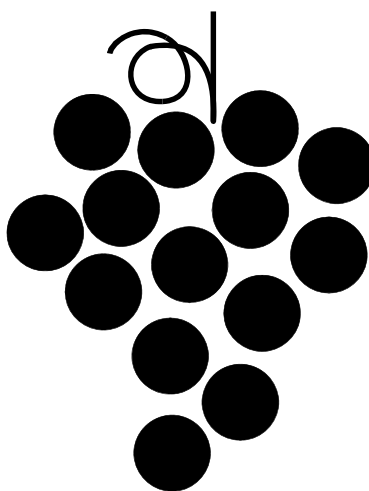


**WINE GRAPE
PRODUCTION OUTSIDE
TRADITIONAL AREAS
IN ONTARIO**



PREPARED BY

Ken Slingerland

Tender Fruit & Grape Specialist
Ontario Ministry of Agriculture, Food & Rural Affairs
Vineland Station

Dr. Helen Fisher

Research Scientist
Department of Plant Agriculture, University of Guelph
Vineland Station

CONTRIBUTIONS BY

Maribeth Fitts

Fruit & Vegetable Specialist
Ontario Ministry of Agriculture, Food & Rural Affairs
Vineland Station

Mary Jane Combe

Business Management Specialist
Ontario Ministry of Agriculture, Food & Rural Affairs
Vineland Station

INDEX

Introduction.....	4
Four Point Plan	4
Site Selection and Climate Factors	5
Land Preparation and Soils	6
Variety Selection.....	7
Winter Freeze Damage & Spring Frost Ratings	8
Training the Young Vine	9
Pruning and Training	9
Training Systems	10
Cold Maintenance Practices.....	11
Propagation	11
Sources of Vines	12
Resources	13

INTRODUCTION

Viticulture in Ontario is well established in Niagara and parts of southwestern Ontario. The success of this industry is tempting many in other areas to try grape growing as well. Niagara and SW Ontario are blessed with mild winters and hot summers. This allows growers and winemakers to grow the best French hybrid and traditional European varieties and produce world recognized high quality wines.

To be successful, an industry requires not only consistent annual production, but also continued excellence. The present Ontario wine industry has developed its own, self imposed quality standards through the Vintners' Quality Alliance. Its stringent application has brought recognition and praise in the ruthless international world of wine marketing.

Outside Niagara and southwestern Ontario, many climatic risks have to be taken into account when growing grapes. Because winters will be more rigorous, compromises have to be made with variety selection, but good quality wines can be made with other than pure vinifera varieties. The key to success will be consistent wine quality drawing repeat customers. Good tourist traffic in the summer will pay some of the winter bills, but good local support with recurrent business will ultimately solidify the enterprise.

FOUR POINT PLAN

There are always many components to investigate for your business plan prior to entering any new enterprise or to planting any new crop. All four of the following are critical to success:

- **Marketing** – Selling your crop is NEVER guaranteed, but it is better to plant what is in demand rather than what **you** want to plant. Discussion with a buyer and even securing contracts before planting should be part of your plan.
- **Human Resources** – Who is going to do the work in the vineyard? Will you be able to find skilled help? Can you predict your workload within the season and over the first few years and match this with the labour that is available? These are only a few questions that you will need to address prior to planting.
- **Financing** – You will need to secure financing not only for the year of planting but the following years while waiting for the vine to bear full crops. OMAFRA's Grape Economic Booklet is a good resource for beginning growers to project their cash flow needs.
- **Production** – This information package deals mainly with establishing a vineyard. Grape production involves several components after the vineyard is established; training, trellises, pruning, tying, pest management and other cultural practices.

SITE SELECTION AND CLIMATE FACTORS

There are many potential sites for wine grapes but these sites must be chosen very carefully. A minor difference in geography may represent a major difference in the local climate and will affect the ultimate viability of the vineyard.

Climate:

- Look at the regional climate as well as local climate
- Avoid extreme winter temperatures colder than -24°C
- The frost free period should be 165 days minimum
- Sunshine exceeding 1250 hours
- Avoid frost pockets and low areas
- Orient your rows N/S unless steep slopes require a different orientation

Avoid:

- High frequency of extreme winter cold and/or killing frosts in spring and fall
- High rainfall during bloom or harvest period
- Poor water drainage, both surface and within the soil
- Poor air drainage to escape frosts and reduce disease incidence
- Full southern exposure to prevent early spring budbreak and southwest injury

Look for:

- Good soil texture to ensure good soil water drainage
- Good soil quality with organic matter and good nutrient availability
- Good surface air and water drainage (3% slope desirable)

Plan:

- Proper field preparation
- Good perennial weed control before planting
- Proper installation of drainage tile
- Proper match of rootstock with soil/climate/vigour potential of vineyard
- Proper vine spacing and trellis design for variety and vigour potential of the vineyard
- Proper variety for average growing season and cold risk of the site

Critical period for vines:

Time	Vine stage	Critical range	Notes
Jan/Feb	dormant	below -20°C	avoid extreme cold or there will be damage to vines and/or buds
March/April	starting to grow	+10°C to -10°C	wide swings in temperature that could prompt early growth and reduce hardiness
May/June	growing and approaching bloom	-1°C to -5°C	fluctuating temperatures could result in spring frost damage to shoots and/or bloom
Nov/Dec	preparing for winter acclimation	+5°C to -10°C	early winter freezes before full dormancy could result in severe bud/wood injury

LAND PREPARATION AND SOILS

Steps in Preparation

- Land levelling, underdrainage
 - take soil test, nematode test
 - know herbicide history, control perennial weeds
 - grow cover crops and add organic matter
- Add lime, fertilizer if necessary

Drainage and Irrigation

Drainage Tile

- Critical during heavy rainfalls in spring and fall
- Every row for heavy soils
- Every other row for loam soils
- Cross tiling across a vineyard – not common, but possible

Irrigation/Rainfall

- Critical for vineyard establishment
- Critical for seed development in early July, and building of the hard green berry structure (same time as the next seasons bud development)
- Critical for veraison in early August (sugar accumulation, colour change and rapid berry enlargement)
- Beware – if irrigating, stop early enough for good fruit ripening for good wine quality and wood ripening for winter survival
- About 2/3 of the annual rainfall occurs during the growing season (860mm) in most areas of Southern Ontario

Soil Fertility

- Soil fertility is not as critical as soil structure
- Can be addressed through soil and petiole analysis interpretation and proper fertilizer application
- Excess nitrogen causes excess vigour, disturbing the delicate balance between yield, berry maturity and ultimately wine quality
- The great balancing act – climate, soil, vigour, cultivar, drainage, labour, etc.) must all be balanced for good wine quality

Soils

Ideal: Coarse textured soils, moderate slope, well aerated, no restrictive soil layers

- Allows development of a large root system (150-300 cm) to fully explore for water
- Allows greater regularity in the water supply to the plant
- Allows heavy rains to percolate quickly
- Grape vines will tolerate a wide range of soils (but avoid shallow, poorly drained heavy clay soils)

VARIETY SELECTION

(Source: Euro Nurseries & Vineyards)

311 GM* (white) H	Riesling type flavour, ripens mid September
318 GM* (white) H	Riesling type flavour, ripens beginning of September
322 GM* (white) H	Gewurztraminer flavour, ripens end of September
Auxerrois (white) V	Early ripening Burgundy wine, similar to Pinot Blanc, ripens mid September, good producer
Baco noir (red) H	An extremely vigorous variety, does very well in heavy soil. On fertile soils should be grafted on rootstock to reduce vigour. The fruit usually has high acidity but produces wines of good quality and good colour Ripens mid September.
Bianca (white) H	Sauvignon Blanc type variety, cold hardy, late budding, early September. Exceptionally disease resistant, needs little spraying. High yields on good sites but does not need good location to do well.
Foch (red) H	Variety with small clusters, small berries which are particularly attractive to birds. Vines are vigorous, hardy and productive, makes excellent wine. Ripens mid September.
Gamay (red) V	A traditional cultivar of Beaujolais. Vines are vigorous. Vines should be thinned to control crop level and to ensure good colour and maturity. Ripens mid September.
Léon Millot (red) H	One of the best French Hybrids. Very vigorous should be grafted to contain vigour, high yielding. Ripens early September. Cold hardy.
Ortega (white) V	Variety that is suitable for table grape as well for wine making. Ripens early September. Can produce very good late harvest wines. Cold hardy.
St. Laurent (red) V	This variety is of velvety fruity character with very dark colour. Vigour is moderate, ripens end of September.
Sirius (white) H	Late budding variety, Riesling type wine. Cold hardy. This variety is disease resistant but needs a better site to produce excellent crop
Vidal (white) H	A white French Hybrid, very good wine record. Vines are vigorous and productive, will suffer winter injury if too vigorous or overcropped. Ripens early October, suitable for late harvest or icewine production.
Zweigelt (red) V	Variety makes an excellent wine. Will grow at mediocre site without problem. Ripens mid September.
Others:	Cayuga white, St. Croix, St.Pepin

* = GM (*Geisenheim*) varieties

WINTER FREEZE DAMAGE AND SPRING FROST RATINGS FOR GRAPES AT VINELAND STATION, ONTARIO

Variety	Winter Freeze Damage (rating 1-10*)	Spring Frost (rating 1-5**)
Aurore	8	3
Auxerrois	5	3
Baco Noir	8	1
Cabernet Franc	5	5
Cabernet Sauvignon	3	5
Cavuga White	8	2
Chambourcin	7	5
Chardonnay	5	3
Concord	10	2
De Chaunac	9	3
Elvira	10	2
Fredonia	10	2
Gamay Noir	5	5
Gewürztraminer	3	5
Geisenheim 318	8	5
Léon Millot	10	1
Limberger	3	5
Maréchal Foch	10	1
Merlot	2	4
Nebbiolo	1	?
Niagara	8	2
Petit Sirah	1	?
Pinot Blanc	3	5
Pinot Gris	3	5
Pinot Noir	3	5
Riesling	5	5
Sauvignon Blanc	1	5
Sevval	8	4
Sovereign Coronation	9	3
Vidal	8	5
Zinfandel	1	?

* Ranked 1 to 10: 1 is most susceptible and 10 is most tolerant

** Ranked 1 to 5: 1 is most susceptible and 5 is most tolerant

The ratings are based on best management practices with growers and research experience and are subject to fluctuations.

TRAINING THE YOUNG VINE

- Do not plant too soon or too late – new vines need warm, moist soils – not cool and wet (may need to irrigate at planting if too dry)
- Allow several shoots to break
- Reduce the number of shoots to 2 or 3 strong ones
- Establish the trellis system and add the lowest wire
- Tie a steel or bamboo stake to the lowest wire and secure the developing shoots to the stake
- Continue to tie the developing shoots to the main stake until you reach the lowest wire, remove the secondary shoots as they break
- Add a second and third wire to continue the shoot training until it reaches the top
- Continue to remove any secondary shoots from the ground up to 6 inches below the lowest wire
- **Maintain good mechanical and/or hand weed control throughout the season**

PRUNING AND TRAINING SYSTEMS

Grape pruning seems drastic to the uninitiated. The bulk of the previous season's growth is removed, leaving only four to six canes. These are reduced in length according to the vigour of the vines. Pruning is basically simple, but requires experience and judgement in the selection of the few canes that are to remain.

The canes selected should originate from the trunk or as close to it as possible. They should be of normal vigour and about pencil size, avoiding weak growth or very heavy bull canes.

In the Niagara district several systems of training are followed, such as Pendelbogen, Umbrella Kniffen, four- and six-cane Kniffen. Kniffen and Pendelbogen are the most common. The main advantage of following a particular system is that the work, particularly pruning and tying, is simplified and standardized.

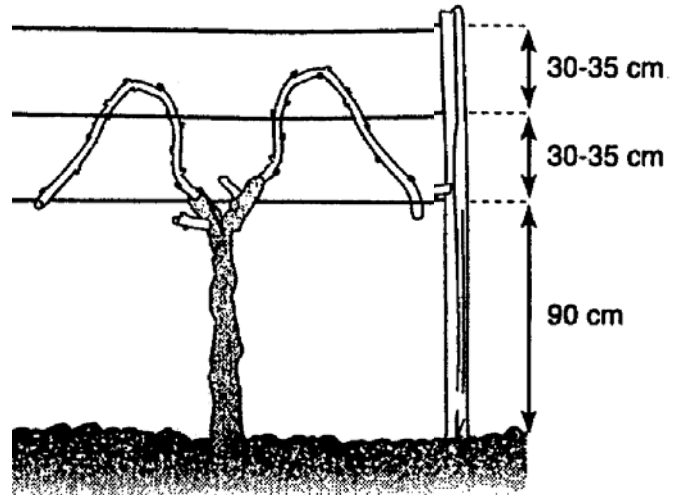
The six cane Kniffen is trained to a central trunk with six arms (3 left and 3 right). These arms produce canes each year of which one quality cane is selected, usually with 5-6 buds. The canes are tied each spring to support trellis wires at 3 heights from the ground, the lowest at 90 cm, the middle at 130 cm and the top at 170 cm.

The six-cane Kniffen system is preferred by most growers because selection of fruiting canes and tying are generally easier.

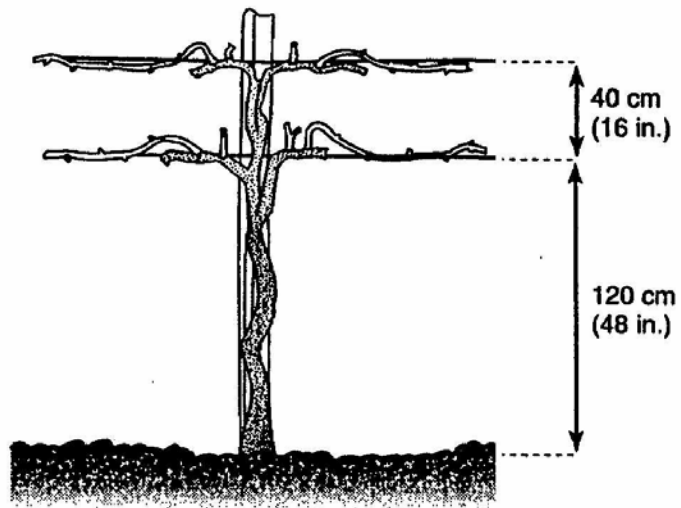
Time of Pruning

Pruning can begin any time after the first hard frost (-5°C or below) and should be finished before the vines start to "bleed" in the spring. The important consideration is that the vines be thoroughly dormant. Pruning should not be done on very cold days when canes are very brittle and those left may be injured when pulling out the brush. Prune labrusca types (Concord, Niagara) first, and prune the French hybrids and viniferas last, as they are more likely to suffer winter injury.

TRAINING SYSTEMS



Pendelbogen (vinifera)



**Four-cane Kniffen
(labrusca, hybrids)**

COLD CLIMATE MAINTENANCE PRACTICES

“The Spare Parts Approach”

- Multiple trunks of different ages
- Retain 2-3 times the normal buds, remove appropriate number in spring

“Other Practices”

- Hill vines to protect roots and graft union over winter
- Use the hardiest cultivars
- Use appropriate vineyard floor management for enhancing fall acclimation
- Use canopy management techniques to accentuate good sunlight exposure for wood and fruit ripening

PROPAGATION

Some growers prefer to raise their own plants. Grapes are propagated easily from hardwood cuttings if certain precautions are observed. Cuttings may be taken anytime when the vine is dormant, but if they are taken during November and December there is less likelihood of the canes or buds having suffered any winter injury.

Well-matured canes of the past season's growth (hardwood cuttings) are used. Three-bud cuttings are best, the nodes being sufficiently close together that the cuttings are not longer than 25 cm (10 in.). In preparing the cuttings, a cut is made just below the basal bud and 2 to 5 cm (1 to 2 in) above the top bud. This method of cutting distinguishes the lower end which is to be placed in the ground. For convenience in planting, all cuttings should be placed the same way in the bundle. Bundles of 50 to 100 are easy to handle.

Cuttings may be stored in a cool, moist place until time for planting in the spring. Moist sawdust, sand, and peat moss are satisfactory materials for packing and storing. Unless the cuttings can be stored in a cool place, a well-drained outdoor pit may prove more satisfactory. A sandy or sandy-loam soil is best, but if only heavy soil is available, moist sand may be used to partially fill the pit. The cuttings should be covered with at least 8 cm (3 in) of sand or sandy soil pressed firmly around them. A heavy straw mulch should be placed over the cutting bed.

The cuttings are planted in a nursery row as early in the spring as is possible to work the soil. For planting, a furrow should be made deep enough that most of the cuttings can be planted in a vertical position with the top bud just at the normal soil level. If some cuttings are too long slant them slightly. Rows should be 1 to 1 ¼ m (3 to 4 ft) apart with cuttings in furrows 15 to 20 cm (6 to 8 in) apart. Firm packing of soil around the cuttings is very important. Thorough cultivation for good weed control during the growing season is required for maximum growth.

To replace misses in a vineyard where a vigorous vine is adjacent to the missing one, choose a vigorous cane and extend it to the desired position (layering). Bend it so the angle is placed in a small hole covered with soil and at least two buds beyond the bend are left above the surface. As the shoots develop, they should be removed from the portion between the mother vine and the buried area, leaving those beyond the buried angle. The cane is left connected to the mother plant for two to three years, until the new vine is well established.

Softwood cuttings are taken in mid July when you have green succulent shoots. One bud cuttings are used with 70% of the leaf area removed. Rooting in a mist bed usually takes 2-3 weeks then transplanted into 4" pots. The hardening of process begins when 5-6" of growth is attained by reducing the water temperature in the greenhouse. The stock is then planted in late spring into a nursery.

Bench grafting is done in March and early April with dormant cuttings. The grafts are packed in ½ perlite and ½ peat moss and stored at 25°C with no light for 2 weeks to promote callus. The grafts are then moved to light with cool temperatures (15°C) until late spring planting in a nursery.

Top working undesirable varieties to another kind has not been very satisfactory. It may be possible under ideal conditions and when done by a skilled operator. Kimbal grafting, a process developed at the New York Agricultural Experiment Station (NYAES) in Geneva, New York, has had marginal success in changing over varieties in a mature vineyard.

SOURCES OF NURSERY VINES

Bert Dunn
www.hardygrapes.tottenham.on.ca

Gemrich Vineyard & Nursery
R.R. #6, 1136 Line 4
Niagara-on-the-Lake, ON L0S 1J0
Phone: 905-468-4324 Fax: 905-468-8594
- selection of grafted or own rooted vines

Mori-Vin Inc.
R.R. #2
Niagara-on-the-Lake, ON L0S 1J0
Phone: 905-468-0822 Fax: 905-468-7271

Chateau des Charmes Wines Ltd.
Box 280
St. Davids, ON L0S 1P0
Phone: 905-262-4219 Fax: 905-262-5548

Produce Link - Joe Dutchyn
1099 Creek Road
Niagara-on-the-Lake, ON L0S 1J0
Phone: 905-262-0020 Fax: 905-262-0021

RESOURCES

- OMAFRA publication 360, “Fruit Production Recommendations”
- OMAFRA Grape Package:
 - 1997 Grape Economic Information
 - 1999 Vineyard Establishment
 - 1999 Grape Pest Management
- Ontario Grape Growers’ Marketing Board Annual Report (905-688-0990)
- Preparing Business Plans, Agdex 811
- OMAFRA Business Development site
www.gov.on.ca/OMAFRA/english/busdev/agbusdev.html
- The Grape in Ontario, K.H. Fisher, O.A. Bradt, R.A. Cline
- Management Guide for Grapes, Province of British Columbia, Ministry of Agriculture, Fisheries & Food
-