

VINEYARD DEVELOPMENT: SITE SELECTION CONSIDERATIONS FOR NOVA SCOTIA

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1. GROWING SEASON TEMPERATURES

Heat, together with daytime sun exposure, is one of the most important environmental factors in viticulture. It drives grapevine phenology (the timing of growth stages) and strongly influences grape composition, fruit quality and ultimately wine style. While sufficient warmth is necessary for vine growth and fruit ripening, the timing and consistency of favourable temperatures (typically 17–25°C) are equally important. Temperatures above 30°C can slow or halt physiological processes, particularly during ripening after veraison, while cooler temperatures may delay development and reduce fruit quality. Two periods are particularly sensitive to temperature extremes:

- Bud break to flowering
- From veraison to harvest

A minimum base temperature of 10°C is required for wine grape growth. Total heat accumulation, commonly measured as Growing Degree Days (GDD), is also critical. Generally, 1000–1350 GDDs are sufficient to ripen early-ripening hybrid and *Vitis vinifera* cultivars, including the Pinot family (Pinot Noir, Pinot Gris, Chardonnay) and Riesling, under suitable growing conditions.

$$\text{GROWING DEGREE DAYS (GDD)} = \left(\frac{\text{MAX TEMP} + \text{MIN TEMP}}{2} \right) - \text{BASE TEMP}$$

Figure 1. Formula for calculating GDD. Metropolitan Forestry Services.

FROST FREE DAYS (FFD)

In addition to heat accumulation, a minimum of 150 frost-free days (FFD) is required, while optimal sites may provide up to 180 frost-free days. Kentville and Wolfville average approximately 162 frost-free days, about 40 more than a century ago. Winter minimum temperatures below -25°C are particularly damaging; if these conditions occur more than twice every 10 years, the site is generally considered poorly suited for wine grape production. Sites where winter minimum temperatures consistently remain warmer than -23°C are considered the most suitable. To learn more on this, see the [Interspecific Hybrids versus Vitis vinifera L. Bud Hardiness, Viability, and Postfreeze Pruning Implications in Cane-Pruned Vines](#) article from the American Journal of Enology and Viticulture.

Remember: Grapevines do not respond to monthly average temperatures; instead, growth is driven by temperatures above a base threshold of 10°C during the growing season. Paying attention to minimum-maximum temperatures in a season is much more telling of site suitability.

GDD alone is not the best indicator of site suitability:

- Sites with good late-season heat retention can improve grape ripening and fruit maturity.
- Monitor daily minimum and maximum temperatures from budbreak through harvest. [Perennia’s Farm Data Tools](#) platform makes accessing local weather information much easier.
- The maritime influence on vine growth in Nova Scotia cannot be overstated. Unlike many wine regions, conditions such as high humidity, strong winds, localized rainfall and a shorter growing season are typical and must be considered in site selection and vineyard management.
- Consider the historical ripening success of similar fruit crops grown in the surrounding area.

KEY QUESTION: Is the site capable of supporting full wine grape ripening from mid-August to late October? It is important to understand each winery’s definition of “ripe” before determining harvest timing.

2. AIR DRAINAGE AND FROST RISK (TOP PRIORITY)

- Higher elevations are more prone to early and late-season frost events. In Kentville, the average last frost occurs around May 8 (Julian Day 128) and the first frost around October 17 (Julian Day 290) (Harrison Wright, KRDC).
- Avoid planting in valley floors or low-lying depressions.
- Select sites with a clear downhill flow to allow cold air to drain away from the vineyard.
- Be cautious of surrounding features such as buildings, forests, hedgerows or terrain that may obstruct cold air movement.
- Do not plant in areas where cold air is likely to pool.
- Consider that spring frost may occur later than in nearby vineyard or fruit-growing sites.

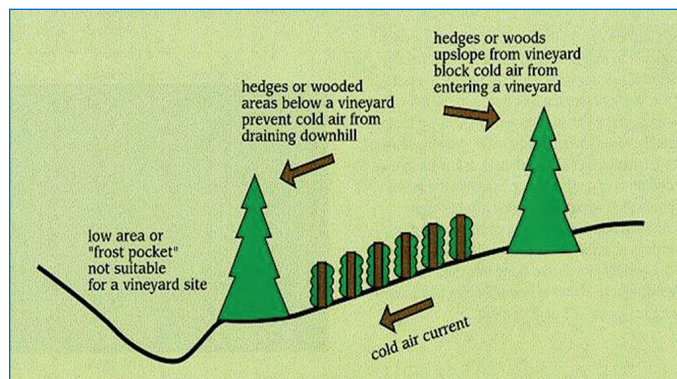


Figure 2. Topography and adjacent vegetation influence the susceptibility of a vineyard site to spring and fall freeze damage. Nebraska Extension.

RED FLAGS:

- Repeated frost damage in adjacent crops
- Cold air “pooling” at night
- Topography indicates that vineyard is located in a bowl

Considerations: Use of wind machines, frost prevention technology, row orientation and/ or other air drainage methods to mitigate cold/frost injury damage.

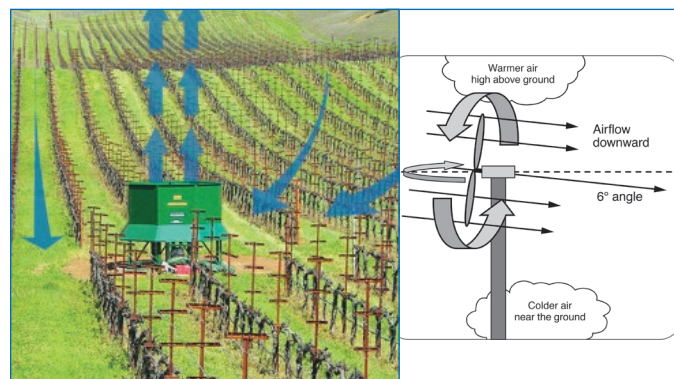


Figure 3. Wind Machine placed on vineyard location affected by frost (left) and how a wind machine works (right). Ontario, Rural, agriculture and north.

REMEMBER: Site selection is the best way to avoid frost damage and winter injury. Select a site that will be economically viable each year to mitigate risks.

3. SOIL DRAINAGE AND STRUCTURE

- Soil easily drains within 24 to 48 hours after heavy rain (no standing water for prolonged periods of time).
- No perched water table (verified by soil pits dug prior to planting or purchase).
- No presence of hardpans that may result in perched water tables.
- Soil structure allows good root development.
- Moderate fertility (not prime row or field crop soil).
- Low compaction risk.

RED FLAGS:

- Standing water in spring (especially if frost is not off the ground)
- Soils with poor overall structure (high clay content)
- High vigour in vegetation growing nearby (e.g.: weeds, shrubs, pasture)

4. WATER MANAGEMENT REALITY

- Drainage tile will benefit ALL vineyards sites.
- Surface water flows away from vine—no pooling of water near the trunks.
- Lower the erosion risk on slopes by utilizing cover crops (no clean cultivation between rows). Native species are ok.

Remember: Drainage matters more than irrigation in most sites in Nova Scotia.

5. ASPECT AND SLOPE (MODIFIER, DOES NOT FIX SITE PROBLEMS)

- Slope of the vineyard should not impede use of machinery and equipment and should be managed to minimize potential erosion.
- Where possible, vineyard rows need to consider the topography. South-facing orientation is ideal but topography and equipment use may prohibit this.
- Aspect matches the planting plan for the site.
- Do not assume that south-facing is safe from late fall frost or early spring frost. Refer to the second point on soil drainage.

Remember: Aspect is no guarantee of a good grape growing site.

6. WIND AND CANOPY/FRUIT EXPOSURE

Humidity during the growing season is a major challenge in Nova Scotia. The most humid conditions typically occur from late-June (around bloom) through early-July and extend into late-September and October, with August often being the peak. High ambient humidity, combined with in-canopy transpiration, creates a favourable microclimate that prolongs leaf and fruit wetness and promotes the establishment, development and spread of fungal diseases. Good canopy management is essential to improve airflow and reduce disease pressure:

- Adequate airflow to reduce disease pressure
- Wind should not be excessive to damage shoots or fruit
- Ensure that there is no blockage of airflow, no humidity to create excessively humid conditions and that there is air movement without stagnation.



Figure 4. Full canopy with no de-leafing (left) coupled with high humidity promotes disease pressure. De-leafing (right) promotes airflow necessary to prevent humidity and promote a healthy canopy. Michigan State University.

7. CULTIVAR-SITE MATCH

- Select cultivars based on site evaluation to ensure they will fully ripen at your location.
- Ensure that cultivar cold hardiness matches the site and its exposure to adverse weather.
- Cultivars should have a ripening window that realistically matches the ripening window at your location.
- Hybrids and vinifera must be matched to site limitations and attributes.
- Appropriate training system to match the cultivar.
- Row spacing should accommodate standard vineyard equipment to ensure efficient operation and avoid the need for specialized machinery.

WARNING SIGN: You must select cultivars that work at your location. Do not plant cultivars simply to prove they can succeed. Plant small test areas if you want to experiment.

8. OPERATIONAL PRACTICALITY

- Ensure slopes are suitable for safe and efficient machinery operation (sprayers, tractors, harvesters).
- Orient rows to support airflow, vine health and overall vineyard management.
- Consider labour efficiency when determining row length and vineyard layout.
- Account for establishment and annual operating costs, as well as labour requirements during critical periods such as pruning, canopy management, crop load balancing and harvest.



Figure 5. Tractor on a steep vineyard slope with cover crop for traction.

9. DATA AND LOCAL KNOWLEDGE

- At least one to three years of site observations is ideal, supported by temperature records.
- Soil pits dug in multiple locations across the proposed vineyard site, with interpretation by a qualified professional; assess soil fertility at the same time (Use Perennia’s recourses—drop your samples off at Perennia’s offices in Kentville or Truro).
- Review of prior crop history and any potential herbicide use on the site.
- Analysis of weather data, with nearby station records used where site-specific historical data is not available (site-specific data is ideal).
- Where possible, consult neighbouring farmers about site conditions and history.

Remember: Local growers will know the most about the property in question.

10. STOP SIGNS (SOME THINGS CAN'T BE CHANGED)

- Are persistent frost events common at this location, either early or late in the season?
- Poorly drained soils may require remediation through subsurface tile drainage.
- Does the site have “three-day soil”? Too wet one day, perfect the next and too dry by the third day?
- Is the site close enough to where you live and work to allow timely management and interventions when needed?
 - » Vineyard sites require constant attention and ongoing intervention to function successfully.
- Do the economics only work in “perfect” years? Consider whether you have the financial flexibility to tolerate a full crop loss in one or multiple years due to hurricanes, high winds or other weather events.
- Do you know how to estimate site capacity and expected yield in relation to your break-even point?

FINAL QUESTIONS (MOST IMPORTANT)

If this site underperforms, can management realistically fix it? Or is the problem not manageable?

What is your financial threshold for “fixing?”

Remember: In Nova Scotia, site selection is about reducing risk, not chasing heat.