 cubic feet
2nd week September - 3rd week September, 2,109 cubic feet
4th week September - 1st week October, 704 cubic feet

Storage

Short term on peaches July through Autust (726 cubic feet extra). Peaches not stored in September due to demand for space from grapes. Storage up to Christmas on some grape varieties.

SOURCE: Bartsch, James; Personal Communication, Department of Agricultural Engineering, Cornell University, Ithaca, New York, October 1984.

Table A-2
CONSTRUCTION COSTS FOR COLD STORAGE UNIT

Building Specifications

Inside dimensions: 11'7" by 19'3" by 9'6"
Capacity: 2,118 cubic feet
Floor space: 222 square feet
Insulation: 4", R-34
Door: 60" by 84"

New Cost for Building (includes assembly)

Walk-in unit with door:	$11,118
Extra light	30
Exterior ramp	360
1 1/2 hp. compressor with electric defrost coil	6,000
5 year warranty	95
Wooden floor racks ($5.70/sq. ft.)	800
Freight charge to New York	300
Total Cost	$18,703

SOURCE: Yerger, Ray; Personal Communication, Bally Engineered Structures, Bally, Pennsylvania, October 1984.

Table A-3
OPERATING COSTS FOR COLD STORAGE UNIT
ELECTRICITY USE

	Peak Period Cooling July 7 - October 7 91 days	Long Term Storage October 8 - December 22 77 days	
1 1/2 hp compressor plus fan motors and electric defrost coil	2 kilowats/hr x 16 hrs/day = 32 kilowats/day	2 kilowats/hr x 10 hrs/day = 20 kilowats/day	
Door heaters & lights	1/2 kilowat/hr x 24 hrs /day = 12 kilowats/day	1/2 kilowat/hr x 24 hrs /day = 12 kilowats/day	
Total Kilowats Used	4,004	2,464	
1984 Rate: 14 cents/kilowat hr.	$560.56	$344.96	Total $905.52

SOURCE: Farmer interviews, Long Island, October 1984.

Fred, Leonard; Personal Communication, Bally Engineered Structures, Bally, Pennsylvania, October 1984.