

Ohio Grape-Wine Electronic Newsletter

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Content:

Polar Vortex and Its Impact on Grapes

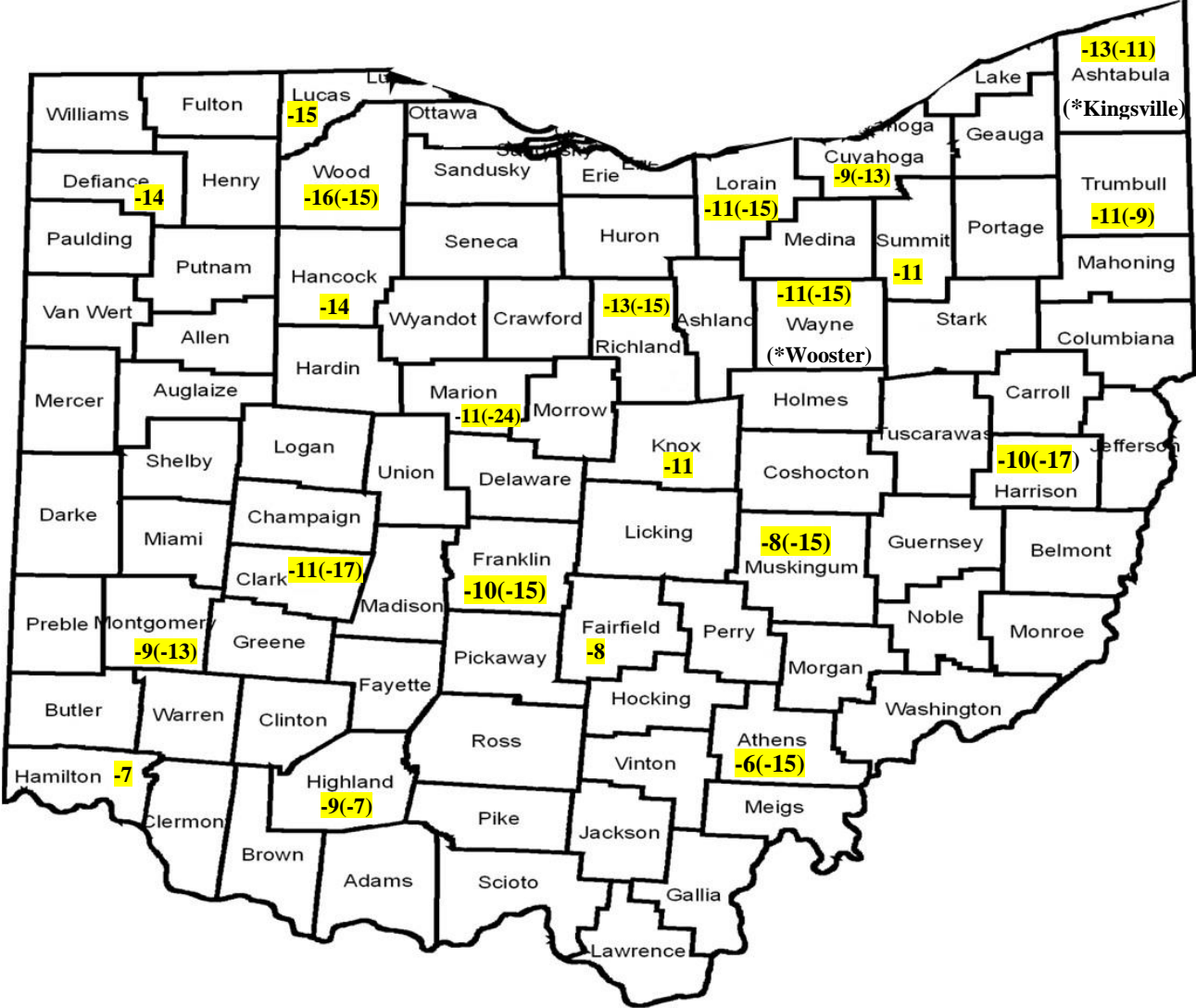
Polar Vortex and Its Impact on Grapes

By: Imed Dami, Diane Kinney, and Shouxin Li HCS-OSU

Early this week many of us experienced one of the coldest Arctic outbreaks in two decades that plunged into the US bringing bitterly cold temperatures to the Midwest, South, and East including Ohio. For us humans, the wind chill was even worse and life threatening leading to closures of public institutions and businesses across the country on January 6 and 7 (including our university). So, how did this arctic blast impact grapes in Ohio? It is still early to tell, but I would like to share the minimum temperatures recorded across Ohio and some facts about cold hardiness and potential damage to grapes. Let's start with the weather. The map of Ohio (below) shows the minimum temperatures recorded on January 6 and 7, 2014. For comparison sake, we added minimum temperatures recorded in January 2009 (in parenthesis), which was the coldest winter since 1994.

- On January 6 and 7, 2014, the lowest temperatures ranged between -6F (southeast) and -16F (northwest). Actually, in 2009 minimum temperatures were even colder ranging between -7F and -24F. The 2014 cold, however, was different (in a bad way). I'll explain:
 - It was an advective freezing event meaning a massive cold air moved to our region with windy conditions. To make matters worse, the lowest temperatures lingered for hours. In 2009, the minimum temperatures were reached and stayed for a short time (minutes instead of hours) and resulted from a radiative freeze with calm conditions.
 - This year, the coldest temperatures were more widespread especially in our largest grape producing region in northeast Ohio.
 - To add insult to injury the windy condition precluded growers from using wind machines. In other words, wind machines were, unfortunately, useless this time.

Minimum Temperatures 2009 vs. 2014



Minimum temperatures recorded on 6-7 January 2014 and 15-17 January 2009 (in parenthesis) in Ohio. Research vineyards marked with asterisks (*) are located in Wooster (Wayne County) and Kingsville (Ashtabula County).

- Now, how about the grapes? In our lab, we conduct freezing tests regularly so we are able to monitor the cold hardiness of grape varieties throughout the dormant season. Shouxin Li, a graduate student in Dr. Dami's lab conducted freezing tests of several vinifera varieties and the most recent one was conducted in December 2013 at the AARS in Kingsville. The LT50 of dormant buds in selected varieties are listed in the following table.

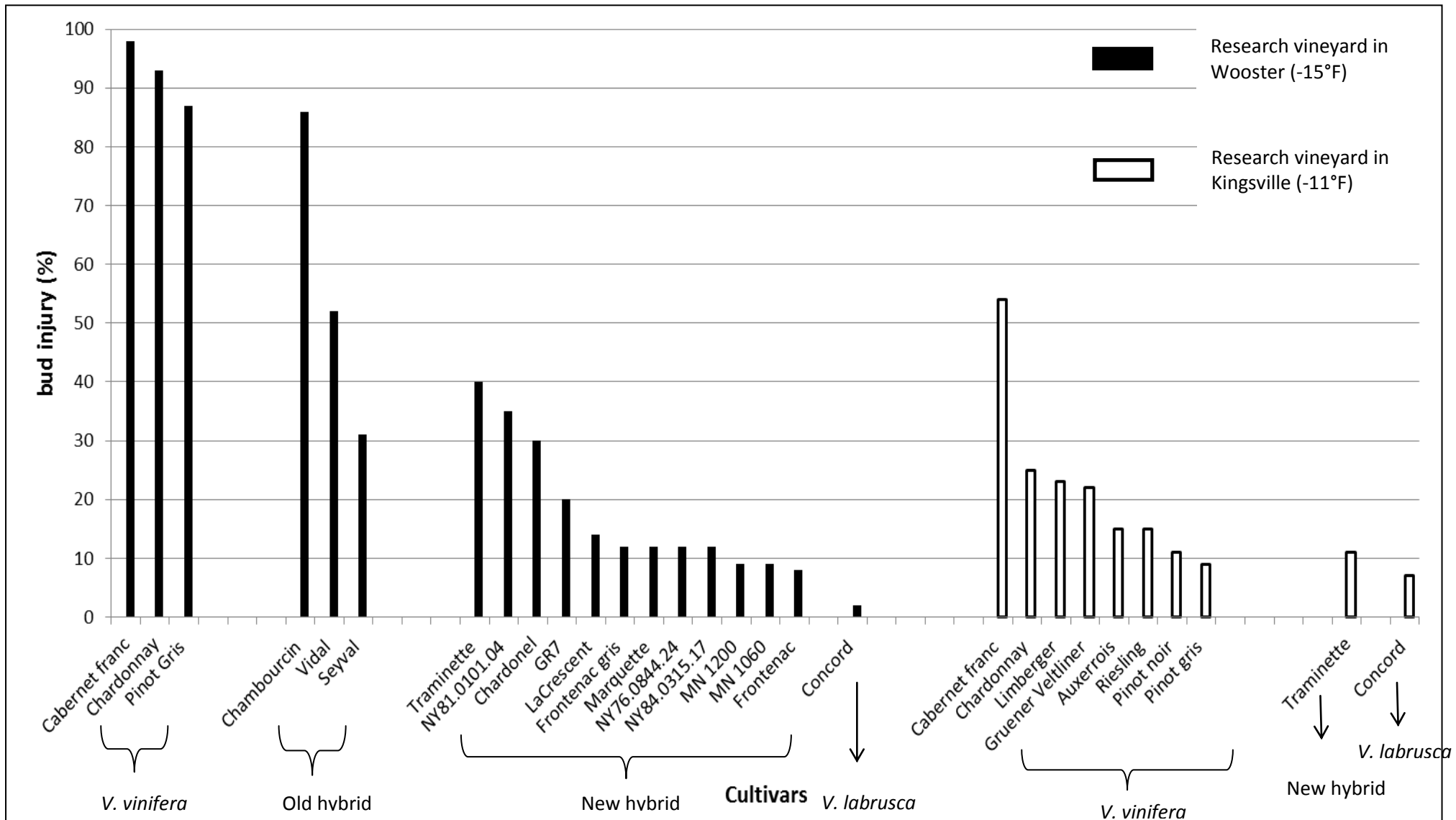
Cold hardiness (LT50) of varieties grown at AARS in **Kingsville**
(Collection on 26 December, 2013).

Variety	LT50 (°C)	LT50 (°F)
Cabernet franc	-21.1	-6.0
Chardonnay	-21.0	-5.8
Gamay noir	-22.5	-8.5
Gruener Veltliner	-19.2	-2.6
Kerner	-20.0	-4.0
Pinot noir	-20.6	-5.1
Regent	-22.7	-8.9
Sauvignon blanc	-19.5	-3.1

Here are my observations:

- The level of cold hardiness of these varieties is not at its “potential” maximum as we experienced in previous years with LT50s ranging between -2.6F (Gruener) and -8.5F (Gamay). So you may ask, why? My explanations are as follows:
- December was unusually mild with temperature highs reaching the 60's for several days. This was not unique to Ohio, but observed across the East and Midwest. Mild weather prompts grapes to lose hardiness, or “de-acclimate”.
- There was large fluctuation of temperatures between highs and lows a few days before the temperature dipped on January 6-7. Freeze/thaw cycles in midwinter are not desirable as they lead to more damage. We did not experience this phenomenon in 2009. In fact in 2009, air temperatures were below freezing for 10 days before the coldest temperature was reached. The weather pattern in 2009 caused grapes to reach maximum cold hardiness. The chart below shows the % bud injury of several varieties grown at the OSU research vineyards in Wooster and Kingsville after the 2009 winter freeze.
- Unfortunately, I doubt that the same varieties will have the same cold hardiness as in 2009 and will likely see more damage this year for the reasons explained above.
- We are in the process of collecting canes to assess bud damage and will share the information as soon as we have it available.

Bud Injury in 2009 (Source: Dami et al. 2012 AJEV)



- To assist our growers deal with this difficult situation, The OSU Grape Team will be holding workshops to demonstrate how to assess bud damage and how to prune and manage vines after injury. We will post the dates soon.
- If you would like to read more about this topic, we have published several articles in OGEN in the past 8 years. Links to these articles in OGEN are listed below for your convenience.

OGEN Articles:

2013:

Deep Freeze and Impact on Grapes:

http://www.oardc.ohio-state.edu/grapeweb/images/OGEN_28_Jan_2013.pdf

2012:

How are Grapes Coping with this Mild Winter? :

http://www.oardc.ohio-state.edu/grapeweb/images/OGEN_02142012.pdf

2011:

Sub-Zero Temperatures in 2011...Not 2009 again! :

[http://www.oardc.ohio-state.edu/grapeweb/images/OGEN_10_February_2011_\(2\)1.pdf](http://www.oardc.ohio-state.edu/grapeweb/images/OGEN_10_February_2011_(2)1.pdf)

2010:

Sub-Freezing Temperatures in January:

[http://www.oardc.ohio-state.edu/grapeweb/images/OGEN_20_Jan_2010_\(1\).pdf](http://www.oardc.ohio-state.edu/grapeweb/images/OGEN_20_Jan_2010_(1).pdf)

2009:

Update on the recent freezing events in Ohio:

<http://www.oardc.ohio-state.edu/grapeweb/images/OGEN20090206.pdf>

Update on Freeze Injury:

[http://www.oardc.ohio-state.edu/grapeweb/images/OGEN_13_MARCH_\(6\)6.pdf](http://www.oardc.ohio-state.edu/grapeweb/images/OGEN_13_MARCH_(6)6.pdf)

2007:

Pruning Considerations Following Winter Injury:

<http://oardc.osu.edu/grapeweb/OGEN/20070322/ogen032207.htm>

New Book on Grape Winter Hardiness:

<http://oardc.osu.edu/grapeweb/OGEN/20071005/ogen10052007.htm>

2006:

Warm Weather and Vine Hardiness:

<http://oardc.osu.edu/grapeweb/OGEN/02242006/ogen02242006.htm>