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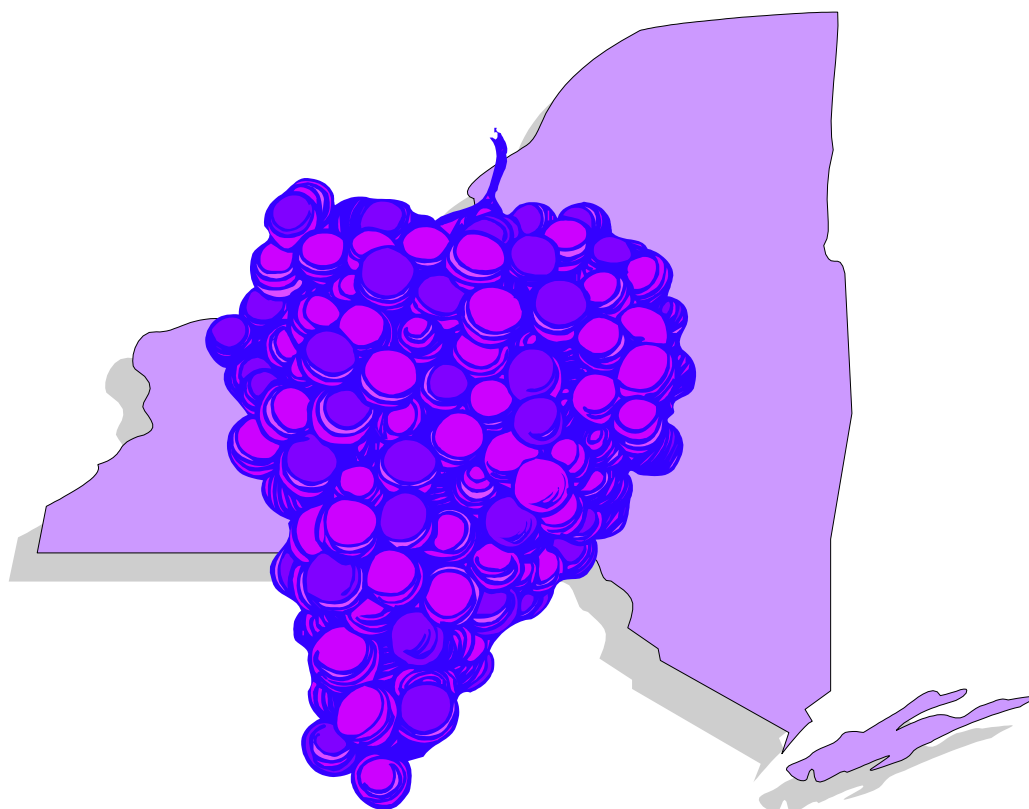
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COST OF ESTABLISHMENT AND PRODUCTION OF VINIFERA GRAPES IN THE FINGER LAKES REGION OF NEW YORK-2004



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COST OF ESTABLISHMENT AND PRODUCTION OF *VINIFERA* GRAPES IN THE FINGER LAKES REGION OF NEW YORK, 2004

By Gerald B. White*

INTRODUCTION

In recent years there has been increased interest in the Finger Lakes, as well as in other parts of New York state, in planting *Vitis vinifera* grapes for premium wine production. Acreage of red varieties such as Pinot Noir, Cabernet Sauvignon, and Cabernet Franc all increased in the most recent orchard and vineyard survey compiled by the New York Agricultural Statistics Service.

There has been an increase in consumer demand for quality wines (Interspecific French American hybrid and *V. vinifera* cultivars, or designated appellations). Wine consumption in the United States has increased during the last 10 years. In 2004, the increase was 5.2 per cent, driven by good news regarding the health benefits of moderate wine consumption. In addition, most Finger Lakes and Long Island wineries are reporting increased winery visitation by tourists as well as local area repeat purchasers. Some well-managed wineries in the Finger Lakes are reporting annual sales increases of ten per cent and higher, after sales had leveled off in 2003 due to the poor economy and changing consumer behavior in the aftermath of 9/11. In addition to the increase in tourism resulting from promotional efforts made by several local tourism organizations, New York is gaining stature as a producer of high quality wines that command premium prices.

Growers who are considering planting additional *V. vinifera* vineyards need to carefully weigh the cost of planting and establishing a vineyard and the annual cost of production of a mature vineyard against the expected yields and prices to determine whether the investment of \$13,000 per acre or more required to bring a *V. vinifera* vineyard into production will result in a profitable return on investment. Furthermore, the Finger Lakes experienced severe winter injury in January 2004 that reduced *vinifera* production to less than one-half ton per acre on a third to a half of the Finger Lakes acreage, and an estimated 300 acres of *vinifera* acreage will need to be replanted. This requires a reassessment of which varieties to plant on this acreage and which sites will support profitable *vinifera* production.

This question is complicated by the long-run nature of the investment (payback periods are in excess of ten years and can be even much longer), as well as the risk from a worldwide over-supply of wine grapes from significant plantings of that has led to price cutting at the retail level. A huge crop of grapes across the European Union in 2004, as well as large crops in Australia in 2002 and 2004 has meant that there is no shortage of quality wines available. Imported wine outpaced consumption of domestic wine, despite a weak US dollar, climbing 11.3 per cent overall.

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Domestic wine consumption was up 3.4 per cent. More expensive wines were, however, making a comeback with US consumers in 2005 after meeting consumer resistance for a couple of years.

Although the New York industry is somewhat insulated by the small scale of its market structure in the premium wine sector with most wineries selling over 50 per cent of their wine (volume) through direct sales, wineries cannot expect to be completely unaffected if global supply outstrips demand in the future. The acreage of *V. vinifera* varieties in the Finger Lakes is still quite limited. For example, the two most widely planted *V. vinifera* varieties, Chardonnay and Riesling, accounted for just 418 acres and 340 acres, respectively, in the most recent survey of acreage by New York Agricultural Statistics. Given the limited area planted, a small increase in planted acreage can have a large impact on supply when the new acreage begins bearing.

Conversely, shortages of hybrid and *vinifera* tonnage in 2005 are equally disruptive to the industry. Wineries that have built up clientele over the 90's are finding they do not have an adequate supply of wine to service the increased demand they had built up with investment in tasting rooms, promotion and building brand image. This investment is typically far greater than investment in vineyards. Lost sales resulting from an inadequate supply of grapes threatens to constrain the future growth of Finger Lakes wineries.

The objective of this project was to determine the cost of producing *V. vinifera* grapes in the Finger Lakes region in a commercial sized operation. Estimates of the total investment in land, machinery, vineyard establishment and development costs, and annual operating costs were developed.

These estimates may be used by growers and potential investors to compute and analyze the costs and profit potential for their own situations. The estimates are not necessarily representative of average costs for grape production in the Finger Lakes, but rather are typical costs for well-managed vineyards using recommended practices. The yield estimates used for estimation of typical returns assume better sites (well-drained, productive soils with appropriate slopes for air drainage). We also assumed that vineyard practices were used which would result in premium quality grapes. Practices such as leaf pulling and cluster thinning of certain varieties, limit yields and contribute to higher quality wine. Poorer sites and/or failure to follow optimal management practices can have a significant negative impact on the earnings estimates presented in this publication. Operations such as special tillage practices (hilling up and take away) once again had their value demonstrated with the winter injury that was widespread in 2004.

METHODS

The methods used to construct cost estimates were a combination of 1) interviews with a panel comprised of grower representatives, and 2) economic engineering using recommended practices. In June of 2004, we met with a panel of four growers and vineyard managers. The growers reviewed the data prepared for the most recent estimates of the cost of establishing and growing *V. vinifera* grapes (Pisoni and White, 2001.). Consensus estimates were developed for labor requirements and wage rates for the various operations in a *V. vinifera* vineyard and for a typical machinery complement for a full-time commercial vineyard. The panel reviewed the machinery time estimates, which had been updated from the '01 study, and made recommendations for changes.

The panel also provided estimates, based on their own experience in the vineyard, of time required to perform various vineyard operations, such as tillage, spraying, mowing, etc., and hand operations such as pruning, tying & removal, suckering, and cluster & shoot thinning.

Land. The study assumes land was purchased at \$2,500 per acre. The size of the vineyard was decided in consultation with the grower panel. The specified size was 54 acres, with 50 acres planted to grapes. The other four acres are occupied by roads, headlands, and a shop. The 50-acre vineyard is large enough to use vineyard machinery and equipment efficiently, but small enough to be operated by one working manager with one other full-time worker. Some hand labor operations would be done by hired part-time labor or, increasingly in recent years, by migrant labor crews.

Vineyard layout. The vineyard was assumed to be planted on a 6' X 9' spacing (vine by row) resulting in a planting density of 807 vines per acre. There were 11 rows to an acre and rows were 440 feet long. Vine cost was estimated to average \$3.50 each and were planted using contracted laser planting. The fee for laser planting was \$30 per row and \$.40 per vine. Each year it was assumed that 2 per cent of the vines had to be replanted.

Varieties. The 40-acre vineyard was planted to the following four *V. vinifera* varieties: Pinot Noir, Cabernet Franc, Chardonnay, and Riesling. These four varieties were selected because they are well suited for the cool climate of the Finger Lakes region and exhibit excellent potential for premium wine production.

Tile Drainage. It was assumed that tile drainage was installed in the middle of every third row or 27 feet apart. The tile drainage system consisted of 4" lateral pipes running down the middle of every third row, and these lateral pipes connected to a 6" mainline pipe that ran along the width of the vineyard.

Trellis System. It was assumed that the vines were trained using the vertically shoot positioned (VSP) training system. The trellis system was made up of two pairs of catch wires and two cordon wires (for a total of six wires), a 3" X 8' wooden line post at every third vine, two catch wire clips per line post, and a 5" X 8' wooden end post and anchor support post at the end of each row.

Spray Costs. Pesticide costs were formulated using Cornell and Penn State Cooperative Extension's 2004 New York and Pennsylvania Pest Management Recommendations for Grapes. The program was developed by Dr. Wayne Wilcox, Plant Pathologist at the Geneva Experiment Station. Fertilizer and herbicide practices were also based on current Cornell Cooperative Extension recommendations.

Herbicides and Fertilizer/Soil Program. The sample herbicide program was developed by Richard Dunst, Research Support Specialist, Fredonia Vineyard Laboratory. Details are shown in Appendix Table 1. The sample fertilizer/soil program was developed by Dr. Tim Martinson, Extension Educator, Finger Lakes Grape Program. See Appendix Table 2 for details.

Wage Rates. Wage rates used represented the consensus of the grower panel. The rates assumed were \$15.60 per hour for skilled labor (i.e. \$12.00 per hour plus 30 per cent fringe

benefits). Fringe benefits consist of worker's compensation, social security, Medicare, insurance, and other benefits. For unskilled labor, the rate was \$10.00 per hour (\$8.06 per hour plus 24 per cent fringe benefits). Piece rate wage rates were used for pruning the vines in the third and fourth year. The rate was \$.24/vine in the third year and \$.32/vine in the fourth year.

Harvesting & Hauling. Grapes were custom hand harvested in the third year of production and hand-harvesting rates were estimated at \$200 per ton. It was assumed that hand harvesting was necessary in the third year because the vines were not yet fully mature. Grapes were custom machine harvested in the fourth year and beyond. Machine harvesting rates are \$40 per ton if the yield is greater than four tons per acre, or \$200 per acre if the yield is less than four tons per acre. Hauling costs were estimated at \$25 per ton and represent the additional expense of transporting the grapes to the winery.

Machinery. Machinery depreciation and interest were charged on the basis of prices for new equipment. Diesel fuel at \$1.50 per gallon was budgeted for machine operations. (Note: the diesel being used is green diesel, which may only be used for agricultural purposes). Gasoline was charged at \$1.60 per gallon. Hourly machinery variable costs (repairs, fuel, and lube) are shown in Table 3 of the appendix. Hourly machinery variable costs were estimated according to American Society of Agricultural Engineers 2000 Standards.

Overhead. Annual insurance expense was estimated at 1 per cent of the initial investment in buildings and machinery. Office supplies, phone, etc. was estimated at \$2,500 per year. School and property taxes were \$24,324 per \$1,000 of assessed value of the initial land investment.

Management Charge. A management fee of five per cent of gross receipts was assessed for the vineyard. This represents the opportunity cost for the vineyard owner to manage the operation. All labor requirements were assessed as a cash cost. Therefore, in situations where the owner or manager is performing vineyard tasks and managing the operation, actual cash outlays would be lower than are represented in these cost estimates.

Cost of Capital. A four per cent interest charge on capital investment and operating capital was charged. This rate represents a real rate based on a seven per cent nominal rate of interest and an expected rate of inflation of three per cent.

Yields. Yields were specified as the long-term average attainable on suitable sites (near the lake, sloping, good air drainage, somewhat well-drained with soil depth at least medium). These yields assume better than average management practices that are consistent with the attainment of premium quality *V. vinifera* wines. These management practices include shoot thinning and cluster removal that often decrease yields, but improve wine quality. Table 1 summarizes the yield assumptions.

Table 1: Yield Assumptions.

Variety	Year 3	Year 4+
Pinot Noir	1 ton/acre	2.3 tons/acre
Cabernet Franc	1 ton/acre	3.2 tons/acre
Chardonnay	1 ton/acre	3.6 tons/acre
Riesling	1 ton/acre	3.6 tons/acre

Grape Prices. Prices were the average of the most recent five-year period (2000-2004) in the Finger Lakes Region. The base prices were obtained from the *Finger Lakes Vineyard Notes* newsletter, Harvest Issues.

RESULTS

Grape Prices

Prices for the five years ending in 2004 are shown in Table 2. These averages were computed from the Finger Lakes Vineyard Notes, Harvest Issues, for wineries stating prices. (Note: the 2000-2004 New York state average price per ton for *V. vinifera* varieties was \$1,328.

Table 2: Average Price for Selected *V. vinifera* Grapes in the Finger Lakes Region, 2000-2004, Dollars per Ton.

	Chardonnay	Riesling	Pinot Noir	Cabernet Franc
2000	\$ 1,154	\$ 1,188	\$ 1,405	\$ 1,540
2001	\$ 1,150	\$ 1,250	\$ 1,473	\$ 1,538
2002	\$ 1,046	\$ 1,232	\$ 1,469	\$ 1,506
2003	\$ 1,106	\$ 1,322	\$ 1,480	\$ 1,446
2004	\$ 1,280	\$ 1,461	\$ 1,527	\$ 1,583
Mean	\$ 1,147	\$ 1,291	\$ 1,471	\$ 1,523

Source: *Finger Lakes Vineyard Notes*, Harvest Issues, 2000-2004.

Machinery and Buildings Costs

The investment costs and annual costs for new equipment and buildings are summarized in Table 3. The machinery investment required totals \$131,025, an average investment of \$2,621 per acre of vineyard. The investment for a shop is estimated at \$59,850, or \$1,197 per acre. The shop was 1,500 ft², and the construction cost was estimated at \$39.90 per ft² which includes basic amenities such as water and electricity. The total annual costs for depreciation and interest amount to \$17,882 for machinery and \$3,459 for buildings, or \$358 and \$69 annual costs per acre, respectively. Machinery investment would be much greater if a mechanical grape harvester was necessary.

Table 3: Machinery, Equipment, and Building Capital Recovery and Interest Costs,
50 acre *V. vinifera* Vineyard, Finger Lakes Region, NY 2004.

	Purchase Price	Years of Life	Salvage Value	Capital to be Recovered	Cost Recovery Factor	Annual Recovery	Interest on Salvage Value	Total Capital Recovery & Interest
<i>Machinery and Equipment</i>								
Tractor, 62-HP, 2WD, spray cab	\$ 30,800	10	\$ 3,080	\$ 27,720	0.1233	\$ 3,418	\$ 123	\$ 3,541
Tractor, 45-HP	\$ 21,600	10	\$ 2,160	\$ 19,440	0.1233	\$ 2,397	\$ 86	\$ 2,483
Air-blast sprayer- 300 gallon	\$ 11,000	10	\$ 1,100	\$ 9,900	0.1233	\$ 1,221	\$ 44	\$ 1,265
Herbicide sprayer- 50 gallon	\$ 1,200	10	\$ 120	\$ 1,080	0.1233	\$ 133	\$ 5	\$ 138
Mower/brush chopper (7ft)	\$ 2,850	5	\$ 285	\$ 2,565	0.2246	\$ 576	\$ 11	\$ 587
Fertilizer Spreader	\$ 1,800	10	\$ 180	\$ 1,620	0.1233	\$ 200	\$ 7	\$ 207
Small disc (used)	\$ 400	10	\$ 40	\$ 360	0.1233	\$ 44	\$ 2	\$ 46
Grape hoe	\$ 5,000	10	\$ 500	\$ 4,500	0.1233	\$ 555	\$ 20	\$ 575
Post driver	\$ 5,000	10	\$ 500	\$ 4,500	0.1233	\$ 555	\$ 20	\$ 575
Trailer	\$ 2,000	10	\$ 200	\$ 1,800	0.1233	\$ 222	\$ 8	\$ 230
Pickup truck	\$ 20,000	5	\$ 2,000	\$ 18,000	0.2246	\$ 4,043	\$ 80	\$ 4,123
Auger	\$ 3,500	10	\$ 350	\$ 3,150	0.1233	\$ 388	\$ 14	\$ 402
Mechanical hedger (used)	\$ 2,250	10	\$ 225	\$ 2,025	0.1233	\$ 250	\$ 9	\$ 259
Leaf remover	\$ 6,000	10	\$ 600	\$ 5,400	0.1233	\$ 666	\$ 24	\$ 690
Replanter	\$ 1,500	10	\$ 150	\$ 1,350	0.1233	\$ 166	\$ 6	\$ 172
Net applicator (bird control)	\$ 7,000	10	\$ 700	\$ 6,300	0.2246	\$ 1,415	\$ 28	\$ 1,443
Nets (bird control)-12.5 ac. @ \$150/Ac	\$ 1,875	7	\$ 0	\$ 1,875	0.1666	\$ 312	\$ 0	\$ 312
Bird control equipment	\$ 2,250	10	\$ 225	\$ 2,025	0.1233	\$ 250	\$ 9	\$ 259
Shop Equipment	\$ 5,000	10	\$ 500	\$ 4,500	0.1233	\$ 555	\$ 20	\$ 575
Total Machine & Equipment costs	\$ 131,025		\$12,915	\$ 118,110				\$ 17,882
Cost per planted acre	\$ 2,621							\$ 358
<i>Buildings</i>								
Shop (1,500 ft ² @ \$39.90 ft ²)	\$ 59,850	30	\$ 0	\$ 59,850	0.0578	\$ 3,459	\$ 0	\$ 3,459
Cost per planted acre	\$ 1,197							\$ 69

Pesticide Program Spray Costs

Table 4 indicates the **recommended** spray program and costs for years one, two and three through twenty-five. Beginning in year three, sprays are assumed to be approximately the same from year to year, with the necessity on average for twelve sprays during the growing season. Spray materials costs were \$276.28 per acre for red varieties and \$309.78 for white varieties. Of course, spray programs will have to be adjusted slightly from year to year to accommodate variable weather and/or pest pressure. Additionally, fungicide applications may vary slightly among vinifera cultivars due to the differences in disease resistance. For example, Pinot Noir is more susceptible to Botrytis bunch rot. White varieties had extra costs for spray materials due to an extra fungicide material (Vangard 75 WP) necessary with the 6th spray.

Pesticide applications costs for labor and machinery, as well as herbicide cost, are developed in Tables 7 and 9 to follow.

Table 4: Sample Fungicide & Insecticide Spray Program for *V. vinifera* Grapes, Finger Lakes Region, NY, 2004.

	Material	Rate/acre	Price	\$/acre
Year 1				
Sprays 1-3	Mancozeb 80 WP	3 lbs.	\$ 2.35 lb.	\$ 7.05
	Sulfur	4 lbs.	\$ 0.21 lb.	\$ 0.85
	Spreader	4 oz.	\$ 18.00 gal.	\$ 0.56
Total per spray				\$ 8.46
Total for year (3 sprays)				\$ 25.39
Year 2				
Sprays 1-4	Mancozeb 80 WP	3 lbs.	\$ 2.35 lb.	\$ 7.05
	Sulfur	4 lbs.	\$ 0.21 lb.	\$ 0.85
	Spreader	4 oz.	\$ 18.00 gal.	\$ 0.56
Total per spray				\$ 8.46
Total for year (4 sprays)				\$ 33.85
Years 3-25				
Sprays 1-4	Mancozeb	3 lbs.	\$ 2.35 lb.	\$ 7.05
	Rubigan	2 fl oz.	\$ 69.73 qt.	\$ 4.36
	Sulfur	4 lbs.	\$ 0.21 lb.	\$ 0.85
	Spreader	4 oz.	\$ 18.00 gal.	\$ 0.56
Total per spray				\$ 12.82
Total for year (4 sprays)				\$ 51.29

Table 4 continued

	Material	Rate/acre	Price	\$/acre
Sprays 5 & 6	Quintec	4 fl oz.	\$ 4.50 fl oz.	\$ 18.00
	Sulfur	5 lbs.	\$ 0.21 lb.	\$ 1.06
	Mancozeb 80 WP	4 lbs.	\$ 2.35 lb.	\$ 9.40
Total per spray				\$ 28.46
Total for year (2 sprays)				\$ 56.93
Spray 7	Mancozeb	4 lbs.	\$ 2.35 lb.	\$ 9.40
	Sulfur	8 lbs.	\$ 0.21 lb.	\$ 1.70
	Sevin 80 WP	2.5 lbs.	\$ 5.23 lb.	\$ 13.08
	Spreader	4 lbs.	\$ 18.00 gal.	\$ 0.56
Total spray 7				\$ 24.74
Spray 8	Quintec	4 lbs.	\$ 4.50 fl oz.	\$ 18.00
	Sulfur	8 lbs.	\$ 0.21 lb.	\$ 1.70
	Prophyt	2.5 pt.	\$ 4.00 pt.	\$ 10.00
Total spray 8				\$ 29.70
Spray 9 & 10	Sulfur	8 lbs.	\$ 0.21 lb.	\$ 1.70
	Prophyt	2.5 pt.	\$ 4.00 pt.	\$ 10.00
	Spreader	4 oz.	\$ 18.00 gal.	\$ 0.56
Total per spray				\$ 12.26
Total for year (2 sprays)				\$ 24.53
Spray 11	Captan 80 WP	2.5 lbs.	\$ 4.11 lb.	\$ 10.28
	Sulfur	8 lbs.	\$ 0.21 lb.	\$ 1.70
	Vanguard 75 WP	10 oz.	\$ 3.35 oz.	\$ 33.50
	Spreader	4 oz.	\$ 18.00 gal.	\$ 0.56
Total spray 11				\$ 46.04
Spray 12	Captan 80 WP	2.5 lbs.	\$ 4.11 lb.	\$ 10.28
	Sulfur	8 lbs.	\$ 0.21 lb.	\$ 1.70
	Elevate 50 WP	1 lb.	\$ 30.52 lb.	\$ 30.52
	Spreader	4 oz.	\$ 18.00 gal.	\$ 0.56
Total spray 12				\$ 43.06
Total cost of all year 3+ sprays, red varieties				\$ 276.28
“*For the sixth spray, add for Chardonnay and Riesling:	Vanguard 75 WP	10 oz.	\$ 3.35 oz.	\$ 33.50
Total cost of all year 3+ sprays, white varieties				\$ 309.78

The sample fungicide and insecticide spray program was developed by Dr. Wayne Wilcox, Professor of Plant Pathology, Geneva Experiment Station.

Drainage Construction Costs

Table 5 contains an estimate of drainage construction costs. These costs are transferred to the site preparation section of the establishment and development costs. These costs will vary greatly from site to site depending on the soil conditions and preferences of the vineyard manager. This study assumed that tile drainage was placed in the middle of every third row or 27' apart.

Table 5: Tile Drainage Costs per acre for *V. vinifera* Grapes, Finger Lakes Region, NY, 2004.

Item	Quantity	Price	Total Cost per acre
Main line: 6" pipe	99 ft	\$ 0.69 ft	\$ 68
Laterals: 4" pipe	1,613 ft	\$ 0.25 ft	\$ 403
Installation	1,712 ft	\$ 0.52 ft	\$ 890
Total Drainage Construction per acre			\$ 1,362

Trellis Construction Costs

Table 6 contains an estimate of trellis construction costs. The total cost for materials is estimated at \$2,244 per acre. These costs are transferred to Table 7 in the first year of establishment and development. Labor and machinery costs for trellis establishment are also shown in Table 7.

The trellis was designed for Vertically Shoot Positioned (VSP) vines. It was made up of two pairs of moveable catch wires and two fixed wires for vine support (a total of six wires). Wooden line posts were used for every third vine, and two catch wire clips were used on each post to hold the catch wires in place. Wooden anchor posts were used to support each end post. Rows were 440 feet long and there were 11 rows to an acre and 73 vines per row.

Establishment and Development Costs

The costs for labor machinery and materials for site preparation and years one through three constitute the establishment and development (E&D) costs (Table 7). First year costs, including site preparation, trellis construction, and planting, are substantial, amounting to \$8,391 per acre. A planting density of 807 vines (6' x 9') (vine by row) was assumed. The largest cost in the first year is the expenditure of \$2,823 for vines. In year two, costs are a relatively modest \$785 per acre with lower spray costs and less labor required than for mature vines. In the third year, a full spray program is required, and hand harvesting is required to protect the young vines. Total costs for the third year are \$1,406 per acre.

Table 6: Trellis Construction Costs per acre for *V. vinifera* Grapes, Finger Lakes Region, NY, 2004.

Item	Quantity	Price	Total per acre
Wood end posts (8 ft X 5" diameter)	22 posts	\$ 7.45 post	\$ 164
Wood anchor posts (8 ft X 5" diameter)	22 posts	\$ 7.45 anchor	\$ 164
Wood line posts (8 ft, 3" diameter, every 3 rd plant)	269 posts	\$ 4.95 post	\$ 1,331
12.5 gauge HT foliage & cordon wire (\$79.95 roll of 4000 ft)	26,889 ft.	\$ 0.020 ft	\$ 537
Catch wire clips (2 per line post)	538 clips	\$ 0.70 clip	\$ 38
Staples, lbs.	3 lbs.	\$ 1.92 lb.	\$ 6
Crimping sleeves (for joining wire ends)	50 crimps	\$ 0.09 crimp	\$ 4
Total Trellis Construction materials			\$ 2,244

The total costs for the entire E&D period are summarized in Table 8. The totals from Table 7 for each of the three years are brought into the row labeled 'annual variable costs'. Hand harvesting costs are added in for the third year only. Fixed costs (capital recovery for machinery and equipment and buildings, property taxes, office supplies, land charge, insurance, and management) are added. Interest, at a real rate of five per cent, is added to the cumulative costs. Credit is given for the revenue from the estimated one ton of grapes harvested in year three. The price of grapes in year three is the average of the four varieties produced. The total cumulative cost for the E&D period is \$13,486 per acre. Amortized at a four per cent real rate of interest for the estimated years of life from year four through 25 (or 22 years), the annual cost for capital recovery (interest and depreciation) is \$933 per acre. This amount was charged as a fixed cost in Table 11, which summarizes the costs and returns for a mature vineyard. Cash costs for establishment, including labor, are \$10,582 for site preparation and the first three years.

Costs and Returns for a Mature Vineyard

Annual growing costs for years four through 25 are developed in Table 9. Total growing costs for a typical year in the mature vineyard are estimated to be \$1,968 per acre. The most costly operations are spraying (12 times, for a total of \$450 per acre, including labor, machinery and materials costs) and pruning (\$258 per acre). By year four, the well-managed vineyard will nearly have reached its full yield potential and will require approximately the same management each year for the duration of its life.

Table 10 summarizes the growing, establishment, and development costs for a *V. vinifera* vineyard. Growing costs are largest in the first year when a significant amount must be spent preparing the site, planting the vines, and constructing the trellis. Growing costs are \$1,968 in years four through 25, and this number is transported to Table 11 to use in the computation of the costs and returns for the mature vineyard.

Table 7: *V. vinifera* Grape Establishment and Development Costs per acre,
Finger Lakes Region, NY, 2004

Operation	Labor Used	Labor Hours	Equipment Hours	Labor Cost	Equipment Cost	Materials Cost	Total Cost
Site Preparation							
Drainage (see table 5 for details)	Custom					\$ 67.00	\$ 1,430
Lime (2 tons/acre)	Custom					\$ 24.00	\$ 67
Herbicide application	Custom				\$ 9.00		\$ 33
Stone removal & land maintenance.	Unskilled	1	0.8	\$ 10.00	\$ 5.49	\$ 1.50	\$ 15
Soil Sampling	Skilled	0.2		\$ 3.12		\$ 48.80	\$ 5
Fall fertilization	Skilled	0.6	0.5	\$ 9.36	\$ 3.77		\$ 62
Plowing	Custom				\$ 15.90		\$ 16
Disking (2X)	Custom				\$ 22.20		\$ 22
Total		1.8	1.3	\$ 22.48	\$ 56.36	\$ 141.30	\$ 1,650
First Year							
Floating	Skilled	0.25	0.2	\$ 3.90	\$ 1.27		\$ 5
Laser Planting	Custom	n/a	n/a	\$ 358.23	\$ 358.23	\$ 2,823.33	\$ 3,540
Fertilization (hand application)	Skilled	0.6	0.5	\$ 9.36	\$ 3.43	\$ 15.66	\$ 28
Hilling up	Skilled	1.5	1.2	\$ 23.40	\$ 9.40		\$ 33
Chem. weed control –trellis+Solubor	Skilled	2.5	2	\$ 39.00	\$ 13.39	\$ 42.40	\$ 95
Trellis construction (see table 6 for details)	Skilled	41	8	\$ 639.60	\$ 61.07	\$ 2,244.00	\$ 2,945
Cultivation	Skilled	0.6	0.5	\$ 9.36	\$ 3.92		\$ 13
Spray 1	Skilled	0.4	0.3	\$ 6.24	\$ 3.12	\$ 8.46	\$ 18
Spray 2	Skilled	0.4	0.3	\$ 6.24	\$ 3.12	\$ 8.46	\$ 18
Spray 3	Skilled	0.4	0.3	\$ 6.24	\$ 3.12	\$ 8.46	\$ 18
Mowing (2X)	Skilled	1.3	1	\$ 20.28	\$ 8.01		\$ 28
Total		50.75	14.3	\$ 1,121.85	\$ 468.07	\$ 5,150.79	\$ 6,741
Total for first year and site prep							\$ 8,391

Table 7 continued

	Labor Used	Labor Hours	Equipment Hours	Labor Cost	Equipment Cost	Materials Cost	Total Cost
Second Year							
Pruning & brush removal	Skilled	6		\$ 93.60			\$ 94
Tying & renewal	Unskilled	4		\$ 40.00		\$ 3.20	\$ 43
Vine Replacement	Skilled	2	2	\$ 31.20	\$ 14.67	\$ 56.47	\$ 102
Spring Fertilization	Skilled	0.6	0.5	\$ 9.36	\$ 3.77	\$ 7.48	\$ 21
Chem. weed control-trellis	Skilled	2.6	2	\$ 40.56	\$ 13.39	\$ 44.40	\$ 98
Suckering	Unskilled	5		\$ 50.00			\$ 50
Cluster removal	Unskilled	5		\$ 50.00			\$ 50
Take away	Skilled	3	2.5	\$ 46.80	\$ 19.58		\$ 66
Hand hoe	Unskilled	8		\$ 80.00			\$ 80
Chem. weed control- row middle	Skilled	0.6	0.5	\$ 9.36	\$ 3.35	\$ 9.60	\$ 22
Hilling up	Skilled	1.7	1.5	\$ 26.52	\$ 11.75		\$ 38
Spray 1	Skilled	0.4	0.3	\$ 6.24	\$ 3.12	\$ 8.46	\$ 18
Spray 2	Skilled	0.4	0.3	\$ 6.24	\$ 3.12	\$ 8.46	\$ 18
Spray 3	Skilled	0.6	0.5	\$ 9.36	\$ 5.20	\$ 8.46	\$ 23
Spray 4	Skilled	0.6	0.5	\$ 9.36	\$ 5.20	\$ 8.46	\$ 23
Mowing (2X)	Skilled	1.3	1	\$ 20.28	\$ 8.01		\$ 28
Rogueing	Unskilled	1		\$ 10.00			\$ 10
Total		42.8	11.6	\$ 538.88	\$ 91.15	\$ 154.99	\$ 785

Table 7 continued

	Labor Used	Labor Hours	Equipment Hours	Labor Cost	Equipment Cost	Materials Cost	Total Cost
Third Year							
Pruning and brush pulling	Custom	Piece rate*		\$ 193.60			\$ 194
Tying & renewal	Unskilled	10		\$ 100.00		\$ 3.20	\$ 103
Vine replacement	Skilled	2	2	\$ 31.20	\$ 14.67	\$ 56.47	\$ 102
Spring fertilization	Skilled	0.6	0.5	\$ 9.36	\$ 3.77	\$ 14.95	\$ 28
Chem. weed control- trellis	Skilled	2.6	2	\$ 40.56	\$ 13.39	\$ 34.10	\$ 88
Suckering	Unskilled	7		\$ 70.00			\$ 70
Cluster removal	Unskilled	8		\$ 80.00			\$ 80
Take away	Skilled	3	2.5	\$ 46.80	\$ 19.58		\$ 66
Hand hoe	Unskilled	8		\$ 80.00			\$ 80
Spot herbicide treatment	Skilled	0.4	0.3	\$ 6.24	\$ 2.01	\$ 6.00	\$ 14
Chem. weed control- row middle	Skilled	0.6	0.5	\$ 9.36	\$ 3.35	\$ 9.60	\$ 22
Spray 1	Skilled	0.6	0.5	\$ 9.36	\$ 5.20	\$ 12.82	\$ 27
Spray 2	Skilled	0.6	0.5	\$ 9.36	\$ 5.20	\$ 12.82	\$ 27
Spray 3	Skilled	0.6	0.5	\$ 9.36	\$ 5.20	\$ 12.82	\$ 27
Spray 4	Skilled	0.6	0.5	\$ 9.36	\$ 5.20	\$ 12.82	\$ 27
Spray 5	Skilled	0.6	0.5	\$ 9.36	\$ 5.20	\$ 28.46	\$ 43
Spray 6	Skilled	0.6	0.5	\$ 9.36	\$ 5.20	\$ 28.46	\$ 43
Spray 7	Skilled	0.6	0.5	\$ 9.36	\$ 5.20	\$ 24.74	\$ 39
Spray 8	Skilled	0.6	0.5	\$ 9.36	\$ 5.20	\$ 29.70	\$ 44
Spray 9	Skilled	0.6	0.5	\$ 9.36	\$ 5.20	\$ 12.26	\$ 27
Spray 10	Skilled	0.6	0.5	\$ 9.36	\$ 5.20	\$ 12.26	\$ 27
Spray 11	Skilled	0.6	0.5	\$ 9.36	\$ 5.20	\$ 46.04	\$ 61
Spray 12	Skilled	0.6	0.5	\$ 9.36	\$ 5.20	\$ 43.06	\$ 58
Mowing (2X)	Skilled	1.3	1	\$ 20.28	\$ 8.01		\$ 28
Brush chopping (1X)	Skilled	1.2	1	\$ 18.72	\$ 8.01		\$ 27
Hilling up	Skilled	1.7	1.5	\$ 26.52	\$ 11.75		\$ 38
Rogueing	Unskilled	1		\$ 10.00			\$ 10
Petiole sampling	Skilled	0.1		\$ 1.56		\$ 2.30	\$ 4
Total		54.7	17.3	\$ 856.52	\$ 146.93	\$ 402.89	\$ 1,406

* Note: if one decides not to use piece rate labor the estimated pruning time is 18 hours per acre, and with skilled labor the cost is \$280.80. Thus total labor requirements using regular hired labor would be 74.1 hours per acre.

Table 8: Summary of Establishment and Development Costs by Year
for *V. vinifera* Grapes, Finger Lakes Region, NY 2004.

Item	Year 1	Year 2	Year 3
Revenue			
Yield per acre (tons)	0	0	1
Market price (ave. of 4 varieties)	n.a.	n.a.	\$ 1,358
Total revenue	\$ 0	\$ 0	\$ 1,358
Costs			
Site preparation	\$ 1,650	\$ 0	\$ 0
Annual variable costs			
Preharvest	\$ 6,741	\$ 785	\$ 1,406
Harvest (Hand)+hauling	n.a.	n.a.	\$ 200
<i>Total variable costs and site preparation</i>	<i>\$ 8,391</i>	<i>\$ 785</i>	<i>\$ 1,606</i>
Annual fixed costs			
Machines & equipment amortization	\$ 358	\$ 358	\$ 358
Buildings amortization	\$ 69	\$ 69	\$ 69
Property taxes	\$ 61	\$ 61	\$ 61
Land opportunity cost	\$ 100	\$ 100	\$ 100
Office supplies, phone, etc.	\$ 50	\$ 50	\$ 50
Insurance	\$ 38	\$ 38	\$ 38
Management	\$ 213	\$ 213	\$ 213
<i>Total fixed costs</i>	<i>\$ 889</i>	<i>\$ 889</i>	<i>\$ 889</i>
Interest on cumulative costs	\$ 371	\$ 453	\$ 571
<i>Total costs</i>	<i>\$ 9,651</i>	<i>\$ 2,127</i>	<i>\$ 3,066</i>
Net returns	(\$ 9,651)	(\$ 2,127)	(\$ 1,708)
Total cumulative costs	\$ 9,651	\$11,777	\$13,486
Amortization of vineyard:			\$ 933
Cash costs of vineyard establishment (3 Yrs.)			\$10,582

Table 9: Growing Costs, Years Four through Twenty-five, *V. vinifera* Grapes, Finger Lakes Region, New York, 2004.

Operation	Labor Used	Labor Hours	Equipment Hours	Labor Cost	Equipment Cost	Materials Cost	Total Cost
Pruning+brush pulling	Custom	Piece Rate*		\$ 258.13			\$ 258
Trellis maintenance	Skilled	3	1	\$ 46.80	\$ 6.87	\$ 30.00	\$ 84
Tying & renewal	Custom	Piece Rate*		\$ 145.20		\$ 2.24	\$ 147
Spring fertilization	Skilled	0.6	0.5	\$ 9.36	\$ 3.77	\$ 14.95	\$ 28
Vine replacement	Skilled	2	2	\$ 31.20	\$ 14.67	\$ 56.47	\$ 102
Chem.weed control-trellis (Spring)	Skilled	2.6	2	\$ 40.56	\$ 13.39	\$ 33.77	\$ 88
Soil applic. of Solubor (w. herb. spray)						\$ 2.00	\$ 2
Spot herbicide treatment	Skilled	0.4	0.3	\$ 6.24	\$ 2.01	\$ 6.00	\$ 14
Chem. weed control-row middle	Skilled	0.6	0.5	\$ 9.36	\$ 3.35	\$ 9.60	\$ 22
Suckering	Unskilled	7		\$ 70.00			\$ 70
Cluster removal & shoot thinning	Unskilled	10		\$ 100.00			\$ 100
Take-away	Skilled	3	2.5	\$ 46.80	\$ 19.58		\$ 66
Chem. weed control-trellis (Summer)	Skilled	2.6	2	\$ 40.56	\$ 13.39	\$ 25.40	\$ 79
Hand hoe	Unskilled	8		\$ 80.00			\$ 80
Spray 1	Skilled	0.6	0.5	\$ 9.36	\$ 5.20	\$ 12.82	\$ 27
Spray 2	Skilled	0.6	0.5	\$ 9.36	\$ 5.20	\$ 12.82	\$ 27
Spray 3	Skilled	0.6	0.5	\$ 9.36	\$ 5.20	\$ 12.82	\$ 27
Spray 4	Skilled	0.6	0.5	\$ 9.36	\$ 5.20	\$ 12.82	\$ 27
Spray 5	Skilled	0.6	0.5	\$ 9.36	\$ 5.20	\$ 28.46	\$ 43
Spray 6	Skilled	0.6	0.5	\$ 9.36	\$ 5.20	\$ 28.46	\$ 43
Spray 7	Skilled	0.6	0.5	\$ 9.36	\$ 5.20	\$ 24.74	\$ 39
Spray 8	Skilled	0.6	0.5	\$ 9.36	\$ 5.20	\$ 29.70	\$ 44
Spray 9	Skilled	0.6	0.5	\$ 9.36	\$ 5.20	\$ 12.26	\$ 27
Spray 10	Skilled	0.6	0.5	\$ 9.36	\$ 5.20	\$ 12.26	\$ 27
Spray 11	Skilled	0.6	0.5	\$ 9.36	\$ 5.20	\$ 46.04	\$ 61
Spray 12	Skilled	0.6	0.5	\$ 9.36	\$ 5.20	\$ 43.06	\$ 58
Foliar spray-Solubor w. cover spray (2X)						\$ 1.60	\$ 2
Mowing (3X)	Skilled	1.9	1.5	\$ 29.64	\$ 12.02		\$ 42
Brush chopping	Skilled	1.2	1	\$ 18.72	\$ 8.01		\$ 27
Lime (1 in 5 years)	Skilled	0.1	0.1	\$ 1.56	\$ 1.27	\$ 5.70	\$ 9
Pickup truck	n/a	n/a			\$ 40.53		\$ 41

Table 9 Continued

Operation	Labor Used	Labor Hours	Equipment Hours	Labor Cost	Equipment Cost	Materials Cost	Total Cost
Shoot positioning/move catch wires	Unskilled	6		\$ 60.00			\$ 60
Shoot positioning/move catch wires	Unskilled	6		\$ 60.00			\$ 60
Leaf removal	Skilled	1.25	1	\$ 19.50	\$ 9.50		\$ 29
Summer pruning	Skilled	1.3	1	\$ 20.28	\$ 7.23		\$ 28
Petiole sampling (every 2 years)	Skilled	0.1		\$ 1.56		\$ 1.15	\$ 3
Soil sampling (every 5 years)	Skilled	0.1		\$ 1.56		\$ 0.30	\$ 2
Hilling-up	Skilled	1.7	1.5	\$ 26.52	\$ 11.75		\$ 38
Rogueing	Unskilled	1		\$ 10.00			\$ 10
Fall fertilization	Skilled	0.3	0.3	\$ 4.68	\$ 2.26	\$ 16.27	\$ 23
Bird Control	Skilled	0.25		\$ 3.90			\$ 4
Total		68.2	23.2	\$1,254.45	\$ 231.98	\$ 481.71	\$ 1,968

* Note: if one decides not to use piece rate labor the estimated pruning time is 30 hours per acre, and with skilled labor the cost is \$468. Thus total labor requirements, using regular hired labor, would be 119.4 hours per acre.

Table 10: Summary of Growing Costs for *V. vinifera* Vineyard, Trained to a Vertically Shoot Positioned System, Finger Lakes Region, NY, 2004.

Item	Year 1	Year 2	Year 3	Year 4+
Site preparation	\$ 1,650			
Vines & planting	\$ 3,545			
Trellis materials & construction	\$ 2,945			\$ 84
Replanting & Rogueing		\$ 112	\$ 112	\$ 112
Dormant pruning & removal		\$ 94	\$ 194	\$ 258
Weed control	\$ 108	\$ 201	\$ 205	\$ 284
Fertilization	\$ 28	\$ 21	\$ 32	\$ 68
Canopy management		\$ 143	\$ 253	\$ 494
Disease & insect control	\$ 53	\$ 82	\$ 451	\$ 451
Take away & hilling up	\$ 33	\$ 105	\$ 105	\$ 105
Mowing	\$ 28	\$ 28	\$ 55	\$ 68
Bird Control				\$ 4
Pick-up				\$ 41
Total Growing Costs	\$ 8,391	\$ 785	\$ 1,406	\$ 1,968

Table 11: Costs and Returns for a mature *V. vinifera* Vineyard, Trained to a Vertically Shoot Positioned System, Finger Lakes Region, NY, 2004.

Item	Pinot Noir	Cab. Franc	Chardonnay	Riesling
Receipts:				
Yield target, tons per acre	2.3	3.2	3.6	3.6
Price, \$ per ton	\$ 1,471	\$ 1,523	\$ 1,147	\$ 1,291
Total receipts	\$ 3,383	\$ 4,872	\$ 4,130	\$ 4,646
Costs:				
Variable Costs:				
Growing	\$ 1,968	\$ 1,968	\$ 1,968	\$ 1,968
Cluster removal (Cab. Franc and P. Noir)	\$ 99	\$ 99		
Additional spray materials for white var.'s	\$ 0	\$ 0	\$ 34	\$ 34
Interest on operating capital	\$ 39	\$ 39	\$ 39	\$ 39
Machine Harvesting	\$ 200	\$ 208	\$ 234	\$ 234
Total variable costs	\$ 2,307	\$ 2,315	\$ 2,275	\$ 2,275
Fixed Costs:				
Vineyard capital recovery	\$ 933	\$ 933	\$ 933	\$ 933
Machinery and equipment capital recovery	\$ 358	\$ 358	\$ 358	\$ 358
Buildings capital recovery	\$ 69	\$ 69	\$ 69	\$ 69
Property taxes	\$ 61	\$ 61	\$ 61	\$ 61
Land opportunity cost	\$ 100	\$ 100	\$ 100	\$ 100
Office supplies, phone, etc.	\$ 50	\$ 50	\$ 50	\$ 50
Insurance	\$ 38	\$ 38	\$ 38	\$ 38
Management	\$ 169	\$ 244	\$ 206	\$ 232
Total fixed costs	\$ 1,778	\$ 1,853	\$ 1,816	\$ 1,841
Total costs	\$ 4,085	\$ 4,167	\$ 4,091	\$ 4,116
Profit or loss	(\$ 702)	\$ 705	\$ 39	\$ 530
Breakeven price (\$/ton)	\$ 1,776	\$ 1,302	\$ 1,136	\$ 1,143
Breakeven yield (tons)	2.8	2.7	3.6	3.2

Table 11 summarizes the costs and returns expected from a mature vineyard. The estimated revenue per acre varies from \$3,383 to \$4,872 depending upon variety. Total costs vary from \$4,085 to \$4,167 per acre by variety. The break-even price prices and yields are shown in table 11.

Pinot Noir shows a loss given the assumed yields and prices. To put this in perspective, it should be remembered that we assumed recommended practices throughout the model. Some growers will be able to reduce some of these costs considerably. All labor, including the owner's labor, is charged a cash wage. There is an imputed charge on all capital used. The vineyard capital expense is written off after 25 years, but we have not accounted for the fact that the vineyard at the end of 25 years has a value that is as much, or even more, than it was worth in the early years of the planting, assuming that vine replacement and trellis maintenance are done annually. At the assumed yield and prices, Cabernet Franc looks extremely profitable. Growers and investors should be forewarned, however, that even 20 or 30 more acres of Cabernet Franc planted in the Finger Lakes could cause a surplus that would drive down prices from their current high level. On the other hand, prices for Riesling have been on an upward trend, and perhaps as much as 100 acres planted may be profitably planted with the growth in demand that could occur.

Capital Requirement

Table 12 indicates the capital investment necessary to get into grape production in the Finger Lakes region, assuming a vineyard of 50 total acres and reliance on either custom hand or machine harvesting of grapes. The table uses the value of new machinery and equipment and buildings. Land costs assume a prime site close to the lake. Table 12 indicates that it would require \$19,803 per acre to get a vineyard into maturity in the Finger Lakes under the assumptions indicated above. Established growers, with depreciated vineyards, machinery and equipment, and buildings, would have lower capital investment (book value) depending upon the age of their depreciable assets. Growers with smaller acreage will typically have higher investment costs per acre. This is due to less efficient use of the machinery complement unless they hire more tasks to be done by custom operators, thus giving them the possibility of buying fewer pieces of machinery and equipment.

Table 12: Investment Per Acre of *V. vinifera* Grapes,
Finger Lakes Region of New York,
for a 50-Acre Vineyard, 2004.

Assets	\$/acre
Land*	\$ 2,500
Machinery & equipment	\$ 2,621
Buildings (shop & tool shed)	\$ 1,197
Vineyard establishment and development	\$13,486
Total Investment per acre	\$19,803

*Prime site close to the lake

DISCUSSION AND SENSITIVITY ANALYSIS

Costs per ton of grapes and profits for Finger Lakes vineyards will vary widely due to factors such as land costs, site factors, farm size, managerial ability and labor efficiency. The cost and return estimates developed in this publication represent typical costs for well-managed vineyards producing premium quality grapes on prime sites.

The panel did not believe there was sufficient data to adjust costs for varietal differences. In reality, vigorous cultivars such as Cabernet Franc may require a greater labor input for pruning, brush removal, tying and other hand labor tasks. Differences in fungicide applications may be necessary due to the differences in disease resistance among the various varieties. For example, Pinot Noir and Riesling are more susceptible to Botrytis bunch rot, while Chardonnay is highly susceptible to Powdery mildew.

The total cost per ton, or breakeven price, is quite sensitive to yield as shown in Table 13. If yields are two tons per acre or less and/or with low yielding cultivars, a price over \$2,000 per ton would be required to break even. Even the highest price paid in the most recent seasons of relatively high prices would result in unprofitable production with such a low yielding scenario. Higher yields are probably marketable at the grape prices assumed in Table 11.

Yields of more than four tons per acre for Cabernet Franc or more than 2.5 tons per acre for Pinot Noir; or more than five tons per acre for white vinifera varieties are probably incompatible with the quality requirements of the market for premium wines, but this is a question that needs more definitive research.

Table 13: Total Cost Per Ton (Breakeven Price) At Varying Yields,
V. vinifera Grapes, Finger Lakes Region of New York, 2004.

Pinot Noir		Cab Franc		Chardonnay		Riesling	
Yield (tons/acre)	Cost/ton*	Yield (tons/acre)	Cost/ton*	Yield (tons/acre)	Cost/ton*	Yield (tons/acre)	Cost/ton*
1.5	\$2,655	1.5	\$2,704	1.5	\$2,663	1.5	\$2,653
2.0	\$2,007	2.0	\$2,045	2.0	\$1,993	2.0	\$2,006
2.5	\$1,619	2.5	\$1,649	2.5	\$1,608	2.5	\$1,618
3.0	\$1,360	3.0	\$1,385	3.0	\$1,351	3.0	\$1,359
3.5	\$1,175	3.5	\$1,196	3.5	\$1,167	3.5	\$1,174
4.0	\$1,036	4.0	\$1,055	4.0	\$1,029	4.0	\$1,036
				4.5	\$ 922	4.5	\$ 928
				5.0	\$ 836	5.0	\$ 841

* Cost at different yield levels adjusted for machine harvesting and hauling.
Assumes a 5% real interest rate and a \$2,000 land value.

CONCLUSIONS

The cost and returns estimates derived in this publication indicate results for *V. vinifera* in the Finger Lakes under the assumption of prime sites, the use of recommended practices, good management, current prices for inputs, and prices for grapes that reflect several quality enhancing practices such as leaf pulling, cluster removal for two varieties, and limited yields.

Potential investors should be forewarned that the current economic climate for grape growing in the Finger Lakes can change. There is concern about the potential impact of large plantings of *V. vinifera* in California (White) and the increasing availability of inexpensive, high quality imported wine. In some years, given the thin markets for certain varieties, a surplus situation can develop when a few growers plant additional acres. The total acreage of some varieties in the Finger Lakes is quite limited. For example, in 2001, the New York Crop Agricultural Statistics Service estimated acreage of certain varieties in the Finger Lakes as follows: Cabernet Franc, 136 acres; Cabernet Sauvignon, 61 acres; Merlot, 52 acres; and Pinot Noir, 137 acres. With such limited acreage, a few small plantings or one large planting of these varieties can lead to a large per centage increase in grapes produced, temporarily depressing the cash market. This happened with Chardonnay in the Finger Lakes in the early 1990s. On the other hand Riesling prices are gradually increasing through time as the Finger Lakes receives greater recognition as a premium producing region for that variety.

Nevertheless, given the growing consumption of table wine in the United States, the developing tourist trade in the Finger Lakes, and the growing reputation of Finger Lakes wine quality, the long-run potential appears favorable for investors who can weather the inevitable ups and downs associated with an agricultural enterprise subject to the usual vagaries of weather and market forces.

Appreciation is expressed to Dave DeMarco, Dave Stamp, Mark Wagner, and Dave Weimann, who served as the growers' panel for helping to establish the costs reported in this bulletin. Tim Martinson, Extension Educator, Finger Lakes Grape Program provided a helpful review of the manuscript.

APPENDIX

Appendix Table 1: Sample Herbicide Program for *V. vinifera* Grapes,
Finger Lakes Region, NY, 2004.

	Material	Rate/acre	Price	\$/acre
Year 0 (site prep.)				
Custom herbicide (in site prep.)	Round-Up	2 qt.	\$ 12.00 qt.	\$ 24.00
Year 1 (planting)				
Chem. weed control – trellis	Surflan	1.6 qt.	\$ 24.00 qt.	\$ 38.40
Total for Year 1				\$ 38.40
Year 2				
Chem. weed control – trellis	Surflan	1.6 qt.	\$ 24.00 qt.	\$ 38.40
	Round-Up	0.5 qt.	\$ 12.00 qt.	\$ 6.00
Spot herbicide treatment	Round-Up	0.5 qt.	\$ 12.00 qt.	\$ 6.00
Chem. weed control – middle	Round-Up	0.8 qt.	\$ 48.00 qt.	\$ 9.60
Total for Year 2				\$ 60.00
Year 3				
Chem. weed control – trellis	Solicam	1.5 lb.	\$ 18.73 qt.	\$ 28.10
	Round-Up	0.5 qt.	\$ 12.00 qt.	\$ 6.00
Spot herbicide treatment	Round-Up	0.5 qt.	\$ 12.00 qt.	\$ 6.00
Chem. weed control – middle	Round-Up	0.8 qt.	\$ 12.00 qt.	\$ 9.60
Total for Year 3				\$ 49.70
Year 4				
Chem. weed control – trellis	Karmex	2.4 lb.	\$ 4.73 lb.	\$ 11.35
	Princep 90%	2.1 lb.	\$ 3.83 lb.	\$ 8.04
	Round-Up	0.5 qt.	\$ 12.00 qt.	\$ 6.00
Alternate years (every 2 nd or 3 rd year)	Solicam	1.5 lb.	\$ 18.73 lb.	\$ 28.10
	Princep 90%	2.1 lbs.	\$ 3.83 lb.	\$ 8.04
	Round-up	0.5 qt.	\$ 12.00 qt.	\$ 6.00
Spot herbicide treatment	Round-up	0.5 qt.	\$ 12.00 qt.	\$ 6.00
Chem. weed control – middle	Round-Up	0.8 qt.	\$ 12.00 qt.	\$ 9.60
Total for Year 4 (with Karmax)				\$ 41.00
Total for Year 5 (with Solicam)				\$ 57.74
Average total treatment cost for Years 4-25				\$ 49.37

The sample herbicide program was developed by Richard Dunst, Research Support Specialist, Fredonia Vineyard Laboratory.

Appendix Table 2: Sample Fertilizer/Soil Program for *V. vinifera* Grapes,
Finger Lakes Region, NY, 2004.

	Material	Rate/acre	Price	\$/acre
Year 0 (site prep.)				
Lime (custom application)	Lime	2 tons	\$ 34 ton	\$ 67.00
Fall fertilization	Muriate of Potash	400 lbs.	\$ 244 ton	\$ 48.80
Soil sampling	n/a	0.1 acre	\$ 15 test	\$ 1.50
Total for year 0				\$ 117.30
Year 1				
Fertilization (hand application)	10:10:10	175 lbs.	\$ 179 ton	\$ 15.66
Solubor (w. herb applic.)	Solubor	5 lbs.	\$ 0.80 lb.	\$ 4.00
Total for year 1				\$ 19.66
Year 2				
Spring fertilization	Ammonium Nitrate	50 lbs.	\$ 299 ton	\$ 7.48
Years 3				
Spring fertilization	Ammonium Nitrate	100 lbs.	\$ 299 ton	\$ 14.95
Petiole test	n/a	0.1 acre	\$ 23 test	\$ 2.30
Total for year 3				\$ 17.25
Years 4+				
Spring fertilization	Ammonium Nitrate	100 lbs.	\$ 299 ton	\$ 14.95
Soil application	Solubor	2.5 lbs.	\$ 0.80	\$ 2.00
Foliar spray (w. cover spray)	Solubor (for Boron)	1.0 lbs.	\$ 0.80	\$ 0.80
Foliar spray (w. cover spray)		1.0 lbs.	\$ 0.80	\$ 2.00
Fall fert. (every 3 rd year)	Muriate of Potash	400 lbs.	\$ 244 ton	\$ 16.27
Lime (1 in 5 years)	Lime	1 ton	\$ 28.50 ton	\$ 5.70
Petiole Sampling (every other year)		0.1 acre	\$ 23.00 test	\$ 1.15
Soil sampling (1 in 5 years)		0.1 acre	\$ 15.00	\$ 0.30
Total for year 4				\$ 41.97

The sample Fertilizer/Soil Program was developed by Dr. Tim Martinson,
Extension Educator, Finger Lakes Grape Program.

Appendix Table 3: Hourly Machinery and Equipment Variable Costs.

Item	Purchase Price	Hours of life	Total life Repairs cost	Repairs	Fuel	Lube (15% of fuel)	Total Hourly Variable Cost
Tractor, 62-HP, 2WD, spray cab	\$ 30,800	12000	100%	\$2.57	\$3.94	\$0.59	\$7.10
Tractor, 45-HP	\$ 21,600	12000	100%	\$1.80	\$3.94	\$0.59	\$6.33
Air-blast sprayer- 300 gallon	\$ 11,000	2000	60%	\$3.30			\$3.30
Herbicide sprayer- 50 gallon	\$ 1,200	2000	60%	\$0.36			\$0.36
Mower/brush chopper (7ft)	\$ 2,850	2500	80%	\$0.91			\$0.91
Fertilizer Spreader	\$ 1,800	1200	80%	\$1.20			\$1.20
Small disc	\$ 400	2000	60%	\$0.12			\$0.12
Grape hoe	\$ 5,000	2000	60%	\$1.50			\$1.50
Post driver	\$ 5,000	2000	80%	\$2.00			\$2.00
Trailer	\$ 2,000	3000	80%	\$0.53			\$0.53
Pickup truck	\$ 20,000	2500	83%	\$6.64	\$3.20	\$0.48	\$10.32
Auger	\$ 3,500	2000	80%	\$1.40			\$1.40
Mechanical hedger	\$ 2,250	2000	80%	\$0.90			\$0.90
Leaf remover	\$ 6,000	2000	80%	\$2.40			\$2.40
Replanter	\$ 1,500	1200	80%	\$1.00			\$1.00
Net applicator	\$ 7,000	2000	80%	\$2.80			\$2.80

Diesel Fuel Factor: 0.0438

Gasoline Fuel Factor: 0.0600

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