

COST OF ESTABLISHMENT AND PRODUCTION OF VINIFERA GRAPES IN THE FINGER LAKES REGION OF NEW YORK-2007



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COST OF ESTABLISHMENT AND PRODUCTION OF *VINIFERA* GRAPES IN THE FINGER LAKES REGION OF NEW YORK, 2007

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, Merlot, and Cabernet Franc all increased in the most recent orchard and vineyard survey compiled by the New York Agricultural Statistics Service in 2006. Acreage of Riesling increased by 60 percent from the 2001 survey, while Chardonnay decreased by 16 percent. Overall, vinifera acreage increased by 38 percent (to 1596 acres) in the Finger Lakes in the five year period, led by Riesling, with a 60 percent increase and a total acreage of 543. Vinifera now accounts for 18 percent of grape acreage in the Finger Lakes.

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 by about 3.7 percent during the last 10 years driven by good news regarding the health benefits of moderate wine consumption. In 2007, the increase was 4.0 percent. New York is gaining stature as a producer of high quality wines that command premium prices, and the Finger Lakes has benefited from a surge of recent sales and interest nationally in Riesling Varietal wines.

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 \$15,000 per acre or more required to bring a *V. vinifera* vineyard into production will result in a profitable return on investment. This requires a re-assessment of which varieties to plant on this acreage and which sites will support profitable *vinifera* production. Nationally, wine sales in food stores grew the most in 2007 for Cabernet Sauvignon, but there were notable gains for Pinot Noir and Riesling as well. In terms of color, super market data indicated that red wine now makes up 43 percent of wine purchases, while white wines make up 42 percent. These consumption trends have to be considered relative to cold hardiness, as the Finger Lakes has experienced severe winter injury to vinifera about every decade, with the last major freeze event occurring in 2004.

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 in “new world” competitors such as

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Australia, New Zealand, and Chile. In terms of growth, imported wine outpaced consumption of domestic wine, despite a weak US dollar, climbing 11.3 percent overall. Consumption of domestic wine was up 3.4 percent.

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 percent 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. Given the limited area planted, a small increase in planted acreage can have a relatively large impact on supply when the new acreage begins bearing, and that occurred with Chardonnay in recent years. During the 2007 harvest, there was a surplus in Cabernet Franc grapes.

Conversely, shortages of hybrid and *vinifera* tonnage in 2005 were equally disruptive to the industry. Wineries that had 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 in the winery 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. This emphasizes the importance of selection of varieties, which is driven both by the marketing plan, and to a certain extent by the relative cold hardiness of *vinifera* variteies.

The objective of this study was to determine the cost of producing *V. vinifera* grapes in the Finger Lakes region in a commercial size 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 2007, 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 (White, 2005.). Consensus estimates were developed for land prices,

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 and labor time estimates for the '05 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.

Prices of inputs (fertilizer, pesticides, and fuel) are representative of the period July-September, 2007 with one major exception. Prices for gasoline and diesel fuel were updated in January 2008 to reflect the rapidly increasing prices in energy markets that occurred during the last six months of 2007.

Land. The study assumes land was purchased at \$3,500 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 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 \$3.25 each for the initial planting (assuming orders of vines in quantities over 1000). Each year it was assumed that two percent of the vines had to be replanted. At two percent, 807 vines would be used annually for replanting. For quantities of vines under 1000, the vine cost was assumed to be \$3.50 per vine. Vines were planted using contracted laser planting. The fee for laser planting was \$35 per row and \$.50 per vine.

Varieties. The 50-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 second row or 18 feet apart. The tile drainage system consisted of 4" lateral pipes running down the middle of every second row, and these lateral pipes were 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 posts 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.

Herbicides and Fertilizer/Soil Program. The sample herbicide program was developed in consultation with the advisory panel of four growers. The herbicide program relies upon the

use of an Environmist sprayer (purchase price of \$4,500). The program is based on the use of glyphosate in three applications under the trellis per season and one spot application applied by hand held equipment. The sample program is probably not sustainable for the 22 year useful life of the vineyard because of the potential development of weed resistance due to the long-term reliance on a single herbicide; however, new materials are being tested which should be available in the near future that can be used in combination with glyphosate. For details of the sample herbicide program, see Appendix Table 1. The sample fertilizer/soil program was developed by Hans Walter-Peterson, 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 \$16.60 per hour for skilled labor (i.e. \$12.75 per hour plus 30 percent fringe benefits). Fringe benefits consist of workers compensation, social security, medical insurance, and other benefits. For unskilled labor, the rate was \$11.60 per hour (\$9.35 per hour plus 24 percent fringe benefits). Piece rate wage rates were used for pruning the vines in the third and four year. The rate was \$.40 per vine. The piece rates for tying were specified at \$.20 per vine and for shoot thinning at \$.15 per vine.

Harvesting & Hauling. Grapes were custom machine harvested in the fourth year and beyond. The machine harvesting rate is \$75 per ton or a minimum of \$200 per acre if the yield is less than 2.67 tons per acre. Hauling costs are included in this rate 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 with the minor exceptions for a small disc and a mechanical hedger, which were assumed to be used. Diesel fuel at \$3.32 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 \$2.90 per gallon. These were representative of prices in Central New York as of January 2008. 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 percent of the initial investment in buildings and machinery. Office supplies, phone, etc. was estimated at \$2,500 per year. School and property taxes were \$25 per \$1,000 of assessed value of the initial land investment.

Management Charge. A management fee of five percent 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 cash costs. 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 percent interest charge on capital investment and operating capital was charged. This rate represents a real rate based on a seven percent nominal rate of interest and an expected rate of inflation of three percent.

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 tons/acre	2.0 tons/acre
Cabernet Franc	1 tons/acre	3.3 tons/acre
Chardonnay	1 tons/acre	2.8 tons/acre
Riesling	1 tons/acre	2.8 tons/acre

Grape Prices. Prices for the most recent five-year period (2003-2007) in the Finger Lakes Region were obtained from Martinson and Walter-Peterson, *Finger Lakes Vineyard Notes* newsletter, Harvest Issues.

RESULTS

Grape Prices

Prices for the five years ending in 2007 are shown in Table 2. (These averages reflect price lists submitted to the NYS Department of Agriculture and Markets and forwarded to the Finger Lakes Grape Program.) A detailed list of varietal prices is summarized annually in the August issue of the Finger Lakes Vineyard Notes. These averages do not take into account quality and/or quantity of grapes purchased by each processor. Since larger processors often pay less, the true average price is often lower than the average reported in Table 2. However the prices in Table 2 are a reasonable indicator of price trends for the four varieties. The panel of grape growers and vineyard managers took these prices into account when specifying the prices shown in the last row of Table 2, which are the prices used in the profitability analysis reported in this bulletin. The prices specified by the panel reflect special quality practices that are used for premium wine production.

Table 2: Average Price Listings for Selected *V. Vinifera* Grapes in the Finger Lakes Region, 2003-2007, Dollars per Ton.

	Chardonnay	Riesling	Pinot Noir	Cabernet Franc
2003	\$ 1,106	\$ 1,322	\$ 1,480	\$ 1,446
2004	\$ 1,280	\$ 1,461	\$ 1,527	\$ 1,583
2005	\$ 1,358	\$ 1,524	\$ 1,593	\$ 1,609
2006	\$ 1,332	\$ 1,582	\$ 1,654	\$ 1,575
2007	\$ 1,375	\$ 1,628	\$ 1,675	\$ 1,560
Mean	\$ 1,290	\$ 1,503	\$ 1,586	\$ 1,555
Prices used	\$ 1,350	\$ 1,700	\$ 1,650	\$ 1,700

Source: *Finger Lakes Vineyard Notes*, Harvest Issues, 2003-2007

Machinery and Buildings Costs

The investment costs and annual costs for equipment and buildings are summarized in Table 3. The machinery investment required totals \$148,280, an average investment of \$2,966 per acre of vineyard. The investment for a shop is estimated at \$65,237, or \$1,305 per acre. The shop was 1,500 ft², and the construction cost was estimated at \$43.49 per ft² which includes basic amenities such as water and electricity. The total annual costs for depreciation and interest amount to \$20,170 for machinery and \$3,771 for buildings, or \$403 and \$75 annual costs per acre, respectively. Machinery investment would be much greater if a mechanical grape harvester was necessary.

Pesticide Program Spray Costs

Table 4 indicates the **recommended** spray program and costs for years one, two, three, and years four through twenty-five. In year three, eight sprays are recommended. Beginning in year four, 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 \$277.43 per acre for Cabernet Franc and \$312.43 for Chardonnay, Riesling, and Pinot Noir. Fungicide applications may vary slightly among vinifera cultivars due to the differences in disease resistance. For example, Pinot Noir, Chardonnay, and Riesling are more susceptible to Botrytis bunch rot. These varieties had extra costs for spray materials due to an extra fungicide material (Vanguard 75 WP) necessary with the 6th spray. Of course, spray programs will have to be adjusted slightly from year to year to accommodate variable weather and/or pest pressure. Pesticide applications costs for labor and machinery, as well as herbicides, are developed in Tables 7 and 9 to follow.

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. 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 second row or 18 feet apart. Costs were estimated to total \$2,372 per acre.

Trellis Construction Costs

Table 6 contains an estimate of trellis constructions costs. The total cost for materials is estimated at \$2,942 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 total cost of trellis construction for materials, labor, and machinery is \$3,732.

The trellis was designed for Vertically Shoot Positioned (VSP) vines. It was made up of two pairs of moveable catch wires and two fixed fruiting wires (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.

Table 3: Machinery, Equipment, and Building Capital Recovery and Interest Costs,
50 acre *V. vinifera* Vineyard, Finger Lakes Region, NY 2007.

<i>Machinery and Equipment</i>	Purchase Price	Years of Life	Salvage Value	Capital to be Recovered	Cost Recovery Factor	Annual Recovery	Interest on Salvage Value	Total Capital Recovery & Interest
Tractor, 62-HP, 2WD, spray cab	\$34,600	10	\$3,460	\$31,140	0.1233	\$3,840	\$138	\$3,978
Tractor, 45-HP	\$22,000	10	\$2,200	\$19,800	0.1233	\$2,441	\$88	\$2,529
Air-blast sprayer- 300 gallon	\$13,000	10	\$1,300	\$11,700	0.1233	\$1,443	\$52	\$1,495
Herbicide sprayer- 50 gallon	\$1,355	10	\$136	\$1,220	0.1233	\$150	\$5	\$156
Enviro mist sprayer	\$4,500	10	\$450	\$4,050	0.2246	\$910	\$18	\$928
Mower/brush chopper (7ft)	\$3,500	5	\$350	\$3,150	0.2246	\$707	\$14	\$721
Fertilizer Spreader	\$1,875	10	\$188	\$1,688	0.1233	\$208	\$8	\$216
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	\$8,500	10	\$850	\$7,650	0.1233	\$943	\$34	\$977
Trailer	\$3,000	10	\$300	\$2,700	0.1233	\$333	\$12	\$345
Pickup truck	\$26,000	5	\$2,600	\$23,400	0.2246	\$5,256	\$104	\$5,360
Auger	\$3,750	10	\$375	\$3,375	0.1233	\$416	\$15	\$431
Mechanical hedger (used)	\$2,250	10	\$225	\$2,025	0.1233	\$250	\$9	\$259
Leaf remover	\$6,600	10	\$660	\$5,940	0.1233	\$732	\$26	\$759
Replanter	\$4,200	10	\$150	\$4,050	0.1233	\$499	\$6	\$505
Net applicator (bird control)	\$0	10	\$0	\$0	0.2246	\$0	\$0	\$0
Nets (bird control)-12.5 ac. @ \$150/Ac	\$0	7	\$0	\$0	0.1666	\$0	\$0	\$0
Bird control equipment	\$2,250	10	\$225	\$2,025	0.1233	\$250	\$9	\$259
Shop Equipment	\$5,500	10	\$550	\$4,950	0.1233	\$610	\$22	\$632
Total Machine & Equipment costs	\$148,280							\$20,170
Cost per planted acre	\$2,966							\$403
Buildings								
Shop (1,500 ft ² @ \$39.90 ft ²)	\$65,237	30	\$0	\$65,237	0.0578	\$3,771	\$0	\$3,771
Cost per planted acre	\$1,305							\$75
Vineyard								
1 Ac. Vinifera Vineyard	\$15,794	22	\$0	\$15,794	0.0692	\$1,093	\$0	\$1,093

Table 4: Sample Fungicide & Insecticide Spray Program for *V. vinifera* Grapes,
Finger Lakes Region, NY, 2007.

	Material	Rate/acre	Price	\$/acre
Year 1				
Sprays 1-3	Mancozeb 75 DF	3 lbs.	\$ 2.50 lb.	\$ 7.50
	Sulfur	4 lbs.	\$ 0.24 lb.	\$ 0.96
	Spreader	4 oz.	\$ 64.85 gal.	\$ 2.03
Total per spray				\$ 10.49
Total for year (3 sprays)				\$ 31.46
Year 2				
Sprays 1-4	Mancozeb 75 DF	3 lbs.	\$ 2.50 lb.	\$ 7.50
	Sulfur	4 lbs.	\$ 0.24 lb.	\$ 0.96
	Spreader	4 oz.	\$ 64.85 gal.	\$ 2.03
Total per spray				\$ 10.49
Total for year (4 sprays)				\$ 41.95
Year 3				
Sprays 1-4	Mancozeb 75 DF	3 lbs.	\$ 2.50 lb.	\$ 7.50
	Sulfur	4 lbs.	\$ 0.24 lb.	\$ 0.96
	Spreader	4 oz.	\$ 64.85 gal.	\$ 2.03
Total per spray				\$ 10.49
Sprays 5-8	Captan 80 WP	2.5 lbs.	\$ 4.11	\$ 10.28
	Sulfur	8 lbs.	\$ 0.24 lb.	\$ 1.92
	Spreader	4 oz.	\$ 64.85	\$ 2.03
Total per spray				\$ 14.22
Total per year(8 sprays)				\$ 98.83
Years 4-25				
Sprays 1-2	Mancozeb 75 DF	3 lbs.	\$ 2.50 lb.	\$ 7.50
	Sulfur	4 lbs.	\$ 0.21 lb.	\$ 0.96
	Spreader	4 oz.	\$ 64.85 gal.	\$ 2.03
Total per spray				\$ 10.49
Total for year (2 sprays)				\$ 20.97
Sprays 3-4	Mancozeb 75 DF	3 lbs.	\$ 2.50 lb.	\$ 7.50
	Rubigan	3 fl. oz.	\$ 2.23 fl oz.	\$ 6.70
	Sulfur	4 lbs.	\$.24 lb.	\$.96
	Spreader	4 oz.	\$ 64.85 gal.	\$ 2.03
Total per spray				\$ 17.19
Total for year (2 sprays)				\$ 34.38
Sprays 5-6	Pristine 38 WG	10 fl.oz.	\$ 2.05 fl. oz	\$ 20.50
	Sulfur	5 lbs.	\$.24 lb.	\$ 1.20
Total per spray				\$ 21.70
Total for year (2 sprays)				\$ 43.40

	Material	Rate/acre	Price	\$/acre
Spray 7	Mancozeb 75 DF	4 lbs	\$ 2.50 lb.	\$ 10.00
	Sulfur	8 lbs.	\$ 0.24 lb.	\$ 1.92
	Sevin 80 WP	2.5 lbs.	\$ 5.95 lb.	\$ 14.88
	Spreader	4 oz.	\$ 64.85 gal.	\$ 2.03
Total spray 7				\$ 28.82
Spray 8	Quintec	4 fl. oz.	\$ 3.75 fl oz.	\$ 15.00
	Sulfur	8 lbs.	\$ 0.24 lb.	\$ 1.92
	Prophyt	2.5 pt.	\$ 3.50 pt.	\$ 8.75
Total spray 8				\$ 25.67
Spray 9 & 10	Sulfur	8 lbs.	\$ 0.24 lb.	\$ 1.92
	Prophyt	2.5 pt.	\$ 3.50 pt.	\$ 8.75
	Spreader	4 oz.	\$ 64.85 gal.	\$ 2.03
Total per spray				\$ 12.70
Total for year (2 sprays)				\$ 25.39
Spray 11	Captan 80 WP	2.5 lbs.	\$ 4.11 lb.	\$ 10.28
	Sulfur	8 lbs.	\$ 0.24 lb.	\$ 1.92
	Vanguard 75 WP	10 oz.	\$ 3.50 oz.	\$ 35.00
	Spreader	4 oz.	\$ 64.85 gal.	\$ 2.03
Total spray 11				\$ 49.22
Spray 12	Captan 80 WP	2.5 lbs.	\$ 4.11 lb.	\$ 10.28
	Sulfur	8 lbs.	\$ 0.24 lb.	\$ 1.92
	Elevate 50 WP	1 lb.	\$ 35.35 lb.	\$ 35.55
	Spreader	4 oz.	\$ 64.85 gal.	\$ 2.03
Total spray 12				\$ 49.57
Total cost of all year 3+ sprays				\$ 277.43
*For the sixth spray, add for Chardonnay, Riesling, and Pinot Noir	Vanguard 75 WP	10 oz.	\$ 3.50 oz.	\$ 35.00
Total cost of all year 4+ sprays, for Chardonnay, Riesling, and Pinot Noir				\$ 312.43

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

Table 5: Tile Drainage Costs per acre for *V. Vinifera* Grapes,
Finger Lakes Region, NY, 2007.

Item	Quantity	Price	Total Cost per acre
Main line: 6" pipe	99 ft	\$ 0.87 ft	\$ 86
Laterals: 4" pipe	2,420 ft	\$ 0.32 ft	\$ 774
Installation	2,519 ft	\$ 0.60 ft	\$ 1,511
Total Drainage Construction per acre			\$ 2,372

Table 6: Trellis Construction Costs per acre for *V. Vinifera* Grapes,
Finger Lakes Region, NY, 2007.

Item	Quantity	Price	Total per acre
Wood end posts (8 ft X 5" diameter)	22 posts	\$ 12.99 post	\$ 286
Wood anchor posts (8 ft X 5" diameter)	22 posts	\$ 12.99 anchor	\$ 286
Wood line posts (8 ft, 3" diameter, every 3 rd plant)	269 posts	\$ 6.25 post	\$ 1,681
12.5 gauge HT foliage & cordon wire (\$79.95 roll of 4000 ft)	26,889 ft.	\$ 0.023 ft	\$ 618
Catch wire clips (2 per line post)	538 clips	\$ 0.11 clip	\$ 59
Staples, lbs.	3 lbs.	\$ 1.60 lb.	\$ 5
Crimping sleeves (for joining wire ends)	50 crimps	\$ 0.14 crimp	\$ 7
Total Trellis Construction materials			\$ 2,942

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 \$10,079 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 \$2,622 for vines. In year two, costs are a relatively modest \$839 per acre with lower spray costs and less labor required than for mature vines. In the third year, a spray program of eight sprays is recommended, and hand harvesting is required to protect the young vines. Total costs for the third year are \$1,526 per acre.

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 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 four 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

Table 7: *V.vinifera* Grape Establishment and Development Costs
Finger Lakes Region, New York, 2007

	Labor Used	Labor Hours	Equipment Hours	Labor Cost	Equipment Cost	Materials Cost	Total Cost
Site Preparation							
Drainage (see table 5 for details)	Custom						\$2,372
Lime (2 tons/acre)	Custom					\$64.00	\$64
Herbicide application	Custom				\$10.50	\$11.34	\$22
Stone removal & land maint.	Unskilled	1	0.8	\$11.60	\$10.13		\$22
Soil Sampling	Skilled	0.2		\$3.32		\$6.00	\$9
Fall fertilization	Skilled	0.6	0.5	\$9.96	\$6.56	\$45.00	\$62
Plowing	Custom				\$19.30		\$19
Discing (2X)	Custom				\$27.00		\$27
Total		1.8	1.3	\$24.88	\$73.49	\$126.34	\$2,597
First Year							
Floating/dragging	Skilled	0.25	0.2	\$4.15	\$2.37		\$7
Laser Planting	Custom	n/a	n/a	\$394.17	\$394.17	\$2,621.67	\$3,410
Fertilization (banded)	Skilled	0.6	0.5	\$9.96	\$6.56	\$24.00	\$41
Hilling up	Skilled	1.5	1.2	\$24.90	\$16.04		\$41
Chem. weed control -trellis (?)	Skilled	2.5	2	\$41.50	\$24.55	\$36.61	\$103
Trellis construction (see table for details)	Skilled	41	8	\$680.60	\$109.74	\$2,942	\$3,732
Spot herbicide-hand application	Skilled	1	0	\$16.60	\$0.00	\$5.84	\$22
Cultivation (2X)	Skilled	1.2	1	\$19.92	\$13.37		\$33
Spray 1	Skilled	0.4	0.3	\$6.64	\$5.05	\$10.49	\$22
Spray 2	Skilled	0.4	0.3	\$6.64	\$5.05	\$10.49	\$22
Spray 3	Skilled	0.4	0.3	\$6.64	\$5.05	\$10.49	\$22
Seed cover crop	Skilled	0.6	0.5	\$9.96	\$6.56	\$11.25	\$28
Total		51.65	14.3	\$1,221.68	\$588.48	\$5,672.34	\$7,483
Total for first year and site prep							\$10,079

Table 7 continued

	Labor Used	Labor Hours	Equipment Hours	Labor Cost	Equipment Cost	Materials Cost	Total Cost
Second Year							
Pruning & brush removal	Skilled	3		\$49.80			\$50
Tying & renewal	Unskilled	2		\$23.20		\$4.00	\$27
Vine Replacement	Skilled	2	2	\$33.20	\$29.33	\$52.43	\$115
Spring Fertilization	Skilled	0.6	0.5	\$9.96	\$6.56	\$24.00	\$41
Chem. weed control-trellis-1st applic.	Skilled	2.6	2	\$43.16	\$26.43	\$2.23	\$72
Chem. weed control-trellis-2nd applic.	Skilled	2.6	2	\$43.16	\$26.43	\$2.23	\$72
Chem. weed control-trellis-3rd applic.	Skilled	2.6	2	\$43.16	\$26.43	\$2.23	\$72
Suckering	Unskilled	2.5		\$29.00			\$29
Cluster removal	Unskilled	2.5		\$29.00			\$29
Take away	Skilled	3	2.5	\$49.80	\$33.42		\$83
Spot herbicide treatment	Skilled	0.4	0.3	\$6.64	\$3.68	\$5.84	\$16
Hilling up	Skilled	1.7	1.5	\$28.22	\$20.05		\$48
Spray 1	Skilled	0.4	0.3	\$6.64	\$5.05	\$10.49	\$22
Spray 2	Skilled	0.4	0.3	\$6.64	\$5.05	\$10.49	\$22
Spray 3	Skilled	0.6	0.5	\$9.96	\$8.41	\$10.49	\$29
Spray 4	Skilled	0.6	0.5	\$9.96	\$8.41	\$10.49	\$29
Mowing (4X)	Skilled	2.6	2	\$43.16	\$28.07		\$71
Rogueing	Unskilled	1		\$11.60			\$12
Total		31.1	16.4	\$476.26	\$227.33	\$134.92	\$839

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*		\$322.67			\$323
Tying & renewal	Unskilled	Piece rate*		\$161.33		\$4.00	\$165
Brush chopping (1X)	Skilled	1.2	1	\$19.92	\$14.04		\$34
Vine replacement	Skilled	2	2	\$33.20	\$29.33	\$52.43	\$115
Spring fertilization	Skilled	0.6	0.5	\$9.96	\$6.56	\$24.00	\$41
Chem. weed control- trellis	Skilled	2.6	2	\$43.16	\$24.55	\$2.20	\$70
Chem. weed control- trellis	Skilled	2.6	2	\$43.16	\$24.55	\$2.20	\$70
Chem. Weed control-trellis	Skilled	2.6	2	\$43.16	\$24.55	\$2.20	\$70
Suckering	Unskilled	7		\$81.20			\$81
Cluster removal	Unskilled	8		\$92.80			\$93
Take away	Skilled	3	2.5	\$49.80	\$33.42		\$83
Spot herbicide treatment	Skilled	0.4	0.3	\$6.64	\$3.68	\$5.84	\$16
Spray 1	Skilled	0.6	0.5	\$9.96	\$8.41	\$10.49	\$29
Spray 2	Skilled	0.6	0.5	\$9.96	\$8.41	\$10.49	\$29
Spray 3	Skilled	0.6	0.5	\$9.96	\$8.41	\$10.49	\$29
Spray 4	Skilled	0.6	0.5	\$9.96	\$8.41	\$10.49	\$29
Spray 5	Skilled	0.6	0.5	\$9.96	\$8.41	\$14.22	\$33
Spray 6	Skilled	0.6	0.5	\$9.96	\$8.41	\$14.22	\$33
Spray 7	Skilled	0.6	0.5	\$9.96	\$8.41	\$14.22	\$33
Spray 8	Skilled	0.6	0.5	\$9.96	\$8.41	\$14.22	\$33
Mowing (4X)	Skilled	2.6	2	\$43.16	\$28.07		\$71
Hilling up	Skilled	1.7	1.5	\$28.22	\$20.05		\$48
Total		39.1	19.8	\$1,058.06	\$276.06	\$191.71	\$1,526

Table 8: Summary of Establishment and Development Costs by Year
for *V. vinifera* Grapes, Finger Lakes Region, NY 2007

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.	\$ 1,600
Total revenue	\$ 0	\$ 0	\$ 1,600
Costs			
Site preparation	\$ 2,597	\$ 0	\$ 0
Annual variable costs			
Preharvest	\$ 7,483	\$ 839	\$ 1,526
Harvest (Hand)+hauling	n.a.	n.a.	\$ 250
<i>Total variable costs and site preparation</i>	<i>\$10,079</i>	<i>\$ 839</i>	<i>\$ 1,776</i>
Annual fixed costs			
Machines & equipment amortization	\$ 403	\$ 403	\$ 403
Buildings amortization	\$ 75	\$ 75	\$ 75
Property taxes	\$ 88	\$ 88	\$ 88
Land opportunity cost	\$ 140	\$ 140	\$ 140
Office supplies, phone, etc.	\$ 50	\$ 50	\$ 50
Insurance	\$ 43	\$ 43	\$ 43
Management	\$ 218	\$ 218	\$ 218
<i>Total fixed costs</i>	<i>\$ 1,017</i>	<i>\$ 1,017</i>	<i>\$ 1,017</i>
Interest on cumulative costs	\$ 444	\$ 536	\$ 669
<i>Total costs</i>	<i>\$11,540</i>	<i>\$ 2,391</i>	<i>\$ 3,462</i>
Net returns	(\$11,540)	(\$ 2,391)	(\$ 1,862)
Total cumulative costs	\$11,540	\$13,962	\$15,794
Amortization of vineyard:			\$ 1,093
Cash costs of vineyard establishment (3 Yrs.)			\$12,443

cost for the E&D period is \$15,794 per acre. Amortized at a four percent 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 \$1,093 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 \$12,443 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 \$2,210 per acre. The most costly operations are canopy management (\$571 per acre), spraying (12 times, for a total of \$498 per acre, including labor, machinery and materials costs) and pruning and brush removal (\$323 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 9: Growing Costs, Years Four through Twenty-five, *V. vinifera* Grapes, Finger Lakes Region, 2007

Operation	Labor Used	Labor	Equipment	Labor Cost	Equipment Cost	Materials Cost	Total Cost
		Hours	Hours				
Pruning+brush pulling	Custom	Piece rate*		\$322.67			\$323
Brush chopping	Skilled	1.2	1	\$19.92	\$14.04		\$34
Trellis maintenance	Skilled	3	1	\$49.80	\$12.67	\$30.00	\$92
Tying & renewal	Custom	Piece rate*		\$161.33		\$2.80	\$164
Spring fertilization	Skilled	0.6	0.5	\$9.96	\$6.56	\$24.00	\$41
Vine replacement	Skilled	2	2	\$33.20	\$29.33	\$56.47	\$119
Chem.weed control-trellis	Skilled	2.6	2	\$43.16	\$24.55	\$2.23	\$70
Chem.weed control-trellis	Skilled	2.6	2	\$43.16	\$24.55	\$2.23	\$70
Chem.weed control-trellis	Skilled	2.6	2	\$43.16	\$24.55	\$2.23	\$70
Soil applic of Solubor (w. herb. Spray)						\$2.00	\$2
Spot herbicide treatment	Skilled	0.4	0.3	\$6.64	\$3.68	\$5.84	\$16
Suckering	Unskilled	7		\$81.20			\$81
Cluster removal & shoot thinning	Unskilled	10		\$116.00			\$116
Take-away	Skilled	3	2.5	\$49.80	\$33.42		\$83
Spray 1	Skilled	0.6	0.5	\$9.96	\$8.41	\$10.49	\$29
Spray 2	Skilled	0.6	0.5	\$9.96	\$8.41	\$10.49	\$29
Spray 3	Skilled	0.6	0.5	\$9.96	\$8.41	\$17.19	\$36
Spray 4	Skilled	0.6	0.5	\$9.96	\$8.41	\$17.19	\$36
Spray 5	Skilled	0.6	0.5	\$9.96	\$8.41	\$21.70	\$40
Spray 6	Skilled	0.6	0.5	\$9.96	\$8.41	\$21.70	\$40
Spray 7	Skilled	0.6	0.5	\$9.96	\$8.41	\$28.82	\$47
Spray 8	Skilled	0.6	0.5	\$9.96	\$8.41	\$25.67	\$44
Spray 9	Skilled	0.6	0.5	\$9.96	\$8.41	\$12.70	\$31
Spray 10	Skilled	0.6	0.5	\$9.96	\$8.41	\$12.70	\$31
Spray 11	Skilled	0.6	0.5	\$9.96	\$8.41	\$49.22	\$68
Spray 12	Skilled	0.6	0.5	\$9.96	\$8.41	\$49.57	\$68
Mowing (4X)	Skilled	2.6	2	\$43.16	\$28.07		\$71
Lime (1 in 5 years)	Skilled	0.1	0.1	\$1.66	\$2.37	\$6.40	\$10
Pickup truck	n/a	n/a			\$62.12		\$62

Table 9 Continued

	Labor Used	Labor Hours	Equipment Hours	Labor Cost	Equipment Cost	Materials Cost	Total Cost
Operation							
Shoot positioning/move catch wires	Unskilled	6		\$69.60			\$70
Shoot positioning/move catch wires	Unskilled	6		\$69.60			\$70
Leaf removal	Skilled	1.25	1	\$20.75	\$15.56		\$36
Summer pruning	Skilled	1.3	1	\$21.58	\$12.77		\$34
Petiole sampling (every 2 years)	Skilled	0.1		\$1.66		\$1.84	\$4
Soil sampling (every 5 years)	Skilled	0.1		\$1.66		\$0.30	\$2
Hilling-up	Skilled	1.7	1.5	\$28.22	\$20.05		\$48
Fall fertilization	Skilled	0.3	0.3	\$4.98	\$3.94	\$15.00	\$24
Total		61.7	25.1	\$1,362.39	\$419.12	\$428.78	\$2,210

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 \$2,210 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 10: Summary of Growing Costs for *V. vinifera* Vineyard, Trained to a Vertically Shoot Positioned System, Finger Lakes Region, NY, 2007

Item	Year 1	Year 2	Year 3	Year 4+
Site preparation	\$ 2,597			
Vines & planting	\$ 3,417			
Trellis materials & construction	\$ 3,732			\$ 92
Replanting & Rogueing		\$ 127	\$ 115	\$ 119
Dormant pruning & br. removal		\$ 50	\$ 323	\$ 323
Weed control	\$ 186	\$ 232	\$ 226	\$ 226
Fertilization	\$ 41	\$ 41	\$ 41	\$ 82
Canopy management		\$ 85	\$ 339	\$ 571
Disease & insect control	\$ 67	\$ 102	\$ 246	\$ 498
Take away & hilling up	\$ 41	\$ 131	\$ 131	\$ 131
Mowing		\$ 71	\$ 105	\$ 105
Pick-up truck				\$ 62
Total Growing Costs	\$10,079	\$ 839	\$ 1,526	\$ 2,210

Table 11 summarizes the costs and returns expected from a mature vineyard. The estimated revenue per acre varies from \$3,300 to \$5,610 depending upon variety. Total costs vary from \$4,580 to \$4,773 per acre by variety. The break-even price prices and yields are shown in table 11. A yield of 2.8 tons per acre is the break-even point for red varieties. A yield of 3.4 tons per acre is necessary to break even with Chardonnay.

Pinot Noir shows a large loss (-\$1345) given the assumed yield 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 may be 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 surplus Cabernet Franc grapes appeared with the 2006 harvest, and the last two years, average prices for the variety have declined (see Table 2). The model indicates a small positive profit (\$131 per acre) for Riesling. Prices for Riesling have been on an upward trend, and additional acreage probably may be profitably planted with the growth in demand that appears likely.

Table 11: Costs and Returns for a mature *V. vinifera* Vineyard, Trained to a Vertically Shoot Positioned System, Finger Lakes Region, NY, 2007

Item	Pinot Noir	Cab. Franc	Chardonnay	Riesling
Receipts:				
Yield target , tons per acre	2.0	3.3	2.8	2.8
Price, \$ per ton	\$1,650	\$1,700	\$1,350	\$1,700
Total receipts	\$3,300	\$5,610	\$3,780	\$4,760
Costs:				
Variable Costs:				
Growing	\$2,210	\$2,210	\$2,210	\$2,210
Cluster removal (Cab. Franc and P. Noir)	\$99	\$99		
Additional spray materials for Botrytis	\$35	\$0	\$35	\$35
Interest on operating capital	\$44	\$44	\$44	\$44
Machine Harvesting	\$200	\$248	\$210	\$210
Total variable costs	\$2,588	\$2,601	\$2,499	\$2,499
Fixed Costs:				
Vineyard capital recovery	\$1,093	\$1,093	\$1,093	\$1,093
Machinery and equipment capital recovery	\$403	\$403	\$403	\$403
Buildings capital recovery	\$75	\$75	\$75	\$75
Property taxes	\$88	\$88	\$88	\$88
Land opportunity cost	\$140	\$140	\$140	\$140
Office supplies, phone, etc.	\$50	\$50	\$50	\$50
Insurance	\$43	\$43	\$43	\$43
Management	\$165	\$281	\$189	\$238
Total fixed costs	\$2,057	\$2,172	\$2,081	\$2,130
Total costs	\$4,645	\$4,773	\$4,580	\$4,629
Profit or loss	-\$1,345	\$837	-\$800	\$131
Breakeven price (\$ /ton)	\$2,323	\$1,446	\$1,636	\$1,653
Breakeven yield (tons)	2.8	2.8	3.4	2.7

Capital Requirement

Table 12 indicates the capital investment per acre necessary to get into grape production in the Finger Lakes region, assuming a vineyard of 50 total planted acres with an additional four acres for roads, headlands, and a building; and reliance on either custom hand or machine harvesting of grapes. The table uses the value of new machinery and equipment and buildings. If a harvester is purchased, investment per acre for machinery would be considerably higher. Land costs assume a prime site close to the lake. Table 12 indicates that it would require \$23,844 per planted 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, 2007

Assets	\$/acre
Land*	\$ 3,780
Machinery & equipment	\$ 2,966
Buildings (shop & tool shed)	\$ 1,305
Vineyard establishment and development	\$15,794
Total investment per acre of grapes	\$23,844

*Prime site close to the lake. Assumes 54 acres purchased (including support land) for 50 planted acres.

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 grower 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 \$2,200 per

Table 13: Total Cost Per Ton (Breakeven Price) At Varying Yields,
V. vinifera Grapes, Finger Lakes Region of New York, 2007

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	\$3,039	1.5	\$3,092	1.5	\$2,989	1.5	\$3,021
2.0	\$2,298	2.0	\$2,338	2.0	\$2,260	2.0	\$2,285
2.5	\$1,853	2.5	\$1,859	2.5	\$1,823	2.5	\$1,843
3.0	\$1,557	3.0	\$1,548	3.0	\$1,532	3.0	\$1,548
3.5	\$1,345	3.5	\$1,368	3.5	\$1,324	3.5	\$1,338
4.0	\$1,186	4.0	\$1,206	4.0	\$1,168	4.0	\$1,180
				4.5	\$1,046	4.5	\$1,057
				5.0	\$ 949	5.0	\$ 959

* Cost at different yield levels adjusted for machine harvesting and hauling.
 Assumes a 4 % real interest rate and a \$3,500 land value.

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.

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.

OPTIONAL PRACTICES

The preceding base analysis in many instances will need to be modified by site specific requirements and/or conditions. One of the major concerns on many, if not most sites, is wildlife damage control, especially for birds and deer. In the following section, calculations are made to show adjustments to the base analysis that can be made to account for the costs of common measures to control or eliminate wildlife damage. Wildlife pressure will vary from site to site, but is becoming more pervasive over time.

Bird Control

For the varieties considered in this publication, the base analysis indicated that receipts per acre ranged from \$3,300 (for Pinot Noir) to \$5,610 (Cabernet Franc) per acre. Receipts can be decimated by wildlife, especially birds. Pinot Noir is especially vulnerable to bird damage.

In Table 14, the costs per acre for bird netting (a commonly used control measure) is indicated. Total investment for the net applicator and netting amounts to \$28,975 for 12.5 acres. Labor cost for annual installation and removal of the netting is a substantial \$278 per acre. Labor costs vary substantially according to different types of netting, for example one row vs. multiple row systems. The total annual cost per acre from this analysis is \$563, an amount that would

easily be exceeded by damage that often occurs in Finger Lakes vineyards. For example, the average price per ton of the four varieties considered in this bulletin was \$1,600 per ton. If the investment in netting was made, it would pay off if it prevented bird damage to .35 tons per acre (or \$563/1600) in an average season.

Table 14. Cost of Bird Damage Control Measures for a 12.5 acre block, Finger Lake Region of New York, 2007.

Initial cost for net applicator:	\$5,450
Years of life for applicator	10 yrs.
Total annual cost (for depreciation and interest) for net applicator	\$665
Annual cost per acre for applicator	\$53
Initial cost for netting	\$23,525
Years of life for netting	10 yrs.
Total annual cost (for depreciation and interest) for netting	\$2900
Annual cost per acre for netting	\$232
Annual cost for labor per acre (24 hrs. X 11.60/hr.)	\$278
Total annual costs for depreciation, interest, and labor per acre	\$563

Deer Damage

The cost for fencing to control deer is shown in Table 15. An eight foot high fence with two gates and four corners, a total of 3,200 linear feet to enclose 12.5 acres, is assumed. The cost per linear foot is \$8.00, and the total cost for the 12.5 acres is \$25,600. The annual cost per acre is \$162 for depreciation, interest, and repairs, assuming a 25 year life for the investment. Deer pressure on many sites is such that damage per acre per year would exceed the annual cost of the investment of \$162.

Table 15. Cost of Deer Damage Control Measures for a 12.5 acre block, Finger Lakes Region of New York, 2007.

Installed fence, 3,200 linear feet @ \$8.00/ft.	\$25,600
Years of life	25 yrs.
Total annual cost (depreciation and interest)	\$1,638
Repairs (at 1.5 per cent of installed cost per year)	\$384
Total annual costs for 12.5 acres	\$2022
Total annual cost per acre	\$162

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, 2007 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. 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 2006, the New York National Agricultural Statistics Service (NASS) estimated acreage of certain varieties in the Finger Lakes as follows: Cabernet Franc, 199 acres; Cabernet Sauvignon, 84 acres; Merlot, 72 acres; and Pinot Noir, 149 acres. Total *Vinifera* acreage in the Finger Lakes was only 1,596, or about 18 percent of total grape acreage. With such limited acreage, a few small plantings or one large planting of these varieties can lead to a large percentage increase in grapes produced, temporarily depressing the cash market. This happened with Chardonnay in the Finger Lakes in the early 1990s and Cabernet Franc in recent years. 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.

Other concerns include the current macroeconomic conditions with high fuel prices, the potential for inflation of other inputs (especially pesticides and fertilizer), and the decreasing value of the US dollar. Higher costs for gasoline and diesel fuel alone raised total growing costs by 6.3 percent from the 2004 study. Over half of the wine marketed by Finger Lakes farm wineries is sold direct to consumers. High prices for gasoline, especially during a recession, might limit visitors from the surrounding states from making trips to NY Wine Country. The weak dollar has some positive and some negative effects. To the extent producers buy special machinery or winery equipment from Europe, it raises those costs. However, on the other side, European and Australia wines are costing more now, giving NY producers some new market opportunities. In the current environment, cost control is now more important than at any time in the last 20 years.

Labor, especially with more reliance on Mexican labor for pruning and tying, is a concern. More growers need to consider using H2A labor to forestall the possibility of labor shortages. (Growers should be reminded that there is a long lead time involved in securing this labor). Since nearly all grapes are harvested mechanically, the industry is not as vulnerable as the tree fruit and vegetable industries. Immigration reform would help ease growers' minds considerably, but meaningful reform is unsure at the time of writing this publication.

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 Chris Verrill who served as the growers' panel for helping to establish the costs reported in this bulletin. Hans Walter-Peterson, Extension Educator, Finger Lake Grape Program provided a helpful review of the manuscript.

APPENDIX

Appendix Table 1: Sample Herbicide Program for *V. vinifera* Grapes,
Finger Lakes Region, NY, 2007.

	Material	Rate/acre	Price	\$/acre
Year 0 (site prep.)				
Custom herbicide (in site prep.)	Glyphosate	2 qt.	\$ 5.00 qt.	\$ 11.00
Year 1 (planting)				
Chem. weed control – trellis	Surflan	1.6 qt.	\$ 22.87 qt.	\$ 36.60
	Glyphosate	1.0 qt.	\$ 5.50 qt.	\$ 5.50
	Ammonium sulfate	1.7 lb.	\$.197 lb.	\$.34
Total for Year 1				\$ 42.44
Years 2-25				
Chem. weed control – trellis	Glyphosate	0.4qt.	\$ 5.50 qt.	\$ 2.20
	Ammonium sulfate	0.17 lb.	\$.197 lb.	\$.03
Total for treatment				\$ 2.23
Chem. Weed control - trellis	Glyphosate	0.4qt.	\$ 5.50 qt.	\$ 2.20
	Ammonium sulfate	0.17 lb.	\$.197 lb.	\$.03
Total for treatment				\$ 2.23
Chem. weed control – trellis	Glyphosate	0.4qt.	\$ 5.50 qt.	\$ 2.20
	Ammonium sulfate	0.17 lb.	\$.197 lb.	\$.03
Total for treatment				\$ 2.23
Spot herbicide treatment	Glyphosate	1.0 qt.	\$ 5.50	\$ 5.50
	Ammonium sulfate	1.7 lb.	\$.197	\$.34
Total for treatment				\$ 5.84
Average annual treatment costs for Years 2-25				\$ 12.53

Appendix Table 2: Sample Fertilizer/Soil Program for *V. vinifera* Grapes,
Finger Lakes Region, NY, 2007.

	Material	Rate/acre	Price	\$/acre
Year 0 (site prep.)				
Soil sampling (1 test /5 acres@ two depths)	n/a	0.4 acre	\$ 15 test	\$ 6.00
Lime (custom application)	Lime	2.0 tons	\$ 32 ton	\$ 64.00
Fall fertilization	Muriate of Potash	300 lbs.	\$ 300 ton	\$ 45.00
Total for year 0				\$ 115.00
Year 1				
Spring fertilization (banded)	10:10:10	30 lbs.	\$ 0.80 lb.	\$ 24.00
Total for year 1				\$ 24.00
(Optional: mulch-if irrigation is not installed)	Round hay bales	20 bales	\$ 15 bale	\$ 300.00
Year 2				
Spring fertilization (banded)	10:10:10	30 lbs.	\$ 0.80 lb.	\$ 24.00
Total for year 2				\$ 24.00
Years 3				
Spring fertilization (banded)	10:10:10	30 lbs.	\$ 0.80 lb.	\$ 24.00
Total for year 3				\$ 24.00
Years 4+				
Soil application	Solubor	2.5 lbs.	\$ 0.80	\$ 2.00
Fall fert. (every 3 rd year)	Muriate of Potash	300 lbs.	\$ 300 ton	\$ 15.00
Lime (every 5 th year)	Lime	1 ton	\$ 32.00 ton	\$ 6.40
Petiole Sampling (one sample/ 3 acres, every other year)		0.16 acre	\$ 23.00 test	\$ 3.68
Soil sampling (1 in 5 years)		0.2 acre	\$ 15.00	\$ 0.60
Total for year 4				\$ 27.68

The sample Fertilizer/Soil Program was developed by Hans Walter-Peterson, Extension Educator, Finger Lakes Grape Program.

Appendix Table 3: Hourly Machinery and Equipment Variable Costs, *V. vinifera* Grapes, Finger Lakes Region, NY, 2007.

Item	Purchase Price	Hours of life	Total Repairs	Repairs	Fuel	Lube (15% of fuel)	Total Hourly Variable Costs
Tractor, 62-HP, 2WD, spray cab	\$34,600	12000	100%	\$2.88	\$8.72	\$1.31	\$12.92
Tractor, 45-HP	\$22,000	12000	100%	\$1.83	\$8.72	\$1.31	\$11.87
Air-blast sprayer- 300 gallon	\$13,000	2000	60%	\$3.90			\$3.90
Herbicide sprayer- 50 gallon	\$1,355	2000	60%	\$0.41			\$0.41
Environmist sprayer	\$4,500	2000	60%	\$1.35			\$1.35
Mower/brush chopper (7ft)	\$3,500	2500	80%	\$1.12			\$1.12
Fertilizer Spreader	\$1,875	1200	80%	\$1.25			\$1.25
Small disc	\$400	2000	60%	\$0.12			\$0.12
Grape hoe	\$5,000	2000	60%	\$1.50			\$1.50
Post driver	\$8,500	2000	80%	\$3.40			\$3.40
Trailer	\$3,000	3000	80%	\$0.80			\$0.80
Pickup truck	\$26,000	2500	83%	\$8.63	\$5.80	\$0.87	\$15.30
Auger	\$3,750	2000	80%	\$1.50			\$1.50
Mechanical hedger	\$2,250	2000	80%	\$0.90			\$0.90
Leaf remover	\$6,600	2000	80%	\$2.64			\$2.64
Replanter	\$4,200	1200	80%	\$2.80			\$2.80
Tractor Fuel Factors	Factor						
Diesel	0.0438						
Gasoline	0.0600						

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