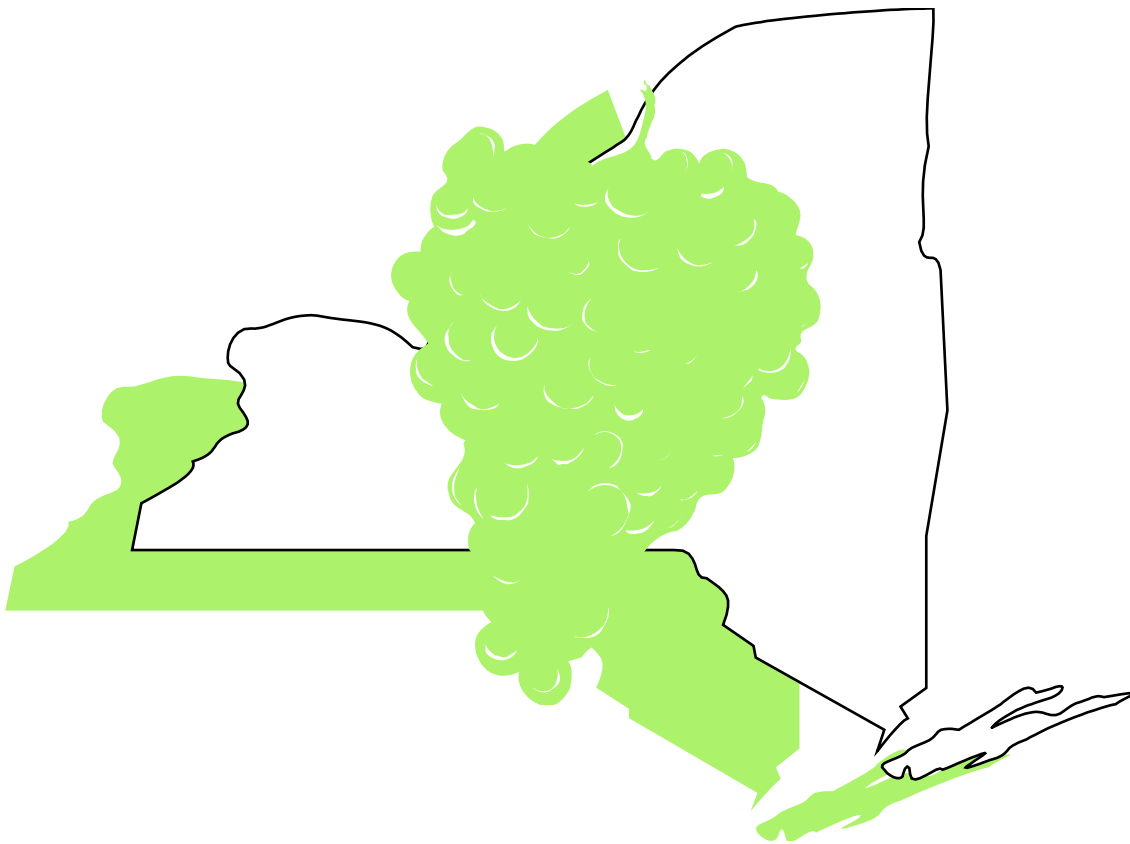


COST OF ESTABLISHMENT AND PRODUCTION OF HYBRID GRAPES IN THE FINGER LAKES REGION OF NEW YORK-2013



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Introduction

The Finger Lakes region, which stretches from Rochester to Syracuse in upstate New York, has been a center for wine production since the 1860s. Today New York is the second largest wine-producing state in the United States, and the Finger Lakes region is the state's largest wine-growing region. Furthermore, the region has perhaps the most diverse array of native *Labrusca*, *Vitis vinifera*, and interspecific hybrid cultivars of any production area in the Northeast, with over 30 varieties of grapes covering its 9,393 acres used in wine production.

For interspecific hybrid cultivars, French-American hybrid grapes are mainly grown in the Finger Lakes region, which combine native varieties with excellent climate adaptations with the great-tasting winemaking varieties from Europe. In upstate New York, hybrid cultivars have flourished because of their excellent tolerance to powdery mildew, other fungal diseases, nematodes, and phylloxera.

Examples of hybrid varieties are the French-American hybrids, Cayuga White and Vidal Blanc. These hybrids have stronger winter hardiness and are more resistant to fungal diseases. These are great grape features for a region such as the Finger Lakes, given its cold climate and exposure to early frosts. As a result of their desirable characteristics, many hybrid varieties have seen increased acreage in the Finger Lakes region over the years. Acreage of Vidal Blanc increased by 58% (to 153 acres) in the most recent Orchard and Vineyard Survey compiled and conducted by the New York Agricultural Statistics Service in 2011. That said, not all hybrids have seen such increase: acres planted to Corot Noir, Cayuga White, and Seyval Blanc hybrids have all decreased from the 2006 survey. Overall, Hybrid grapes play an important role in grape production in the Finger Lakes region.

There is currently increased consumer demand for quality wines (interspecific French-American hybrids and *V. vinifera* cultivars, or from designated appellations). Wine consumption in the United States has increased by about 31.4 percent during the last 10 years, primarily driven by better information around the health benefits of moderate wine consumption. New York is gaining stature as a producer of high quality wines that command premium prices. However, the prices received by Finger Lakes growers for hybrid grapes declined for all major varieties, from 2008 to 2011. This was due to the recession in the US economy as well as increased plantings of *V. vinifera* in New York in recent years. After a consistent pattern of flat or falling prices for most varieties since 2008, average prices in 2012 for almost all varieties either held steady or increased compared to 2011. However, prices for the major hybrid varieties dropped slightly in 2013, probably due to *V. vinifera* varieties becoming more popular in the Finger Lakes region.

Growers who are considering planting additional hybrid 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 an investment of \$18,800 per acre or more required to bring a hybrid vineyard into production will result in a profitable return on investment. This requires an assessment of which varieties to plant on this acreage and which sites

will support profitable hybrid production. Varieties to plant have to be considered relative to cold hardiness, as the Finger Lakes has experienced severe winter injury to hybrid about once every decade, with the last major freeze event occurring in 2004.

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 (by volume) through direct sales in tasting rooms, wineries cannot expect to be completely unaffected if global supply outstrips demand in the future. Many French-American hybrid varieties grow in the Finger Lakes region, and are used in making sweet and sparkling wines. The most well-known variety is Vidal, but also of significance is the Cayuga grape variety, which is named after one of the eleven lakes. This emphasizes the importance of selection of varieties, which is driven by the marketing plan. Production of hybrid grapes in NY reached 22,355 tons in 2011, an increase of 56.6 percent over the production from 2007.

The objective of this study was to determine the cost of producing hybrid 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 can guide 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 cluster removal 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 November of 2013, we met with a panel of four growers and vineyard managers. The growers went through the data prepared for the most recent estimates of the cost of establishing and growing hybrid grapes. Consensus estimates were developed for land prices, labor requirements and wage rates for the various operations in a hybrid grape vineyard and for a typical machinery complement for a full time commercial vineyard. Because this hybrid grape study was first conducted, the panel went through the machinery and labor time estimates for the 2013 *V. vinifera* study, and made recommendations for changes to hybrid grapes.

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

Land. The study assumes land was purchased at \$6,000 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 7' X 9' spacing (vine by row) resulting in a planting density of 691 vines per acre. There were 11 rows to an acre and rows were 440 feet long. Vine cost was estimated to average \$3.50 per plant. Each year it was assumed that two percent of the vines had to be replanted. The initial planting was done using contracted laser planting. The fee for laser planting was \$35 per row and \$0.50 per vine.

Varieties. The 50-acre vineyard was planted to the following three hybrid varieties: Cayuga White, Corot Noir, and Vidal Blanc. These three 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. Cayuga White and Vidal Blanc are two of the more widely grown and vinified hybrid varieties in the region. Corot Noir is a newer red hybrid that was released by Cornell about 8 years ago. It is representative of some newer red hybrid varieties with improved potential wine quality over many of the older red hybrid varieties.

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 High Cordon & Umbrella Kniffen training systems. The trellis system for hybrids uses only two wires - one for the cordon and one to tie the canes to in the case of the Umbrella system, unless there is an irrigation system in place in which case there needs to be a third wire. The trellis system has 22 wood end posts (8 ft X 5" diameter) and 22 screw anchors (8 ft X 3" diameter).

Herbicides and Fertilizer/Soil Program. The sample herbicide program was developed in consultation with the advisory panel of three growers. Glyphosate spot sprays should be made using some kind of shielded sprayer to avoid contact with green tissues. For details of the sample herbicide

program, see Table 1 in Appendix. The sample fertilizer/soil program was developed by Hans Walter-Peterson, Extension Educator, and Finger Lakes Grape Program. See Table 2 in Appendix for details.

Wage Rates. Wage rates used represented the consensus of the grower panel. The rates assumed were \$20.00 per hour for skilled labor (i.e. \$15.38 per hour plus fringe benefits). Fringe benefits consist of workers compensation, social security, medical insurance, and other benefits. For unskilled labor, the rate was \$13.50 per hour (including fringe benefits). Piece rate wage rates were used for pruning the vines in the third and fourth year through twenty-five year. The rate was \$0.45 per vine. The piece rates for tying were specified at \$0.23 per vine.

Harvesting & Hauling. Grapes were custom machine harvested in the fourth year and beyond. The machine harvesting rate is assumed at \$95 per ton, with an additional \$30 per ton expenses for transporting the grapes. Hauling costs are included in this rate.

Machinery. Machinery depreciation and interest were charged on the basis of prices for new equipment with the minor exceptions for a small disc, which was assumed to be used. Diesel fuel at \$3.90 per gallon was budgeted for machine operations. Gasoline was charged at \$3.83 per gallon (for unleaded). These were representative of prices in Central New York as of December 2013. 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. were estimated at \$3,000 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 two 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 hybrid wines. The management practice includes cluster removal that often decreases yields, but improves wine quality. Table 1 summarizes the yield assumptions.

Table 1: Yield Assumptions

Variety	Year 3	Year 4+
Cayuga White	1 tons/acre	8.0 tons/acre
Corot Noir	1 tons/acre	5.0 tons/acre
Vidal Blanc	1 tons/acre	5.0 tons/acre

Results

Grape Prices

Prices for the five years ending in 2013 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 annually 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 weighted 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 three 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 Hybrid Grapes in the Finger Lakes Region, 2009-2013, Dollars per Ton.

	Cayuga White	Corot Noir	Vidal Blanc
2009	\$587	\$554	\$638
2010	\$570	\$570	\$648
2011	\$560	\$590	\$621
2012	\$570	\$631	\$607
2013	\$550	\$585	\$625
Mean	\$567	\$586	\$628
Prices used	\$570	\$650	\$650

Source: *Finger Lakes Vineyard Notes*, Harvest Issues, 2009-2013

Machinery and Buildings Costs

The investment costs and annual costs for equipment and buildings are summarized in Table 3. The machinery investment required totals \$205,350, an average investment of \$4,107 per acre of vineyard. The investment for a shop is estimated at \$69,000, or \$1,380 per acre. The shop was 1,500 ft², and the construction cost was estimated at \$46.00 per ft² which includes basic amenities such as water and electricity. The total annual costs for depreciation and interest amount to \$20,580 for machinery and \$3,081 for buildings, or \$412 and \$62 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,
Hybrid Grape Vineyard, Finger Lakes Region, NY, 2013

<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	\$48,000	10	\$4,800	\$43,200	0.1113	\$4,809	\$96	\$4,905
Tractor, 45-HP	\$28,000	10	\$2,800	\$25,200	0.1113	\$2,805	\$56	\$2,861
Air-blast sprayer- 400 gallon	\$31,000	10	\$3,100	\$27,900	0.1113	\$3,106	\$62	\$3,168
Herbicide sprayer- 50 gallon	\$2,200	10	\$220	\$1,980	0.1113	\$220	\$4	\$225
Environmist sprayer	\$6,700	10	\$670	\$6,030	0.1113	\$671	\$13	\$685
Mower	\$7,800	7	\$1,114	\$6,686	0.1545	\$1,033	\$22	\$1,055
Brush chopper (6ft)	\$8,500	7	\$1,214	\$7,286	0.1545	\$1,126	\$24	\$1,150
Fertilizer Spreader	\$2,000	10	\$200	\$1,800	0.1113	\$200	\$4	\$204
Small disc (used)	\$600	10	\$60	\$540	0.1113	\$60	\$1	\$61
Grape hoe	\$7,500	10	\$750	\$6,750	0.1113	\$751	\$15	\$766
Post driver	\$4,000	10	\$400	\$3,600	0.1113	\$401	\$8	\$409
Vineyard Trailer	\$3,000	10	\$300	\$2,700	0.1113	\$301	\$6	\$307
Pickup truck (used)	\$28,000	10	\$2,800	\$25,200	0.1113	\$2,805	\$56	\$2,861
Auger	\$1,000	10	\$100	\$900	0.1113	\$100	\$2	\$102
Replanter	\$4,800	10	\$480	\$4,320	0.1113	\$481	\$10	\$491
Bird control equipment (\$100 per acre)	\$5,000	10	\$500	\$4,500	0.1113	\$501	\$10	\$511
Shop Equipment	\$8,000	10	\$800	\$7,200	0.1113	\$802	\$16	\$818
Pruning Shears (X5)	\$250	5	\$50	\$200	0.2122	\$42	\$1	\$43
Macrobin (X30)	\$9,000	10	\$900	\$8,100	0.1113	\$902	\$18	\$920
Total Machine & Equipment costs	\$205,350		\$20,309	\$175,791				\$20,580
Cost per planted acre	\$4,107							\$412
<i>Buildings</i>								
Shop (1,500 ft ² @ \$46 ft ²)	\$69,000	30	\$0	\$69,000	0.0446	\$3,081	\$0	\$3,081
Cost per planted acre	\$1,380							\$62
<i>Vineyard</i>								
1 Ac. Vinifera Vineyard	\$18,765	22	0	\$18,772	0.0566	\$1,063	\$0	\$1,063

Pesticide Program Spray Costs

Table 4 indicates the recommended spray program and costs for years one, two, and three (establishment), and years four through twenty-two (operation). In year three, five 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 six sprays during the growing season. Spray materials costs were \$145.11 per acre. Of course, spray programs will have to be adjusted slightly from year to year to accommodate variable weather and/or pest pressure. Pesticide application costs for labor and machinery, as well as herbicides, are developed in Tables 7 and 9 to follow.

Table 4: Sample Fungicide & Insecticide Spray Program for Hybrid Grapes, Finger Lakes Region, NY, 2013

Year	Material	Rate/acre	Price	\$/acre
Year 1				
Spray 1	Mancozeb 75DF	3 lbs.	\$4.05 lb.	\$12.15
	Spreader	4 oz.	\$20.00 gal.	\$0.63
Total per spray				\$12.78
Sprays 2-3	Mancozeb 75DF	3 lbs.	\$4.05 lb.	\$12.15
	Sulfur	4 lbs.	\$0.50 lb.	\$2.00
	Spreader	4 oz.	\$20.00 gal.	\$0.63
Total per spray				\$14.78
Total for year (3 sprays)				\$42.33
Year 2				
Spray 1	Mancozeb 75DF	3 lbs.	\$4.05 lb.	\$12.15
	Spreader	4 oz.	\$20.00 gal.	\$0.63
Total per spray				\$12.78
Sprays 2-4	Mancozeb 75DF	3 lbs.	\$4.05 lb.	\$12.15
	Sulfur	4 lbs.	\$0.50 lb.	\$2.00
	Spreader	4 oz.	\$20.00 gal.	\$0.63
Total per spray				\$14.78
Total for year (4 sprays)				\$57.10
Year 3				
Spray 1	Mancozeb 75DF	3 lbs.	\$4.05 lb.	\$12.15
	Spreader	4 oz.	\$20.00 gal.	\$0.63
Total for year (1 spray)				\$12.78
Sprays 2-3	Revus Top	7 oz.	\$2.34 oz	\$16.41
	Spreader	4 oz.	\$20.00 oz	\$0.63
Total per spray				\$17.03
Total for year (2-3 sprays)				\$34.06

Sprays 4-5	Captan 80WP	2.5 lbs.	\$6.60 lb	\$16.50
	Sulfur	5 lbs.	\$0.50 lb	\$2.50
	Spreader	4 oz.	\$20.00 oz	\$0.63
Total per spray				\$19.63
Total for year (4-5 sprays)				\$39.25
Total for year (5 sprays)				\$86.09
Years 4-25				
Spray 1	Mancozeb 75DF	3 lbs.	\$4.05 lb.	\$12.15
	Spreader	4 oz.	\$20.00 gal.	\$0.63
Total for year (1 spray)				\$12.78
Spray 2	Mancozeb 75DF	3 lbs.	\$4.05 lb.	\$12.15
	Sulfur	5 lbs.	\$0.50 lb.	\$2.50
	Spreader	4 oz.	\$20.00 gal.	\$0.63
Total for year (2 spray)				\$15.28
Sprays 3-4	Revus Top	7 oz.	\$2.34 oz	\$16.41
	Spreader	4 oz.	\$20.00 gal.	\$0.63
Total per spray				\$17.03
Total for year (3-4 sprays)				\$34.06
Sprays 5-6	Captan 80 WP	2.5 lbs.	\$6.60 lb.	\$16.50
	Sulfur	5 lbs.	\$0.50 lb.	\$2.50
	Carvaryl 4L	2 qt.	\$45 gal.	\$22.5
Total per spray				\$41.50
Total for year (5-6 sprays)				\$83.00
Total for year (6 sprays)				\$145.11

The sample fungicide and insecticide spray program was developed by Professor Wayne Wilcox, Department of Plant Pathology and Plant Microbe Biology, Cornell University

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 (see Table 7). Costs will vary greatly from site to site depending on the soil conditions and preferences of the vineyard manager. Growers should consult with their county's Soil & Water District staff to determine the proper amount of drainage a particular site requires. This study assumed that tile drainage was placed in the middle of every second row or 18 feet apart. Costs were estimated to total \$4,360 per acre.

Table 5: Tile Drainage Costs per acre for Hybrid Grapes,
Finger Lakes Region, NY, 2013.

Item	Quantity	Price	Total per acre
Main line: 6" pipe	99 ft	\$1.20 ft	\$119
Laterals: 4" pipe	2,420 ft	\$0.42 ft	\$1,016
Installation	2,519 ft	\$1.28 ft	\$3,224
Total Drainage Construction per acre			\$4,360

Trellis Construction Costs

The trellis was designed for either High Cordon system or Umbrella Kniffen system. The basic principles among these specific systems remain constant. It was made up of one pair wires. Wooden line posts were used for every third vine. Rows were 440 feet long and there were 11 rows to an acre and 63 vines per row.

Table 6 contains an estimate of trellis constructions costs. The total cost for materials is estimated at \$2,512 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 \$3,809 per acre.

Table 6: Trellis Construction Costs per acre for Hybrid Grapes,
Finger Lakes Region, NY, 2013.

Item	Quantity	Price	Total per acre
Wood end posts (8 ft X 5" diameter)	22 posts	\$10.00 post	\$220
Screw anchors (8 ft X 3" diameter)	22 posts	\$7.87 post	\$173
Wood grape stakes (8 ft, 3" diameter)	230 stakes	\$7.95 stake	\$1,832
12.5 gauge HT foilage & cordon wire	9,944 ft	\$0.028 ft	\$273
Staples, lbs.	3 lbs.	\$1.74 lb.	\$5
Crimping sleeves (for joining wire ends)	50 crimps	\$0.15 crimp	\$8
Total Trellis Construction materials			\$2,512

Establishment and Development Costs

The costs for labor machinery and materials for site preparation and in year one through three constitute the establishment and development (E&D) costs in Table 7. First year costs, including site preparation, trellis construction, and planting, are substantial, amounting to \$13,030 per acre. The largest cost in the first year is for trellis construction, for a total of \$3,809. In year two, costs are a relatively modest \$956 per acre with lower spray costs and less labor required than for mature vines. In the third year, a spray program of six sprays is recommended. Total costs for the third year are \$1,576 per acre.

The total costs for the entire E&D period (years 1-3) 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 two percent, is added to the cumulative costs. Credit is given for the revenue from the estimated one ton of grapes per acre harvested in year three. The price of grapes in year three is the average of the three varieties produced. The total cumulative cost for the E&D period is \$18,772 per acre. Amortized at a four percent real rate of interest for the estimated years of life from year 4 through 25 (or 22 years), the annual cost for capital recovery (interest and depreciation) is \$1,063 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 \$15,561 for site preparation and the first three years.

Table 7: Hybrid Grape Establishment and Development Costs
Finger Lakes Region, New York, 2013

	(Unit: Acre)	Labor Used	Labor Hours	Equipment Hours	Labor Cost	Equipment Cost	Materials Cost	Total Cost
Site Preparation								
Drainage (see table 5 for details)		Custom						\$4,360
Lime (2 tons/acre)		Custom					\$90.00	\$100
Herbicide application		Custom				\$10.50	\$30.24	\$41
Stone removal & land maint.		Unskilled	10	10	\$135.00	\$165.87		\$301
Soil Sampling		Skilled	0.2		\$4.00		\$4.00	\$8
Fall fertilization		Skilled	0.6	0.5	\$12.00	\$8.56	\$75.00	\$96
Plowing		Custom						\$50
Discing (2X)		Custom						\$46
Pickup truck								\$75
Total for site preparation			10.8	10.5	\$151.00	\$184.93	\$184.24	\$5,076
First Year								
Floating/dragging		Skilled	1	1	\$20.00	\$15.79		\$36
Laser Planting (\$3.5/vine)		Custom			\$1,250.00		\$2,420.00	\$3,670
Fertilization (banded)		Skilled	0.6	0.5	\$12.00	\$8.56	\$7.50	\$28
Hilling up		Skilled	1.5	1.2	\$30.00	\$21.64		\$52
Hilling up		Unskilled	1.5		\$20.25			\$20
Chem. weed control -trellis		Skilled	1.25	1.25	\$25.00	\$20.56	\$14.34	\$60
Trellis construction (see table 6 for details)		Skilled	50	15	\$1,000.00	\$297.66	\$2,512	\$3,809
Spot herbicide-hand application		Skilled	1		\$20.00		\$15.24	\$35
Cultivation (2X)		Skilled	1.2	1.2	\$24.00	\$21.64		\$46
Spray 1		Skilled	0.4	0.3	\$8.00	\$8.38	\$12.78	\$29
Spray 2		Skilled	0.4	0.3	\$8.00	\$8.38	\$14.78	\$31
Spray 3		Skilled	0.4	0.3	\$8.00	\$8.38	\$14.78	\$31
Seed cover crop		Skilled	0.6	0.5	\$12.00	\$8.56	\$11.25	\$32
Pickup truck								\$75
Total for first year			70.65	21.55	\$2,437.25	\$419.56	\$5,022.26	\$7,954
Total for first year and site prep								\$13,030

Table 7 continued

	(Unit: Acre)	Labor Used	Labor Hours	Equipment Hours	Labor Cost	Equipment Cost	Materials Cost	Total Cost
Second Year								
Pruning & brush removal		Skilled	3		\$60.00			\$60
Tying & renewal		Unskilled	2		\$27.00		\$4.50	\$32
Vine Replacement		Skilled	1	1	\$20.00	\$18.99	\$24.20	\$63
Chem. weed control-trellis		Skilled	1.25	1.25	\$25.00	\$22.25	\$66.00	\$113
Suckering		Unskilled	2.5		\$33.75			\$34
Cluster removal		Unskilled	2.5		\$33.75			\$34
Take away (de-hilling)		Skilled	3	2.5	\$60.00	\$45.09		\$105
Hand hoe		Unskilled	4		\$54.00			\$54
Spot herbicide treatment		Skilled	0.4	0.3	\$8.00	\$4.93	\$21.88	\$34
Spot herbicide treatment		Skilled	0.4	0.3	\$8.00	\$4.93	\$21.88	\$34
Hilling up		Skilled	3	1.5	\$60.00	\$27.05		\$87
Spray 1		Skilled	0.4	0.3	\$8.00	\$8.38	\$12.78	\$29
Spray 2		Skilled	0.4	0.3	\$8.00	\$8.38	\$14.78	\$31
Spray 3		Skilled	0.4	0.3	\$8.00	\$8.38	\$14.78	\$31
Spray 4		Skilled	0.4	0.3	\$8.00	\$8.38	\$14.78	\$31
Mowing (4X)		Skilled	2.6	2	\$52.00	\$42.28		\$94
Roguing		Unskilled	1		\$13.50			\$14
Pickup truck								\$75
Total			28.25	10.05	\$487.00	\$199.06	\$194.56	\$956

Table 7 continued

	(Unit: Acre)	Labor Used	Labor Hours	Equipment Hours	Labor Cost	Equipment Cost	Materials Cost	Total Cost
Third Year								
Pruning and brush pulling (\$0.45/vine)		Custom	Piece rate*		\$311.14			\$311
Tying & renewal (\$0.23/vine)		Unskilled	Piece rate*		\$159.03		\$4.50	\$164
Brush chopping (1X)		Skilled	1.2	1	\$24.00	\$21.36		\$45
Vine replacement		Skilled	1	1	\$20.00	\$18.99	\$24.20	\$63
Chem. weed control- trellis		Skilled	2.6	2	\$52.00	\$32.89	\$66.00	\$151
Suckering		Unskilled	4		\$54.00			\$54
Cluster removal		Unskilled	4		\$54.00			\$54
Take away (de-hilling)		Skilled	3	2.5	\$60.00	\$45.09		\$105
Hand hoe		Unskilled	4		\$54.00			\$54
Bird control		Skilled	3		\$60.00			\$60
Spot herbicide treatment		Skilled	0.4	0.3	\$8.00	\$4.93	\$21.38	\$34
Spot herbicide treatment		Skilled	0.4	0.3	\$8.00	\$4.93	\$21.38	\$34
Spray 1		Skilled	0.6	0.5	\$12.00	\$13.97	\$12.78	\$39
Spray 2		Skilled	0.6	0.5	\$12.00	\$13.97	\$17.03	\$43
Spray 3		Skilled	0.6	0.5	\$12.00	\$13.97	\$17.03	\$43
Spray 4		Skilled	0.6	0.5	\$12.00	\$13.97	\$19.63	\$46
Spray 5		Skilled	0.6	0.5	\$12.00	\$13.97	\$19.63	\$46
Mowing (4X)		Skilled	2.6	2	\$52.00	\$42.28		\$94
Hilling up		Skilled	1.7	1.5	\$34.00	\$27.05		\$61
Pickup truck								\$75
Total			30.9	13.1	\$1,010.17	\$267.40	\$223.55	\$1,576

Table 8: Summary of Establishment and Development Costs by Year
for Hybrid Grapes, Finger Lakes Region, NY 2013

Item	Year 1	Year 2	Year 3
Revenue			
Yield per acre (tons)	0	0	1
Market price (ave. of 3 varieties)	na	na	\$616
Total revenue	\$0	\$0	\$616
Costs			
Site preparation	\$5,076	\$0	\$0
Annual variable costs			
-Preharvest	\$7,954	\$956	\$1,576
-Harvest (hand)+hauling	\$0	\$0	\$275
<i>Total Variable Costs & Site preparation</i>	<i>\$13,030</i>	<i>\$956</i>	<i>\$1,851</i>
Annual fixed costs			
-Machines & equipment amortization	\$412	\$412	\$412
-Buildings amortization	\$62	\$62	\$62
-Property taxes	\$150	\$150	\$150
-Land opportunity cost	\$120	\$120	\$120
-Office Supplies, phone, etc.	\$60	\$60	\$60
-Insurance (fire, liability)	\$55	\$55	\$55
-Management	\$0	\$0	\$0
<i>Total Fixed Costs</i>	<i>\$858</i>	<i>\$858</i>	<i>\$858</i>
Interest on cumulative costs (real interest rate= 2%)	\$278	\$320	\$380
Total costs	\$14,166	\$2,133	\$3,089
Net returns	(\$14,166)	(\$2,133)	(\$2,473)
Total cumulative costs	\$14,166	\$16,299	\$18,722
Amortization of vineyard:			\$1,063
Cash costs of vineyard establishment (3 Yrs.)			\$15,561

Costs and Returns for a Mature Vineyard

Annual growing costs for years four through twenty-two are developed in Table 9. Total growing costs for a typical year in the mature vineyard are estimated to be \$1,770 per acre. The most costly operations are canopy management (\$216 per acre), spraying (6 times, for a total of \$301 per acre, including labor, machinery and materials costs) and pruning and brush removal (\$311 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-two, Hybrid Grapes, Finger Lakes Region, 2013

	(Unit: Acre)	Labor Used	Labor Hours	Equipment Hours	Labor Cost	Equipment Cost	Materials Cost	Total Cost
Operation								
Pruning+brush pulling		Custom	Piece rate*		\$311.14			\$311
Brush chopping		Skilled	1.2	1	\$24.00	\$21.36		\$45
Trellis maintenance		Skilled	4	1	\$80.00	\$16.59	\$30.00	\$127
Tying & renewal		Custom	Piece rate*		\$159.03		\$3.15	\$162
Vine replacement		Skilled	1	1	\$20.00	\$18.99	\$24.20	\$63
Chem.weed control-trellis		Skilled	2.6	2	\$52.00	\$32.89	\$9.19	\$94
Soil applic of Solubor (w. herb. Spray)							\$4.23	\$4
Spot herbicide treatment		Skilled	0.4	0.3	\$8.00	\$4.93	\$31.38	\$34
Suckering		Unskilled	4		\$54.00			\$54
Take-away (de-hilling)		Skilled	3	2.5	\$60.00	\$45.09		\$105
Bird control		Skilled	3		\$60.00			\$60
Spray 1		Skilled	0.6	0.5	\$12.00	\$13.97	\$12.78	\$39
Spray 2		Skilled	0.6	0.5	\$12.00	\$13.97	\$15.28	\$41
Spray 3		Skilled	0.6	0.5	\$12.00	\$13.97	\$17.03	\$43
Spray 4		Skilled	0.6	0.5	\$12.00	\$13.97	\$17.03	\$43
Spray 5		Skilled	0.6	0.5	\$12.00	\$13.97	\$41.50	\$67
Spray 6		Skilled	0.6	0.5	\$12.00	\$13.97	\$41.50	\$67
Mowing (4X)		Skilled	2.6	2	\$52.00	\$42.28		\$94
Lime (1 in 5 years)		Skilled	0.1	0.1	\$2.00	\$4.88	\$9.00	\$16
Pickup truck		n/a	n/a	n/a		\$75.03		\$75
Petiole sampling (\$88 for every 2 years)		Skilled	0.1		\$2.00		\$1.00	\$3
Soil sampling (every 5 years)		Skilled	0.1		\$2.00		\$0.40	\$2
Hilling-up		Skilled	1.7	1.5	\$34.00	\$27.05		\$61
Fall fertilization		Skilled	0.3	0.3	\$6.00	\$5.14	\$37.50	\$49
Crop insurance								\$109
Total			27.7	14.4	\$998.17	\$378.07	\$285.16	\$1,770

Table 10 summarizes the growing, establishment, and development costs for a hybrid 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 \$1,770 per acre in years 4 through 22, and this number is transported to Table 11 to use in the computation of the costs and returns for the mature vineyard. The cost of crop insurance was added in the 2013 study at an average cost of \$109 per acre. Costs for crop insurance will actually vary a few dollars per acre depending upon the grape variety planted.

Table 10: Summary of Growing Costs for Hybrid Vineyard, Trained to HC & UK Systems, Finger Lakes Region, NY, 2013

Item	Year 1	Year 2	Year 3	Year 4+
Site preparation	\$5,076			
Vines & planting	\$3,706			
Trellis materials & construction	\$3,829			\$127
Replanting & Rouging		\$77	\$63	\$63
Dormant pruning & removal		\$60	\$311	\$311
Weed control	\$173	\$148	\$185	\$128
Fertilization	\$28			\$74
Canopy management		\$99	\$272	\$216
Disease & insect control	\$91	\$123	\$216	\$301
Take away & hilling up	\$72	\$246	\$220	\$166
Mowing		\$94	\$140	\$140
Bird Control			\$60	\$60
Pick-up				\$75
Crop Insurance*				\$109
Total Growing Costs	\$12,955	\$846	\$1,467	\$1,770

*Crop Insurance generally starts at the fifth year of positive production (i.e., year 8)

Table 11 summarizes the costs and returns expected from a mature vineyard. The estimated revenue per acre varies from \$3,250 to \$4,560 depending upon variety. Total costs vary from \$4,496 to \$4,937 per acre, also depending upon variety. The break-even prices and yields are shown in Table 11. A yield of 8.8 tons per acre is the break-even yield for Cayuga White. A yield of 7.4 tons per acre would be necessary to break even with Corot Noir. A yield of 7.4 tons per acre would be necessary to break even with Vidal Blanc.

Vidal Blanc shows a large loss (-\$1,351) 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.

Table 11: Costs and Returns for a mature Hybrid Vineyard, Trained HC & UK
Systems, Finger Lakes Region, NY, 2013

Item	Cayuga White	Corot Noir	Vidal Blanc
Receipts:			
Yield target , tons per acre	8	5	5
Price, \$ per ton	\$570	\$650	\$650
Total receipts	\$4,560	\$3,250	\$3,250
Costs:			
Variable Costs:			
Growing (incl. crop insurance @\$109/Ac)	\$1,770	\$1,770	\$1,770
Interest on operating capital	\$18	\$18	\$18
Machine Harvesting (\$95/ton)	\$760	\$475	\$475
Trucking (\$30/ton)	\$240	\$150	\$150
Total variable costs	\$2,788	\$2,413	\$2,413
Fixed Costs:			
Vineyard capital recovery	\$1,063	\$1,063	\$1,063
Machinery and equipment capital recovery	\$412	\$412	\$412
Buildings capital recovery	\$62	\$62	\$62
Property taxes	\$150	\$150	\$150
Land opportunity cost	\$120	\$120	\$120
Office supplies, phone, etc.	\$60	\$60	\$60
Insurance	\$55	\$55	\$55
Management	\$228	\$163	\$157
Total fixed costs:	\$2,149	\$2,083	\$2,083
Total costs	\$4,937	\$4,496	\$4,496
Profit or loss	-\$377	-\$1,246	-\$1,246
Breakeven price (\$ /ton)	\$617	\$899	\$899
Breakeven yield (tons)	8.8	7.4	7.4

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 \$30,732 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 these smaller growers hire some vineyard operations to be done by custom operators and/or vineyard management companies, thus giving them the possibility of buying fewer items of machinery and equipment.

Table 12: Investment per Planted Acre of Hybrid Grapes,
Finger Lakes Region of New York, 2013

Assets	\$/acre
Land*	\$6,480
Machinery & equipment	\$4,107
Buildings (shop & tool shed)	\$1,380
Vineyard establishment and development	\$18,765
Total Investment per acre	\$30,732

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

Sensitivity Analysis

Costs per ton of grapes and profits for Finger Lakes vineyards will vary widely due to factors such as price of land, site-specific 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. The total cost per ton, or breakeven price, is quite sensitive to yield as shown in Table 13. If yields are five tons per acre or less and/or with low yielding cultivars, prices around \$900 per ton would be required to break even. Even the highest prices paid in the most recent seasons would result in unprofitable production with such a low yielding scenario.

Yields of more than 9 tons per acre for Cayuga White or more than 7.5 tons per acre for Corot Noir; or more than 7.5 tons per acre for Vidal Blanc may be incompatible with the quality requirements of the market for premium wines, but this will depend greatly on the characteristics of the given growing season and the contractual agreement between grower and winery purchasing the fruit.

Table 13: Total Cost per Ton (Breakeven Price) At Varying Yields,
Hybrid Grapes, Finger Lakes Region of New York, 2013

Cayuga White		Corot Noir		Vidal Blanc	
Yield (tons/acre)	Cost/ton*	Yield (tons/acre)	Cost/ton*	Yield (tons/acre)	Cost/ton*
5.0	\$912	5.0	\$899	5.0	\$899
5.5	\$841	5.5	\$829	5.5	\$829
6.0	\$781	6.0	\$770	6.0	\$769
6.5	\$731	6.5	\$721	6.5	\$721
7.0	\$687	7.0	\$678	7.0	\$678
7.5	\$650	7.5	\$641	7.5	\$641
8.0	\$617				
9.0	\$562				

Cost at different yield levels adjusted for harvesting and hauling at \$95/ton, trucking at \$30/ton

Discussion: Costs and Returns for a Mature Vineyard -An established vineyard holds positive value

Table 14 indicates the estimated annual cash flow for a mature vineyard (similar to table 11), but assuming that an established vineyard is able to partially recover selected capital investments after 22 years of operation.

In this study, we do not discuss the returns of land investment, as it is mostly case-sensitive and this is not including in the vineyard's establishment capital recovery costs in Table 11. Implicitly, the study thus assumes that land values increase by a rate equal to the real interest rate over the 22 years of operation. Instead, we assume that the trellis maintenance is done annually, so the trellis system has half of the value after 22 years. In addition, certain practices, such as drainage, lime application, land maintenance, herbicide application system do not need to

be done when starting a new production cycle, and add value to the vineyard. The costs of these activities are therefore dropped from the annual vineyard capital recovery estimates. As a result, the capital recovery costs per acre decreases from \$1,063 (Table 11) to \$674 (Table 14). In Table 14, Cayuga White exhibits profit at \$132 per acre. The other two varieties exhibit per-acre losses that is \$737.

Table 11: Costs and Returns for a mature Hybrid Vineyard-2, assuming that E&D costs can be partially recovered, Finger Lakes Region, NY, 2013

Item	Cayuga White	Corot Noir	Vidal Blanc
Receipts:			
Yield target, tons per acre	8	5	5
Price, \$ per ton	\$570	\$650	\$650
Total receipts	\$4,560	\$3,250	\$3,250
Costs:			
Variable Costs:			
Growing (incl. crop insurance @\$109/Ac)	\$1,770	\$1,770	\$1,770
Interest on operating capital	\$18	\$18	\$18
Machine Harvesting (\$95/ton)	\$760	\$475	\$475
Trucking (\$30/ton)	\$240	\$150	\$150
Total variable costs	\$2,788	\$2,413	\$2,413
Fixed Costs:			
Vineyard capital recovery (minus valuable)	\$674	\$674	\$674
Machinery and equipment capital recovery	\$412	\$412	\$412
Buildings capital recovery	\$62	\$62	\$62
Property taxes	\$150	\$150	\$150
Land opportunity cost	\$0	\$0	\$0
Office supplies, phone, etc.	\$60	\$60	\$60
Insurance	\$55	\$55	\$55
Management	\$228	\$163	\$163
Total fixed costs:	\$1,640	\$1,574	\$1,574
Total costs	\$4,428	\$3,987	\$3,987
Profit or loss	\$132	-\$737	-\$737
Breakeven price (\$ /ton)	\$553	\$797	\$797
Breakeven yield (tons)	7.7	6.4	6.4

Concluding Comments

The cost and returns estimates derived in this publication indicate results for hybrid grapes in the Finger Lakes under the assumption of prime sites, the use of recommended practices, good management, 2013 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 grape yields increase or a few growers plant additional acres. The total acreage of some varieties in the Finger Lakes is quite limited. For example, in 2011 (from the most recent vineyard survey available), the New York National Agricultural Statistics Service (NASS) estimated acreage of certain varieties in the Finger Lakes as follows: Cayuga white, 338 acres; Corot Noir, 28 acres; and Vidal Blanc, 153 acres. Total hybrid grape acreage in the Finger Lakes was only 1,878 acres, or about 20 percent of total grape acreage in the Finger Lakes. 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.

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. Over three-fourths of the wine marketed by New York farm wineries is sold directly to consumers. High prices for gasoline, especially during a recession, might limit visitors from the surrounding states from making trips to the region. 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 Australian wines cost more now, giving NY producers some new market opportunities.

Labor, especially with more reliance on Hispanic labor for pruning and tying, is a concern. More growers need to consider using H-2A labor to prevent 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 in the Finger Lakes 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 David DeMarco, Matthew Doyle, Dave Stamp, and Mark Wagner who served as the growers' panel for helping to establish the costs reported in this bulletin. Hans Walter-Peterson, Specialist of Finger Lake Grape Program, provided helpful reviews of the manuscript.

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Establishment and Production of Vinifera Grapes in the Finger Lakes publications. Mark is now viticulturist of the Pisoni Vineyards and Winery, Gonzales, California.

APPENDIX

Appendix Table 1: Sample Herbicide Program for Hybrid Grapes,
Finger Lakes Region, NY, 2013

	Material	Rate/acre		Price		\$/acre
Year 0 (Site prep.)						
Custom herbicide	glyphosate	4.0	qt.	\$7.50	qt.	\$30.00
	Am.sulfate	1.7	lb.	\$0.14	lb.	\$0.24
Total for site preparation						\$30.24
Year 1						
Chem. weed control- trellis	Surflan	1.25	qt.	\$11.47	qt.	\$14.34
Chem. weed control-spot	glyphosate	2.0	qt.	\$7.50	qt.	\$15.00
	Am.sulfate	1.7	lb.	\$0.14	lb.	\$0.24
Total for treatment						\$15.24
Total for Year 1						\$29.58
Year 2-3						
Chem.weed control- trellis	Prowl H2O	6	qt.	\$11.00	qt.	\$66.00
Spot herbicide treatment	glyphosate	2	qt.	\$7.50	qt.	\$15.00
	Am sulfate	1.7	lb.	\$3.75	lb.	\$6.38
Total for treatment						\$21.38
Spot herbicide treatment	glysophate	2	qt.	\$7.50	qt.	\$15.00
	Am. Sulfate	1.7	lb.	\$3.75	lb.	\$6.38
Total for treatment						\$21.38
Total for Year 2-3						\$108.75
Year 4-25						
Chem.weed control- trellis	Chateau	12	fl oz.	\$0.77	qt.	\$9.19
Spot herbicide treatment	glysophate	2	qt.	\$7.50	qt.	\$15.00
	Am. Sulfate	1.7	lb.	\$3.75	lb.	\$6.38
Total for treatment						\$21.38
Total for years 4-25						\$30.56

Appendix Table 2: Sample Fertilizer/Soil Program for Hybrid Grapes,
Finger Lakes Region, NY, 2013

	Material	Rate/acre	Price			\$/acre
Year 0 (Site prep.)						
Soil sampling- I test/5 acres, 2 depths	n/a	0.4	acre	\$10	test	\$4.00
Lime (custom application)	Lime	2	tons	\$45	ton	\$90.00
Fall fertilization	Muriate of Potash	300	lbs	\$500	ton	\$75.00
Total for year 0						\$169.00
Year 1						
Fertilization (banded)	10:10:10	30	lbs	\$0.25	lb.	\$7.50
Mulch (if irrigation not installed-optional)	Round hay bales	20	bales	15.00	ea.	\$300.00
Total for year 1						\$7.50
Year 2						
(no suggested application)	n/a	n/a	n/a	n/a	n/a	n/a
Year 3						
(no suggested application)	n/a	n/a	n/a	n/a	n/a	n/a
Year 4+						
Soil application	Solubor(20%B)	2.5	lbs.	\$1.69	lb.	\$4.23
Fall fertilization (every 2nd year)	Muriate of Potash	300	lbs.	\$500	ton	\$37.50
Lime (1 in 5 years)	Lime	1	ton	45.00	ton	\$9.00
Petiole sampling		0.16	acre	\$24	test	\$3.84
Soil sampling (every 5th year)		0.2	acre	\$10	test	\$0.40
Total for Year 4+						\$54.97

Appendix Table 3: Hourly Machinery and Equipment Variable Costs, Hybrid Grapes, Finger Lakes Region, NY, 2013

Item	Purchase Price	Hours of life	Total Repairs	Repairs	Fuel	Lube (15% of fuel)	Total Hourly Variable Costs
Tractor, 62-HP, 2WD, spray cab	\$ 48,000	7000	100%	\$6.86	\$10.25	\$1.54	\$18.64
Tractor, 45-HP	\$ 28,000	7000	100%	\$4.00	\$10.25	\$1.54	\$15.79
Air-blast sprayer- 400 gallon	\$ 31,000	2000	60%	\$9.30			\$9.30
Herbicide sprayer- 50 gallon	\$ 2,200	2000	60%	\$0.66			\$0.66
Environmist sprayer	\$ 6,700	2000	60%	\$2.01			\$2.01
Mower (6ft)	\$ 7,800	2500	80%	\$2.50			\$2.50
Brush Chopper	\$ 8,500	2500	80%	\$2.72			\$2.72
Fertilizer Spreader	\$ 2,000	1200	80%	\$1.33			\$1.33
Small disc (used)	\$ 600	2000	60%	\$0.18			\$0.18
Grape hoe	\$ 7,500	2000	60%	\$2.25			\$2.25
Post driver	\$ 4,000	2000	80%	\$1.60			\$1.60
Trailer	\$ 3,000	3000	80%	\$0.80			\$0.80
Pickup truck (used)	\$ 28,000	2500	83%	\$9.30	\$7.66	\$1.15	\$18.11
Auger	\$ 1,000	2000	80%	\$0.40			\$0.40
Replanter	\$ 4,800	1200	80%	\$3.20			\$3.20
Tractor Fuel Factors	Factor						
Diesel	0.0438						
Gasoline	0.0600						

OTHER A.E.M. EXTENSION BULLETINS

EB No	Title	Fee (if applicable)	Author(s)
2014-10	New York Economic Handbook, 2015	(\$10.00)	Extension Staff
2014-09	Dairy Farm Business Summary, Northern New York Region, 2013	(\$12.00)	Knoblauch, W., Dymond, C., Karszes, J., Howland, B., Murray, P., Deming, A., Balbain, D., Buxton, S., Manning, J., Collins, B. and A. Figueras
2014-08	Dairy Farm Business Summary, Hudson and Central New York Region, 2013	(\$12.00)	Knoblauch, W., Conneman, G., Dymond, C., Karszes, J. Howland, B., Buxton, S., Kiraly, M., Kimmich, R. and K. Shoen
2014-07	Dairy Farm Business Summary, New York Small Herd Farms, 140 Cows or Fewer, 2013	(\$16.00)	Knoblauch, W., Dymond, C., Karszes, J. and M. Kiraly
2014-06	Dairy Farm Business Summary, Western New York Region, 2013	(\$12.00)	Knoblauch, W., Dymond, C., Karszes, J., Howland, B., Hanchar, J., Carlberg, V., Kimmich, R. and J. Petzen
2014-05	Dairy Farm Business Summary, New York Large Herd Farms, 300 Cows or Larger, 2013	(\$16.00)	Karszes, J., Knoblauch, W. and C. Dymond
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