

Business Planning and Economics of Wine Grape Production in Nova Scotia





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Introduction

Nova Scotia is gaining recognition in Canada and around the world for high quality wines. With this increase in awareness of Nova Scotia as a grape growing and wine producing region, there is also increased interest in the production of grapes. To be successful at growing grapes in Nova Scotia it is imperative that sound business decisions are made from the initial planning through the harvest, marketing and sale of the fruit. There is a substantial capital investment required for the establishment of a commercial vineyard and it takes many years to recover the costs associated with the establishment. It is essential for financial success that the vineyard be operated as a business enterprise paying great attention to detail in both the production and financial management.

Objectives

The purpose of this report is to provide those interested in the production of grapes a guide to the development of a plan and an understanding of the costs associated with the establishment and operation of a vineyard. This report reflects the management practices of growers in Nova Scotia at the present time and the current economic conditions that can influence the establishment and operating costs. The costs in this document represent an average scenario and the expenses will vary depending on the grower and the site.



Methods and Procedures

The information presented in this report was gathered through economic reports from other grape growing regions in Canada, online and printed resources, and discussions with Nova Scotia producers, specialists and agribusinesses.

Overview of Vineyard Establishment

“In the grape growing business, returns are a function of costs (Capital + Operating) and revenue which is a function of (yield, price and quality (sugar)).”

The costs associated with establishing and operating a vineyard can vary from site to site and from operator to operator due to the significant cost of land, labour, machinery and materials. Variation in the establishment costs are affected by many cultural practices like cultivar, vine spacing, training systems, pest management and the location of the site. During the initial years of vineyard establishment the main costs at play are the capital costs such as the land purchase, land preparation, labour, grapevines, trellis materials, pest management materials and interest on debt. There is significant variation in the cost of land preparation depending on the need for clearing, leveling, terracing, and drainage. In some cases there may be the requirement for an investment in irrigation and/or deer fencing. It has been found that generally the added expenses of land improvement will result in an earlier and more consistent crop thus bringing an earlier return on the investment. Production costs will also vary with the site, cultivar, training system, yield and fruit quality. A new grower or someone considering entry into grape production must carefully consider the advantages and disadvantages of the site and cultivar selection because these decisions will have a significant impact on the profitability of the planting.

Just knowing the establishment and production costs is not enough to make an educated decision whether to undertake grape production as a business or not. The individual must give consideration to the potential for profitability which is directly related to yield and price. Yield is a function of site, soil, cultivar and management to mention a few. The price you can achieve for your crop is determined by the current market and quality, therefore the price is a function of your ability to grow and market a quality product. Most wineries in Nova Scotia are interested in producing a premium quality wine, not a bulk wine, and therefore are very interested in securing the highest quality grapes.

Vineyard – Site Selection

The success of a vineyard is closely linked to the location; therefore, a significant amount of time needs to be spent in the evaluation and selection of the site. When evaluating a site for growing grapes, it is important to consider the climate, topography and soil properties.

The climate in both summer and winter has a significant influence on grape vines. Grapes are very sensitive to extreme temperatures in the winter. It is the length of the growing season and the total heat unit accumulation that determines the varieties that will ripen on any given site. An average of 900 heat units is considered the minimum necessary to ripen the early vinifera varieties in Nova Scotia. There are many areas of Nova Scotia that meet this minimum requirement. It is also suggested by some that the timing of the heat units and the hours of sunshine are also of importance. The effective growing season for grapes is considered to be the time between the last spring frost (-2 C) and the first frost in the fall below -2 C. Most grape varieties require a minimum of 150 frost free days. The frost free period varies significantly over very short distances and is influenced significantly by topography. There is considerable variation in varieties tolerance to the minimum winter temperatures. Some sources indicate that the minimum temperature is -23 Celsius however vines have been known to survive -29 Celsius. The health of the vines plays a significant role in their ability to tolerate the cold in the winter.

It is important that a site for growing grapes has a south facing slope for air drainage and maximum interception of solar radiation, as well as shelter from strong winds.

When considering soil as part of selection, it is important that the soil be well drained. A naturally well drained soil is ideal, however in the case where drainage is not ideal and other site factors are favorable the soil drainage can be improved with the installation of tile drainage.





Grape Varieties for Nova Scotia

There are essentially two types of vines for planting in small or large vineyards, “grafted rootstock” and “own root”. Grafted rootstock is usually planted dormant while own root may be planted either as dormant or green. The most important aspect of choosing the rootstock is that you ensure you have a source of healthy economical vine.

Grape vine varieties can be divided into three categories: vitis vinifera, labrusca, French hybrids. The vitis vinifera are the classic wine grape like Chardonnay, Pinot Noir and Riesling they tend to be sensitive to disease and have limited tolerance to winter cold but do produce quality wine. The labrusca are typically vigorous, cold hardy, disease resistant plants and contain cultivars like Concord and Niagara that are not suitable for quality wine. The French hybrids were bred primarily in France to combine natural hardiness and disease resistance of North American vines with vinifera wine quality. Nova Scotia has a substantial part of its vineyard acreage in hybrids. It is important to spend some time researching and deciding what combination of varieties will work best for your site.

Establishment and Cost of Production Assumptions

- It has been assumed that the development is a 10 acre vineyard and there will be a purchase of a tractor and other vineyard related equipment such as a hedger, sprayer and harrows at an investment of \$40,000 at a fixed rate 6.5% for 10 years.
- For the purpose of calculating the land tax, a rate of \$0.80/\$100 was used.
- The assumed design is 10 rows 500 ft in length with vines at 4 ft spacing and a row spacing of 9ft. There will be approximately 1200 vines/acre.
- The trellis system being used is a VSP (vertical shoot positioning) system.
- Prices on trellis supplies were obtained from Scotian Gold.
- Land preparation costs are based on pasture land.
- The price assumption in this document of \$1,200/ton base price is based on an example vineyard which is 60% hybrid and 40% vinifera.
- Land has not been included in this study because of the great deal of variation in land prices and values. It is therefore important to remember that if you are using this information in the planning of your own development, you will need to allow for the land expense in the calculation of your own establishment and operating costs. Table 11 on page 16 shows the effect of various land prices on the breakeven analysis.



Costs and Returns of Grape Production

Variable Costs

The variable costs are those costs that change directly with an increase or decrease in acreage. Grapevines, trellis materials, pesticides, fertilizers, labour and operating expenses for machinery are examples of variable costs.

Fixed Costs

Fixed cost or overhead costs do not change as a result of an increase or decrease in acreage. Some examples of fixed costs are machinery (depreciation and interest), and taxes.

Year 1: Pre-planting - Costs

Table 1. Establishment Costs per acre – Pre-Planting Year

Variable Costs	Cost/acre
Tile Drainage	\$2,500
Land Preparation	\$1,000
Soil Amendments and Testing	\$437
Cover Crop	\$32
Tractor expenses (maintenance and fuel)	\$40
Variable costs Total	\$4,009
Fixed Costs	
Taxes	\$28
Machinery Interest & Depreciation	\$556
Fixed Cost Total	\$584
Total	\$4,593

In the year prior to planting the vineyard, the selected location will require preparation for the planting of the vines. The site will in most cases require installation of tile drainage. Following the installation of the tile drain, the site will require tilling and the application of lime, fertilizer and manure according to recommendations from soil testing. Once the land preparations are complete a cover crop should be planted for the winter to prevent erosion.

Year 2: Planting Year – Costs

Table 2. Establishment Costs per acre – Year 2: Planting Year

Variable Costs		Cost/acre
Labour	Hired Labour	\$2,300
	Vines	\$2,400
	Trellis Supplies	
	Line Posts	\$2,500
	End Posts	\$280
	Wire	\$167
	Grow Tubes	\$600
	Anchors	\$240
	Tying Material	\$20
	Steel Stake for vines	\$840
	Pesticides	\$250
	Soil Amendments and Testing	\$437
	Cover Crop	\$32
	Tractor Expenses (maintenance and fuel)	\$100
	Total Variable Expenses	\$10,166
	Fixed Costs	
	Taxes	\$28
	Machinery Interest & Depreciation	\$556
	Total Fixed Expenses	\$584
	Total Expenses	\$10,750

It is in the year of planting that there is a requirement for a significant infusion of cash into the vineyard. Labour is a very large part of the cost in the planting year, as is the cost of supplies for the trellis system and the vines themselves. There will be variation in the requirements for some things like pesticides, fertilizer, manure and lime. The cost of supplies for the trellis system will vary depending on the design of the system.

The labour expense will vary depending on the amount of labour you need to hire, the availability of the labour, and the wage expected by the labour pool available to you at the time of planting. Money will be saved by using your own labour and family labour but remember that it still has a value even if you are not using cash to pay for it directly, as family labour could also be used in another enterprise.



Year 3: Growth Year

Table 3. Establishment Costs per acre – Year 3: Growth Year

Variable Costs	Cost/acre
Labour	\$2,524
Vines 1% replacement	\$24
Trellis Supplies	
Wire	\$167
Tying Material	\$20
Pesticides	\$250
Soil Amendments and Testing	\$437
Tractor Expenses (maintenance and fuel)	\$100
Harvesting Equipment	\$650
Total Variable Expenses	\$4,172
Fixed Costs	
Taxes	\$28
Machinery Interest & Depreciation	\$556
Total Fixed Expenses	\$584
Total Expenses	\$4,756

In year 3, the vines are left to grow and establish themselves. There will be some input this year as well in the area of labour, pesticides, fertilizer and tying materials. In year three there is no expectation for revenue. Based on the assumption that the vines are planted at 4ft spacing in 10-500 ft rows spaced at 9ft apart a one acre vineyard requires 1200 vines. The vines will vary in price depending on the variety selected however the assumed cost is \$2.00/vine.



Year 4 and Beyond: Production Years

Table 4. Cost per acre to Operate a Mature Vineyard

Variable Costs		Cost/acre
Labour		\$2,524
Vines		\$24
Trellis Supplies	Tying Material	\$20
Pesticides		\$250
Soil Amendments and Testing		\$437
Tractor Expenses (maintenance and fuel)		\$100
Harvesting cost		\$300
Bird Control		\$100
	Total Variable Expenses	\$3,755
Fixed Costs		
Taxes		\$28
Machinery Interest & Depreciation		\$556
	Total Fixed Expenses	\$584
	Total Expenses	\$4,339

It is in the fourth year of the establishment that the vineyard will begin to yield some return. In the first year of harvest one should not expect to receive the yield of a mature vineyard. In some cases a vineyard may have a very small crop in year 3 however for purposes of this report revenue is realized in year 4.

The yield from a mature vineyard is dependent on variety, production management such as fertility and pruning however can be expected to have a yield of between 2 and 4 tons. In the case of the sugar content of the fruit there is a correlation between yield and sugar, typically the higher the yield the lower the sugar. In Nova Scotia a yield between 2 and 4 tons to the acre has sugars between 18 and 22 brix.

Treatment of Establishment Costs

The establishment of a vineyard requires that a grape grower manage three successive years of establishment costs prior to any revenue being received. In order to evaluate the grape enterprise it is often necessary to accumulate the establishment costs until such time as a crop is harvested and revenue is received. In order to do this, the establishment costs in each of the three years along with their respective interest charges are accumulated to the fourth year using an interest rate of 6.5% compounded annually. The total compounded amount represents the cost of establishment per acre of vineyard that is to be repaid over a period of years of harvesting.

Table 5. Establishment Costs per acre

Year	Cost of Establishment	Compounded Interest	Compounded Amount
Pre-planting	\$4,009	\$782	\$4,791
Planting	\$10,166	\$1,322	\$11,488
Year 3	\$4,172	\$271	\$4,443
Total	\$18,347	\$2,375	\$20,722

To maintain a straightforward approach to production costs, it is necessary to assume constant costs and returns for each of the successive harvest years. It is for the same reason that the total compounded cost of establishment is amortized and the repayment of these costs is divided equally over the harvest years. By assuming that the establishment of the vineyard increases the asset value of the land, the grower is able to depreciate the costs annually over a defined number of years of actual harvesting.

Table 6 below shows the amortization of the total three year establishment cost over a 10 year period at an interest rate of 6.5%.

Table 6. Amortization of Establishment Costs per acre

Compound Amount	\$20,722
Rate	6.5%
Term	10
Yearly Payment	\$2,883*

*used on Page 11



Revenue

In the production of grapes, the revenue or return on the investment does not begin until the fourth year, however, it is not until year 6 that a grower should expect the vineyard to be mature and to produce a full yield. On average a grower in Nova Scotia should expect the yield to be about 3 ton/acre in a good year. Some varieties may achieve yields of 3.5 to 4 ton/acre.

The price that a grower receives for the grapes they produce is a function of both quantity and quality. Quantity is the total tons of grapes harvested and the quality is represented by the sugar content in the grapes. The sugar content is measured by brix. Wineries tend to have their own pricing formulas based on the sugar content. It is common for there to be a base price for a minimum acceptable quality and as the sugar goes up the price increases and as the sugar goes down the price paid decreases. The price offered by wineries may have other requirements and may be linked to commitment.

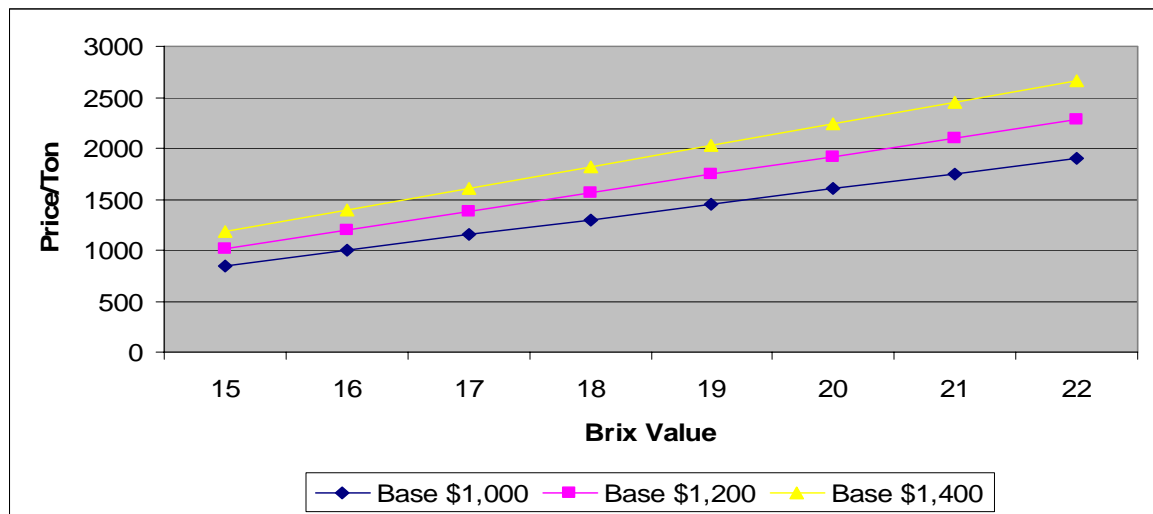
It is important that potential growers understand there is a correlation between yield and sugar. Typically to increase the sugar content of the grapes a grower needs to sacrifice yield. It is therefore important for growers preparing a plan to consider the effect of variety, yield and sugar on price as they prepare a plan.

In Nova Scotia the sugar content of grapes typically ranges between 18 – 22 brix with the average for a vineyard usually around 19 brix.

The base price offered for wine grapes in Nova Scotia varies from winery to winery and there is a difference in price between hybrids and vinifera. On average hybrids will attract about half the base price compared to vinifera, however hybrids tend to have a higher average yield. The price offered by wineries for grapes in Nova Scotia, is often set at a base price for specified sugar contents and the price increases or decreases from the base with sugar. The following graph demonstrates the effect of sugar content (brix) and base price on the returns/ton of grapes.



Graph 1. Effect of Base Price and Sugar on the Return per acre



Contribution Margin

The contribution margin is the difference between the revenue generated and the expenses used to generate the revenue. The contribution margin must provide funds to cover the other expenses such as overhead, loan payments and capital expenses. Table 8 below demonstrates the contribution margin/acre for a 10 acre Nova Scotia vineyard of mixed varieties yielding 3 ton/acre with sugars at 20 brix. The price used to calculate the revenue is a base price of \$1,200/ton at 16 brix with a 15% bonus for every brix above 16. (This price formula is an example and is based on a model vineyard with 60% hybrid and 40 % vinifera and does not reflect the price offered by any specific winery. Individuals should expect that prices offered for grapes will vary depending on the winery.)

Table 7 shows the contribution with the assumptions stated above to be \$2,105. This is the revenue that is left per acre.



Table 7. Contribution Margin per acre

Total Income		\$/Acre
3 tons at	20 brix	\$5,760
Direct Expenses		\$/Acre
Labour		\$2,524
Vines		\$24
Trellis Supplies	Tying Material	\$20
Pesticides		\$250
Soil Amendments and Testing		\$437
Tractor Expenses		\$100
Harvesting cost		\$300
Total Variable Expenses		\$3,655
Contribution Margin		\$2,105

Both yield and quality of the crop has an impact on the revenue generated. The effect of sugar, as a factor of quality, and yield on the contribution margin is demonstrated in Table 8.

Table 8 Effect of Sugar and Yield on the Contribution Margin per acre

Yield ton/acre	16 Brix	17 Brix	18 Brix	19 Brix	20 Brix	21 Brix	22 Brix
2.5	-\$605	\$155	\$295	\$745	\$1,195	\$1,645	\$2,095
3	-\$55	\$485	\$1,025	\$1,565	\$2,105	\$2,645	\$3,185
3.5	\$495	\$1,125	\$1,755	\$2,385	\$3,015	\$3,645	\$4,275
4	\$1,045	\$1,765	\$2,485	\$3,205	\$3,925	\$4,645	\$5,365

Breakeven Analysis

Table 9. Breakeven Analysis per acre (assuming financing required)

Year	Yield ton/acre	Revenue	Variable Costs	Fixed Costs	Cost of Establishment	Total Costs	Net Cash Flow	Accumulated Profit
1 Pre-plant	0	\$0		\$584		\$584	-\$584	-\$584
2 Plant	0	\$0		\$584		\$584	-\$584	-\$1,168
3	0	\$0		\$584		\$584	-\$584	-\$1,752
4	1.5	\$2,880	\$3,755	\$584	\$2,883	\$7,222	-\$4,342	-\$6,094
5	2.25	\$4,320	\$3,755	\$584	\$2,883	\$7,222	-\$2,902	-\$8,996
6	3	\$5,760	\$3,755	\$584	\$2,883	\$7,222	-\$1,462	-\$10,458
7	3	\$5,760	\$3,755	\$584	\$2,883	\$7,222	-\$1,462	-\$11,920
8	3	\$5,760	\$3,755	\$584	\$2,883	\$7,222	-\$1,462	-\$13,382
9	3	\$5,760	\$3,755	\$584	\$2,883	\$7,222	-\$1,462	-\$14,844
10	3	\$5,760	\$3,755	\$584	\$2,883	\$7,222	-\$1,462	-\$16,306
11	3	\$5,760	\$3,755	\$584	\$2,883	\$7,222	-\$1,462	-\$17,768
12	3	\$5,760	\$3,755	\$584	\$2,883	\$7,222	-\$1,462	-\$19,230
13	3	\$5,760	\$3,755	\$584	\$2,883	\$7,222	-\$1,462	-\$20,692
14	3	\$5,760	\$3,755	\$584		\$4,339	\$1,421	-\$19,271
15	3	\$5,760	\$3,755	\$584		\$4,339	\$1,421	-\$17,850
16	3	\$5,760	\$3,755	\$584		\$4,339	\$1,421	-\$16,429
17	3	\$5,760	\$3,755	\$584		\$4,339	\$1,421	-\$15,008
18	3	\$5,760	\$3,755	\$584		\$4,339	\$1,421	-\$13,587
19	3	\$5,760	\$3,755	\$584		\$4,339	\$1,421	-\$12,166
20	3	\$5,760	\$3,755	\$584		\$4,339	\$1,421	-\$10,745
21	3	\$5,760	\$3,755	\$584		\$4,339	\$1,421	-\$9,324
22	3	\$5,760	\$3,755	\$584		\$4,339	\$1,421	-\$7,903
23	3	\$5,760	\$3,755	\$584		\$4,339	\$1,421	-\$6,482
24	3	\$5,760	\$3,755	\$584		\$4,339	\$1,421	-\$5,061
25	3	\$5,760	\$3,755	\$584		\$4,339	\$1,421	-\$3,640
26	3	\$5,760	\$3,755	\$584		\$4,339	\$1,421	-\$2,219
27	3	\$5,760	\$3,755	\$584		\$4,339	\$1,421	-\$798
28	3	\$5,760	\$3,755	\$584		\$4,339	\$1,421	\$623
29	3	\$5,760	\$3,755	\$584		\$4,339	\$1,421	\$2,044
30	3	\$5,760	\$3,755	\$584		\$4,339	\$1,421	\$3,465

(In years 1, 2 and 3 the variable costs are not shown because they are reflected in the cost of establishment column from year 4 to 13.)

Table 10. Breakeven Analysis per acre (assuming no financing required)

Year	Yield ton/acre	Revenue	Variable Costs	Fixed Costs	Total Costs	Net Cash Flow	Accumulated Profit
1 Pre-plant	0	\$0	\$4,009	\$28	\$4,037	-\$4,037	-\$4,037
2 Plant	0	\$0	\$10,166	\$28	\$10,194	-\$10,194	-\$14,231
3	0	\$0	\$4,172	\$28	\$4,200	-\$4,200	-\$18,431
4	1.5	\$2,880	\$3,755	\$28	\$3,783	-\$903	-\$19,334
5	2.25	\$4,320	\$3,755	\$28	\$3,783	\$537	-\$18,797
6	3	\$5,760	\$3,755	\$28	\$3,783	\$1,977	-\$16,820
7	3	\$5,760	\$3,755	\$28	\$3,783	\$1,977	-\$14,843
8	3	\$5,760	\$3,755	\$28	\$3,783	\$1,977	-\$12,866
9	3	\$5,760	\$3,755	\$28	\$3,783	\$1,977	-\$10,889
10	3	\$5,760	\$3,755	\$28	\$3,783	\$1,977	-\$8,912
11	3	\$5,760	\$3,755	\$28	\$3,783	\$1,977	-\$6,935
12	3	\$5,760	\$3,755	\$28	\$3,783	\$1,977	-\$4,958
13	3	\$5,760	\$3,755	\$28	\$3,783	\$1,977	-\$2,981
14	3	\$5,760	\$3,755	\$28	\$3,783	\$1,977	-\$1,004
15	3	\$5,760	\$3,755	\$28	\$3,783	\$1,977	\$973
16	3	\$5,760	\$3,755	\$28	\$3,783	\$1,977	\$2,950
17	3	\$5,760	\$3,755	\$28	\$3,783	\$1,977	\$4,927

Table 9 and 10 demonstrate when a producer can expect to breakeven on the investment in establishing a vineyard. Table 9 illustrates the breakeven if financing is required. Table 10 shows the breakeven when no financing is required. If Financing is required, the breakeven for a vineyard producing a crop of 20 brix at base price of \$1,200/ton and a yield of 3 ton/acre is 28 years. With no requirement for financing the breakeven is 15 years as shown in table 10. In both cases the breakeven does not include principle or interest payments on land.



Land Purchase

The price of land which is suitable for the production of wine grapes will vary considerably depending on a number of factors such as:

- Location
- Demand
- Local economy
- Quality and the investment required to prepare the land for planting

The following table demonstrates the effect of the price of land on the breakeven analysis for wine grape production. (Interest rate is assumed to be 7%)

Table 11. The effect of land price on the breakeven

Price/acre	Annual Interest Cost/acre	Breakeven in Years
\$ 0	\$ 0	28 years
\$500	\$35	28 years
\$1,000	\$70	29 years
\$2,000	\$140	30 years
\$3,000	\$210	32 years
\$4,000	\$280	34 years

Conclusion

It is obvious from the information presented in this report that there is a significant investment required for the establishment of a vineyard in Nova Scotia and that there is a long payback on the investment. The growing of grapes requires producers to pay close attention to details in order to ensure the crop has adequate quality and volume to provide the revenues required. If there is no requirement for borrowed money, there is significantly less pressure on the finances and the breakeven on the investment occurs much sooner as seen in table 10.

Careful planning prior to establishment and close attention to detail during production are essential for growing grapes in Nova Scotia. There are a number of useful resources available to individuals wishing to establish a vineyard in Nova Scotia, many of which are listed in this publication.



Business Planning Resources for Establishment of a Vineyard

**Nova Scotia Department of Agriculture –
Business Development and Economics**
<http://www.gov.ns.ca/agri/bde/>

**Establishment and Production Costs for Grapes in Ontario –
2005 Economic Report**
<http://www.omafra.gov.on.ca/english/busdev/download/grpecon.htm>

**Planning for Profit –
Vinifera Wine Grapes**
http://www.agf.gov.bc.ca/busmgmt/budgets/budget_pdf/berry/bv19.pdf

Winery Association of Nova Scotia
<http://www.winesofnovascotia.ca/index.php>

AgraPoint
[http://www.agrapoint.ca/index.php?option=com_content&task=view&id=100
&Itemid](http://www.agrapoint.ca/index.php?option=com_content&task=view&id=100&Itemid)

Wambolt's Nova Scotia Winegrowers' Guide 2006 edition
(Available from the Nova Scotia Department of Agriculture Business Management
On Line Library or for purchase from the Grape Growers Association of Nova
Scotia)
<http://www.gov.ns.ca/agri/bde/lib/index.shtml>

The Tangled Vine: Winegrowing in Nova Scotia
(Available from the Nova Scotia Department of Agriculture Business Management
On Line Library or for purchase from the Grape Growers Association of Nova
Scotia)
<http://www.gov.ns.ca/agri/bde/lib/index.shtml>

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*Grape Growers Association of
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