

2012 BUD SURVIVAL SURVEY IN NIAGARA & ESSEX AREA VINEYARDS

Prepared for:
The Grape Growers of Ontario

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Table of Contents

INTRODUCTION.....	3
METHODOLOGY – BUD SURVIVAL ANALYSIS.....	3
BUD SAMPLING LOCATIONS	4
2011/2012 REVIEW OF WEATHER DATA & CRITICAL COLD EVENTS	6
RESULTS	9
CULTIVAR SUMMARY.....	15
GENERAL COMMENTS.....	16

INTRODUCTION

The following report summarizes province wide grapevine bud survival results collected from two different viticultural regions in Ontario, Niagara and Lake Erie North Shore (LENS). In Niagara, samples were collected from 8 separate areas following the same geographic delineations as used by the 2005-2009 Winter Injury / Wind Machine project. All efforts were made to replicate the same sampling locations and cultivars that were utilized in the 2010 and 2011 bud survival surveys conducted by Ker Crop Management Services (KCMS) and submitted to the Grape Growers of Ontario (GGO).

Cold hardiness varies dramatically vineyard to vineyard and cultivar to cultivar due to many environmental, cultural and management variables. Individual site specific management records were not available and not outlined within the parameters of the original proposal. This includes the use of wind machines, crop load and disease severity. Therefore, the intention of this report is not for the development of conclusions explaining specific reasons for bud survival results, nor giving characteristics for those locations with higher bud survival percentages from any of the co-operating vineyard locations.

METHODOLOGY – BUD SURVIVAL ANALYSIS

Grape bud survival was estimated by taking a cross section cut of the compound bud and examining the condition of the primary bud. Not examined are the secondary and tertiary buds which are much smaller than the primary bud and are typically much less fruitful. We collected 10-12 sample canes, 10-15 buds in length, randomly from each sample block. Only canes with acceptable bud numbers, cane thickness and visibly in good health were selected. Canes that are too thick or too thin, canes with excessive growth or canes with significant tip dieback or obvious disease symptoms were not sampled. Basically, we are looking to sample canes that would best represent the canes that remain after pruning is complete.

This method is very commonly used in all cool climate grape growing regions and is based on discolouration (browning or oxidation of injured cells) of bud meristem (growing point) that occurs after low temperature injury. Healthy bud meristems maintain their green colour while injured meristematic tissue experiences ruptured cells from ice crystal formation and turn brown after being exposed to above freezing temperatures. Samples are collected in the field then placed at room temperature for 24-48 hours to allow the oxidative browning process to take place.

Within Niagara, eight (8) separate viticultural areas were examined following the same geographic delineations as used by the 2005-2009 Winter Injury/Wind machine project.

For purposes of this 2102 study, samples were taken for 11 cultivars in each of the 8 viticultural areas in Niagara (Figure 2 & 3). Cultivars included were; Cabernet Sauvignon, Cabernet Franc, Merlot, Chardonnay, Riesling, Pinot Noir, Pinot Gris, Gewurztraminer, Sauvignon Blanc, Vidal and Baco Noir. These samples were collected from March 5 to March 23, 2012.

For SW Ontario (Essex), 3 different vineyards were used a part of the project with 7 cultivars sampled from each vineyard (Figure 4). These cultivars include; Cabernet Sauvignon, Cabernet Franc, Merlot, Riesling, Chardonnay, Pinot Gris and Vidal. These samples were collected on March 21 and March 22, 2012.

BUD SAMPLING LOCATIONS

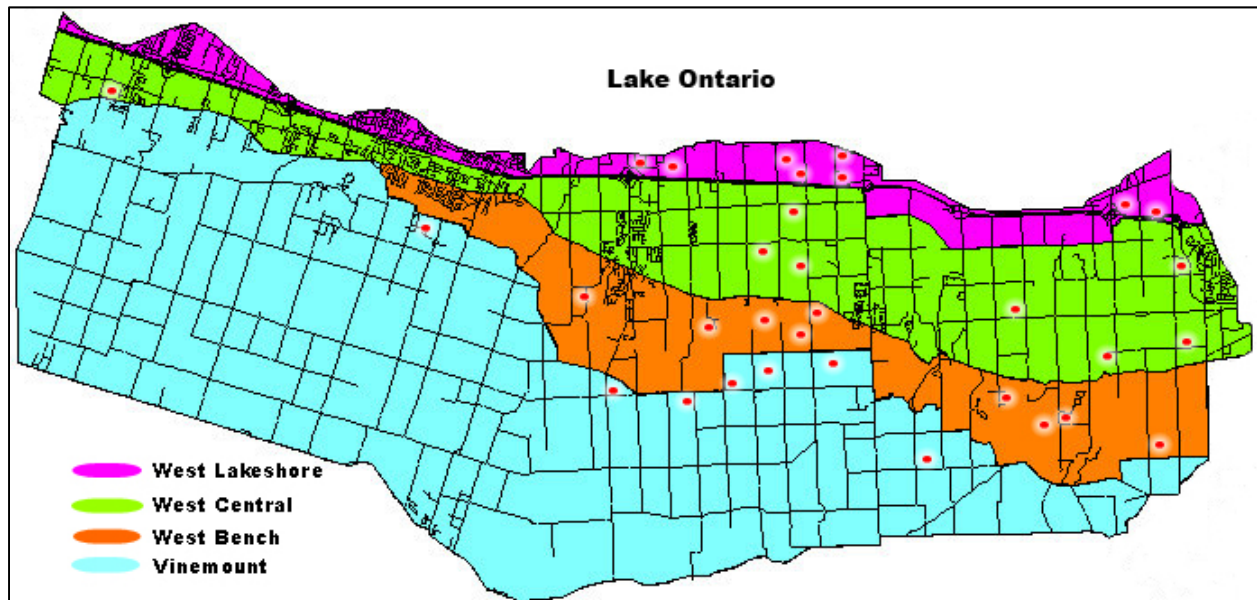


Figure 2. Locations of Niagara area sample vineyards in the 4 sample areas located west of the Welland Canal (St. Catharines, Vineland, Beamsville & Grimsby areas)

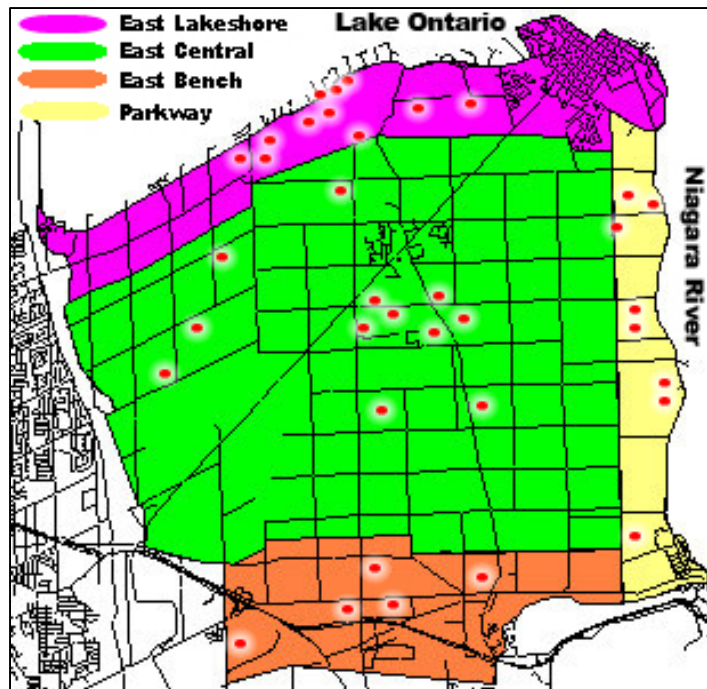


Figure 3. Locations of Niagara area sample vineyards in the 4 sample areas located east of the Welland Canal (Niagara-on-the-Lake, St. David's, Virgil & Queenston areas).



Figure 4. Locations of Essex area sample vineyards are indicated by numbers 1 (Harrow), 2 (Kingsville) and 3 (Leamington).

2011/2012 REVIEW OF WEATHER DATA & CRITICAL COLD EVENTS

The winter of 2011/2012 was characterized by higher than average maximum and minimum daily temperatures and a limited amount of snowfall across Southern Ontario. As grapevines were acclimating (October – December 2011), temperatures remained unseasonably warm and there were no incidents of temperatures reaching injurious levels to grapevines. By the end of December, the vines achieved their maximum hardiness levels without ambient air temperatures getting close to the established LTE values of all cultivars prior to reaching maximum hardiness. The lowest recorded temperature in December was -13.1°C in Grimsby (above the escarpment) on December 29, 2011.

The coldest temperatures experienced in Niagara this past winter were recorded in January. The first episode of cold weather was encountered on the evening of January 3rd and the low temperatures recorded during this event ranged from -13.6°C to -15.2°C in the west end of the Niagara peninsula (Table 1) and -13.1°C to -15.9°C in the east end of the peninsula (Table 2). At this time of the dormant period buds were able to withstand temperatures of at least -18°C or lower and no bud damage was observed from this event. On the morning of January 15th temperatures dropped and ranging from -11.1°C along the lake (Table 1) down to -19.8°C in the St. David's Bench appellation (Table 2). During this period, the beginning of bud damage (LTE10) was predicted to be anywhere from -17.2°C (cv. Merlot – the most sensitive cultivar) to -22.1°C (cv. Cabernet Franc). These temperatures were expected to result in a small percentage of bud injury for cold sensitive cultivars such as Merlot, Sauvignon Blanc and Syrah if no protection measures were practiced.

Throughout February and March, record setting high daytime temperatures were experienced all across Niagara. The lowest temperatures recorded were -16.2°C above the escarpment in Grimsby on February 11th and -14.4°C on the same day along the bench in Beamsville (Table 1). Tender cultivars were estimated to withstand at least -18.5°C in mid-February; therefore we did not anticipate any bud injury as temperatures were much warmer in February and March.

The Lake Erie north shore grape growing region experienced above normal temperatures throughout the dormant season. The lowest temperatures were recorded on January 15 (-18.8°C) and January 20 (-18.4°C) in Kingsville. No additional potential damaging cold temperatures were experienced for the remainder of February and throughout March. Some vineyards in this area had experienced damaging hail during the 2011 growing season with significant damage to clusters and canes reported. This damage was evident in some of the blocks used for this survey however the hail

damage of 2011 did not appear to impact overall bud survivability as measured in 2012.

Table 1-3 outlines the coldest temperatures recorded by Weather Innovations (WIN) weather stations located across Niagara, Essex County and Prince Edward County.

Table 1. Low temperatures recorded NIAGARA – West

Weather Station	Low Temperatures Recorded (°C) – NIAGARA WEST					
	Dec 29, 2011	Jan 3/4, 2012	Jan 15, 2012	Jan 20/21, 2012	Feb 11, 2012	Mar 5, 2012
Grimsby (Vinemount)	-13.1	-15	-16.1	-14.7	-16.2	-11.1
Lincoln Fly Rd. (Vinemount)	-11.1	-15.2	-14.6	-14.8	-13.9	-10.5
Beamsville (W. Bench)	-9.9	-14.2	-15.3	-13.6	-14.4	-9.9
Cherry Ave. (W. Central)	-10.1	-13.9	-15.3	-14.2	-10.8	-9.4
St. Cath. Glass Ave. (W. Central)	-9.3	-13.6	-16	-16.4	-11.2	-9.5
West St. Cath. (W. Central)	-10.3	-14.7	-16.9	-16.4	-13.4	-9.6
Lincoln Lakeshore (W. Lake)	-9.4	-13.7	-11.6	-13.3	-10.8	-9.4

Source: Weather Innovations Inc. (<http://www.vineandtreefruitinnovations.com/>)

Table 2. Low temperatures recorded NIAGARA - East

Weather Station	Low Temperatures Recorded (°C) – NIAGARA EAST					
	Dec 29, 2011	Jan 3/4, 2012	Jan 15, 2012	Jan 20/21, 2012	Feb 11, 2012	Mar 5, 2012
St. David's Bench (E. Bench)	-8.4	-14	-19.8	-12.1	-10.5	-10.3
NOTL Parkway (E. Parkway)	-8.7	-15.9	-15.4	-11.8	-10.5	-10.2
NOTL Virgil (E. Central)	-8.6	-13.6	-16.8	-12.1	-10.5	-10
NOTL Lakeshore (E. Lake)	-7.6	-13.1	-13.7	-11.8	-9.4	-10

Source: Weather Innovations Inc. (<http://www.vineandtreefruitinnovations.com/>)

Table 3. Low temperatures recorded Lake Erie North Shore (LENS)

Weather Station	Low Temperatures Recorded (°C) – LENS				
	Jan 15, 2012	Jan 20, 2012	Jan 30, 2012	Feb 11, 2012	Mar 10, 2012
Kingsville	-18.8	-18.4	-9.9	-15	-7.4
Harrow	-16.2	-16.5	-6.6	-10.5	-6.7

Source: Weather Innovations Inc. (<http://www.vineandtreefruitinnovations.com/>)

RESULTS

NOTE – NS indicates that no sample was taken from this cultivar in this area. Areas without a complete data set (3 samples per cultivar) have been reviewed and deemed acceptable as per verbal agreement with GGO staff. Efforts were made to locate sample blocks from these areas by KCMS and GGO staff and were unable to for various reasons. The primary causes were due to insufficient acreage of specific cultivar to secure all 3 separate sampling locations and that cultivar blocks were already pruned to final bud numbers (predominantly the hybrid grape cultivars).

* - indicates that the sample block is covered by a Wind Machine. Be aware, this is only an indication that a wind machine is present. No information was collected regarding the usage and management of these machines.

The authors would like to express their appreciation to all grower co-operators that allowed us on-site for samples to be collected and included in this survey. All data presented is reflective of samples taken up to March 23, 2012.

CULTIVAR:	CABERNET SAUVIGNON								
% Primary Bud Survival	LOCATION								
	W. Bench	W. Central	W. Lakeshore	Vinemount	E. Bench	E. Central	E. Lakeshore	Parkway	SW Ontario
Sample 1	95*	86	90	95	94	97*	96*	93*	86*
Sample 2	93	96*	94	94*	98	92*	95	89*	91*
Sample 3	N/S	92	N/S	91*	95*	90*	95*	95	84*
Average	94	91	92	93	96	93	95	92	87

* – Wind Machine Present

CULTIVAR:	CABERNET FRANC								
% Primary Bud Survival	LOCATION								
	W. Bench	W. Central	W. Lakeshore	Vinemount	E. Bench	E. Central	E. Lakeshore	Parkway	SW Ontario
Sample 1	95	89	88	90	98	80*	84*	93*	88*
Sample 2	92	94	93	94	95*	91*	93*	95*	65*
Sample 3	99*	89*	88	95*	89	94*	98*	89*	87*
Average	95	91	90	93	94	88	92	92	80

* – Wind Machine Present

CULTIVAR:	MERLOT								
% Primary Bud Survival	LOCATION								
	W. Bench	W. Central	W. Lakeshore	Vinemount	E. Bench	E. Central	E. Lakeshore	Parkway	SW Ontario
Sample 1	92*	87	92	87	88	99*	96*	96*	90*
Sample 2	92*	94*	92	94*	94	99*	99*	92*	87*
Sample 3	94	90*	95	89	94*	94*	95*	95*	85*
Average	93	90	93	90	92	97	97	94	87

* – Wind Machine Present

CULTIVAR:	PINOT NOIR							
% Primary Bud Survival	LOCATION							
	W. Bench	W. Central	W. Lakeshore	Vinemount	E. Bench	E. Central	E. Lakeshore	Parkway
Sample 1	96	92	89	88*	91	96*	96*	98*
Sample 2	92*	90*	96	93	89*	95*	94*	90*
Sample 3	90	91	91	88	91	90*	N/S	94
Average	93	91	92	90	90	94	95	94

* – Wind Machine Present

CULTIVAR:	CHARDONNAY								
% Primary Bud Survival	LOCATION								
	W. Bench	W. Central	W. Lakeshore	Vinemount	E. Bench	E. Central	E. Lakeshore	Parkway	SW Ontario
Sample 1	97*	81	86	82	91	94*	88*	97*	63*
Sample 2	91	91*	92	87	96	87*	95*	96*	77*
Sample 3	95	90*	96	95*	90*	88*	93*	92	84*
Average	94	87	91	88	92	90	92	95	75

* – Wind Machine Present

CULTIVAR:	RIESLING								
% Primary Bud Survival	LOCATION								
	W. Bench	W. Central	W. Lakeshore	Vinemount	E. Bench	E. Central	E. Lakeshore	Parkway	SW Ontario
Sample 1	97*	91*	92	82	98	91*	88*	95*	72*
Sample 2	93	95*	94*	94	95*	96*	89*	97*	46*
Sample 3	93*	91	91	81	90	88*	N/S	96*	53*
Average	94	92	92	86	94	92	89	96	57

* – Wind Machine Present

CULTIVAR:	PINOT GRIS								
% Primary Bud Survival	LOCATION								
	W. Bench	W. Central	W. Lakeshore	Vinemount	E. Bench	E. Central	E. Lakeshore	Parkway	SW Ontario
Sample 1	84*	85	87	78	N/S	87*	95*	93*	80*
Sample 2	88	81	89	78*	N/S	95*	97	91*	83*
Sample 3	N/S	80*	90	N/S	N/S	93*	94	N/S	87*
Average	86	82	89	78	N/S	92	95	92	83

* – Wind Machine Present

CULTIVAR:	GEWURZTRAMINER							
% Primary Bud Survival	LOCATION							
	W. Bench	W. Central	W. Lakeshore	Vinemount	E. Bench	E. Central	E. Lakeshore	Parkway
Sample 1	94*	88	95	91	98*	94*	96*	92*
Sample 2	90	82*	92	N/S	N/S	N/S	94	90*
Sample 3	91	N/S	N/S	N/S	N/S	N/S	98	N/S
Average	92	85	94	91	98	94	96	91

* – Wind Machine Present

CULTIVAR:	SAUVIGNON BLANC							
% Primary Bud Survival	LOCATION							
	W. Bench	W. Central	W. Lakeshore	Vinemount	E. Bench	E. Central	E. Lakeshore	Parkway
Sample 1	94	93*	92	83	93*	92*	89*	93*
Sample 2	93	88	87	91	N/S	97*	84*	94*
Sample 3	N/S	93	86	N/S	N/S	97*	98*	91*
Average	94	91	88	87	93	95	90	93

* – Wind Machine Present

CULTIVAR:	VIDAL								
% Primary Bud Survival	LOCATION								
	W. Bench	W. Central	W. Lakeshore	Vinemount	E. Bench	E. Central	E. Lakeshore	Parkway	SW Ontario
Sample 1	97*	97	87	98	96	97*	98	96*	87*
Sample 2	N/S	93	92	94	95	95	99	98	97
Sample 3	N/S	N/S	93	92*	N/S	N/S	96	99*	N/S
Average	97	95	91	95	96	96	98	98	92

* – Wind Machine Present

CULTIVAR:	BACO NOIR							
% Primary Bud Survival	LOCATION							
	W. Bench	W. Central	W. Lakeshore	Vinemount	E. Bench	E. Central	E. Lakeshore	Parkway
Sample 1	98	99	100	99	97	97	N/S	96
Sample 2	100	98	N/S	95	N/S	99	N/S	N/S
Sample 3	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
Average	99	99	100	97	97	98	N/S	96

* – Wind Machine Present

CULTIVAR SUMMARY

The following are brief comments about the results from each cultivar.

Cabernet Sauvignon

Primary survival ranged from 89 - 98% with SW Ontario having a range of 84 – 91%

Cabernet Franc

Ranges for survival in Niagara were 80 - 99% and SW Ontario was 65 - 88%.

Merlot

The Niagara area had primary bud survival ranges from 87 - 99% with averages across all areas ranging from 87 - 99%. SW Ontario survival ranges were from 85 - 90%.

Pinot Noir

Survival ranges in Niagara ranged from 88 - 96%. There were no samples of Pinot Noir from SW Ontario.

Chardonnay

Survival ranged from 81 - 97% with regional averages being from 87 - 95%. SW Ontario had survival ranges from 63 - 84%.

Riesling

Survival ranged from 81 - 98% with regional averages ranging from 86 - 96%. SW Ontario survival ranges were 46 - 72%.

Pinot Gris

Based on area wide plantings, there were fewer locations with samples of PG. Survival ranges in Niagara were from 78 - 97% with area wide averages being 78 - 95%. SW Ontario survival is between 80 - 87%.

Gewurztraminer

Within Niagara survival ranges were from 82 - 98% with regional averages being 85 - 98%. There were no Gewurztraminer samples taken from SW Ontario.

Sauvignon Blanc

Survival ranges were from a low of 83% to a high of 97% and the regional averages were ranging from 87 - 95%. There were no Sauvignon Blanc samples taken from SW Ontario.

Vidal

Vidal had survival results ranging from 87 - 99% in Niagara. Regional averages ranged from 91 - 98%. SW Ontario survival average was 92%.

Baco Noir

Survival rates in Niagara ranged from 96 – 100%. There were no Baco Noir samples taken from SW Ontario.

GENERAL COMMENTS

At the time of sampling (March 5 – 23, 2012), there does not appear to be any significant bud damage present for any of the sampled cultivars within Niagara. As outlined above in Tables 1 & 2, all recorded low temperatures across Niagara were above the established LTE 50 values which is the temperature where 50% of the buds are expected to be killed (www.ccovi.ca/vine-alert).

At the time of sampling, the sample vineyards located in south-western Ontario appear to have slightly more primary bud damage than vineyards located in Niagara however the degree of damage observed remains minimal and a near full crop load can be expected in 2012. Riesling appears to be most impacted with an average of 57% primary bud survival. When examining these Riesling canes, many of the buds appeared to have some degree of physical damage (of undetermined cause) to them which would dramatically reduce the hardiness of these buds. Specific reasons for this degree of damage cannot be determined as individual block management records were not made available or required for the purpose of this survey.

It has been observed from previous hardiness evaluations that cultivar blocks which have been left for ice wine harvest have had a slight reduction in the maximum hardiness level that can be attained and often have more bud damage/death when compared to blocks of the same cultivar harvested for table wine. This phenomenon along with hail damage and obvious evidence disease pressures present during the last growing season (mostly powdery mildew) may have contributed to the bud survival numbers being lower in some of the samples collected from south-western Ontario.