Measuring and Managing Cold Hardiness in Grapevines: Finger Lakes Edition

Jason Londo and Hongrui Wang

B.E.V. NY 2023

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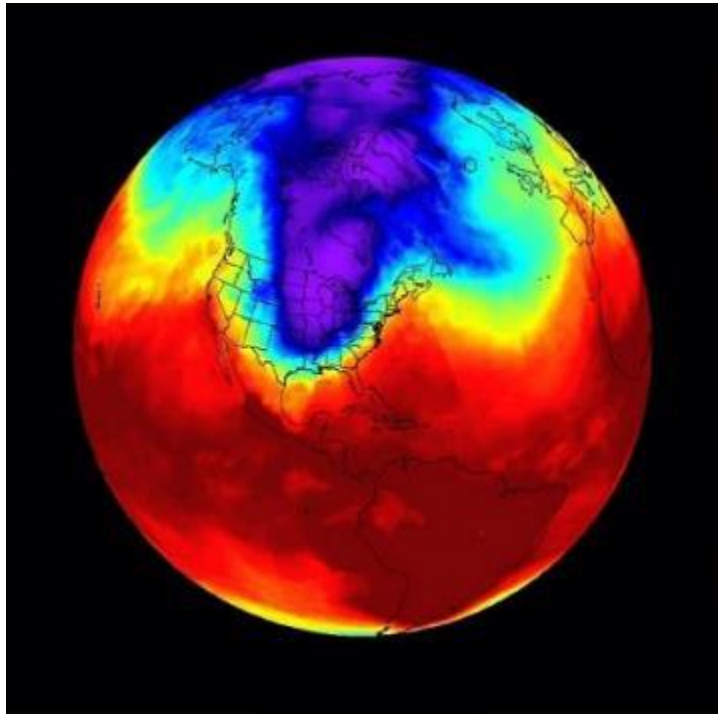
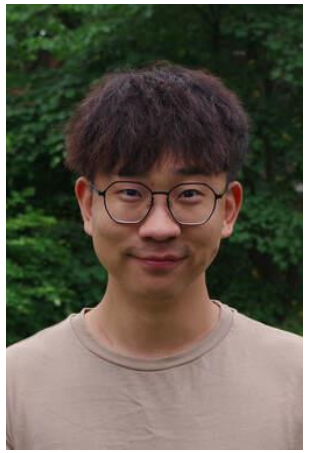
Fruit crop physiology and climate change adaptation

Cornell AgriTech
New York State Agricultural Experiment Station





Jason P. Londo
109 Hedrick Hall
Geneva, NY

jpl275@cornell.edu
@shiversherlock
315-787-2463

Hongrui Wang
PhD Candidate

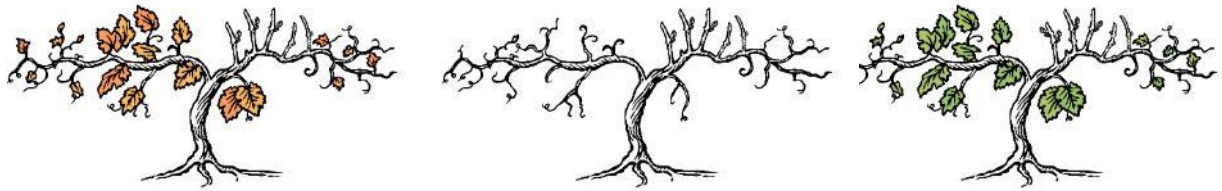
hw692@cornell.edu

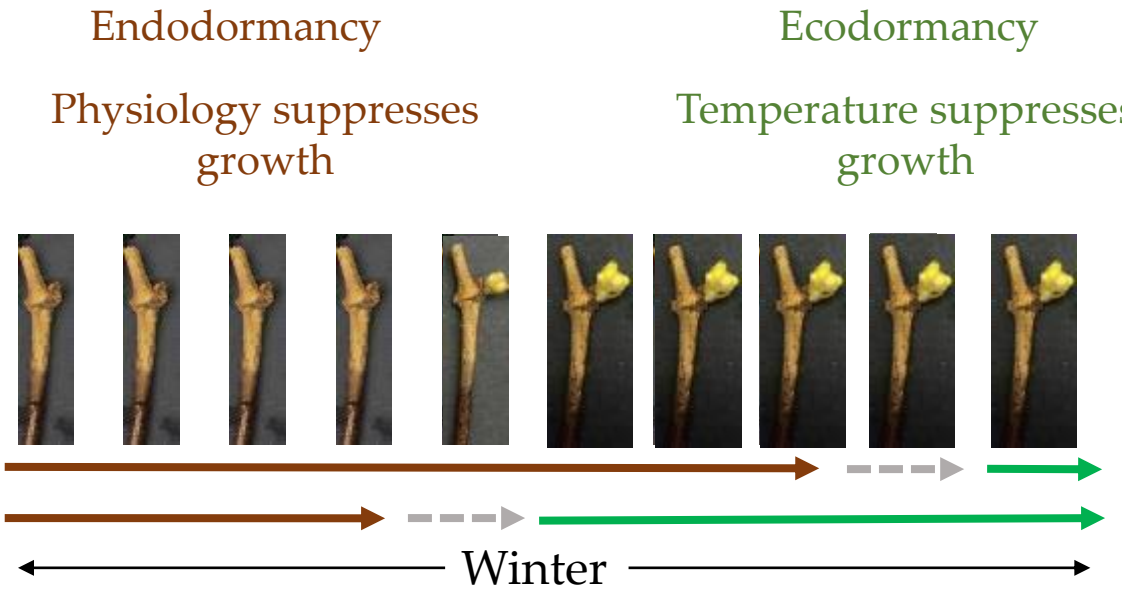
Interaction of cold hardiness and dormancy

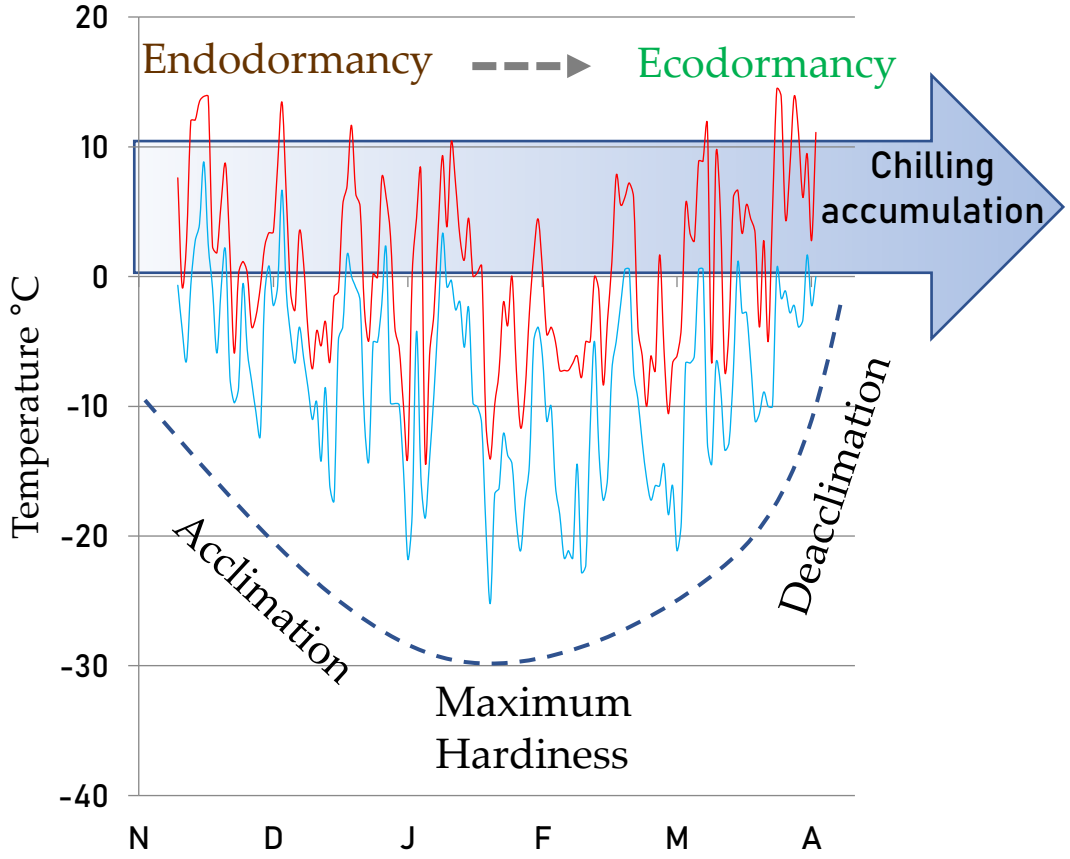
Cold hardiness is the ability to resist freezing temperatures during winter.

Dormancy is critical: must be induced to gain cold hardiness, maintained to prevent damage.

Timing is everything: Need to satisfy the chilling requirement for spring phenology to advance.

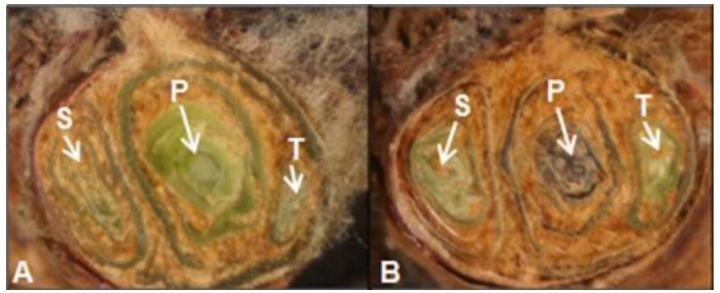


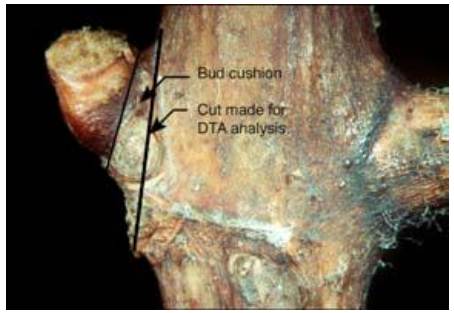


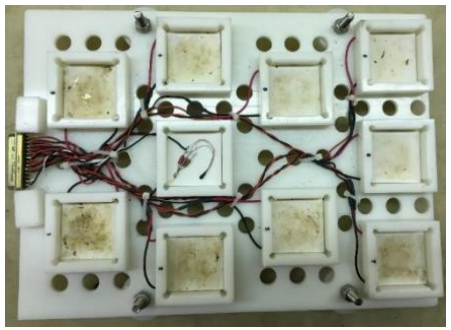


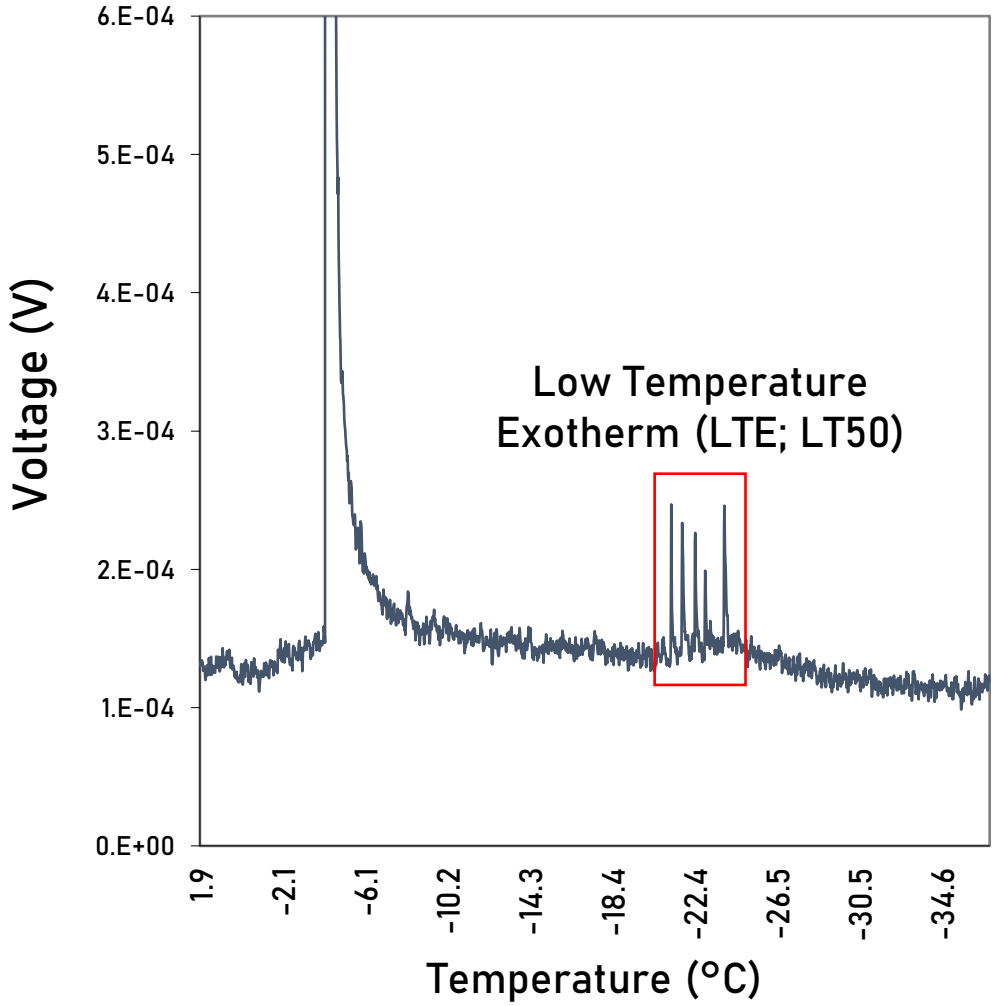
Phenotyping grapevine cold hardiness to understand climate impacts on winter physiology

Lethal temperatures can be measured with Differential Thermal Analysis (DTA)









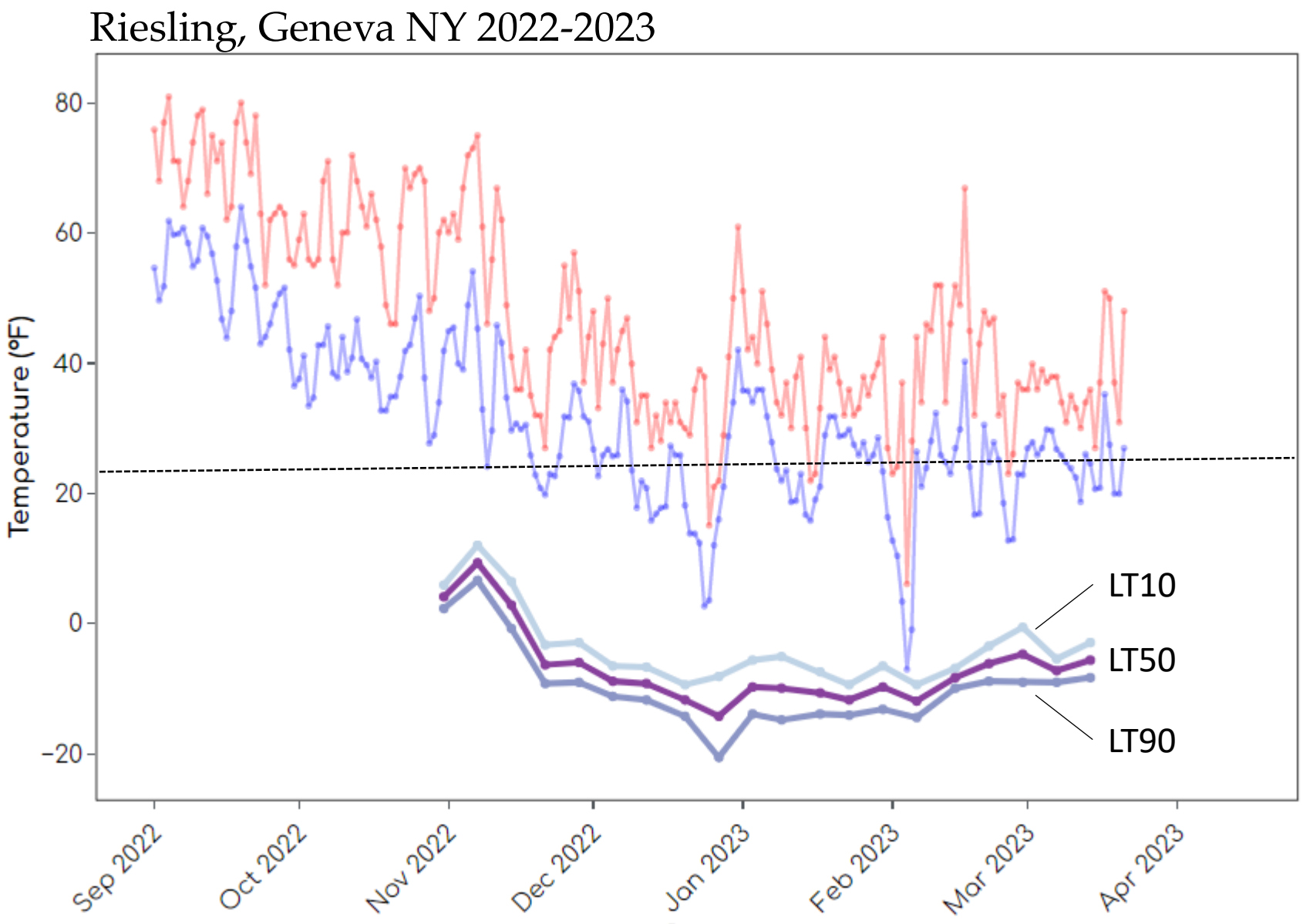
Cold Hardiness monitoring program:

Geneva, NY: 12 cultivars

FLX, NY: various, multiple sites

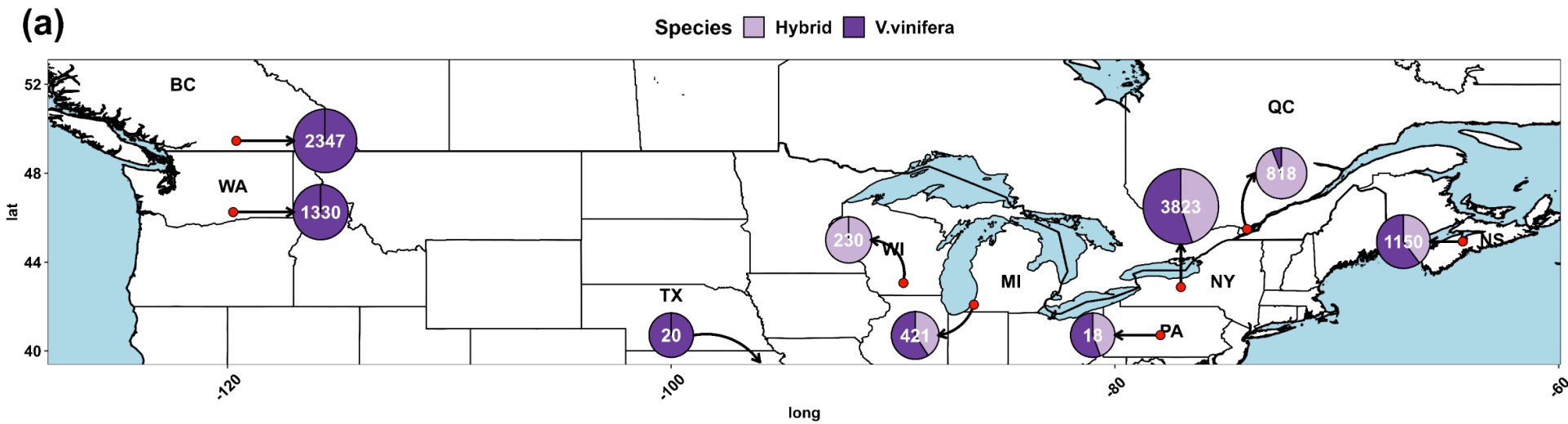
Portland, NY: 19 cultivars

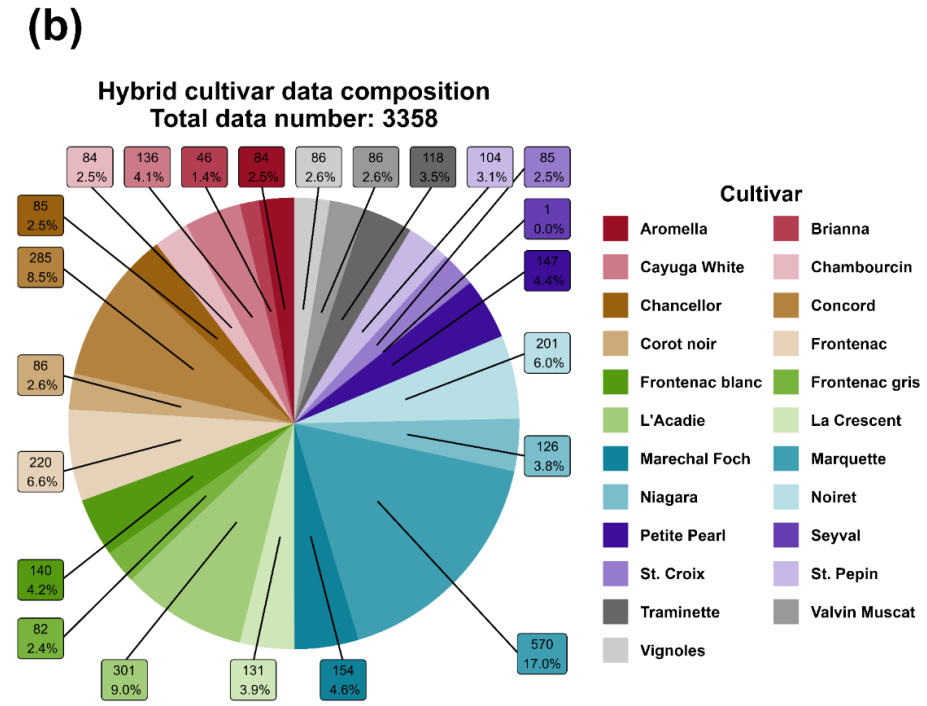
Hudson Valley, NY: Open position, no current tracking

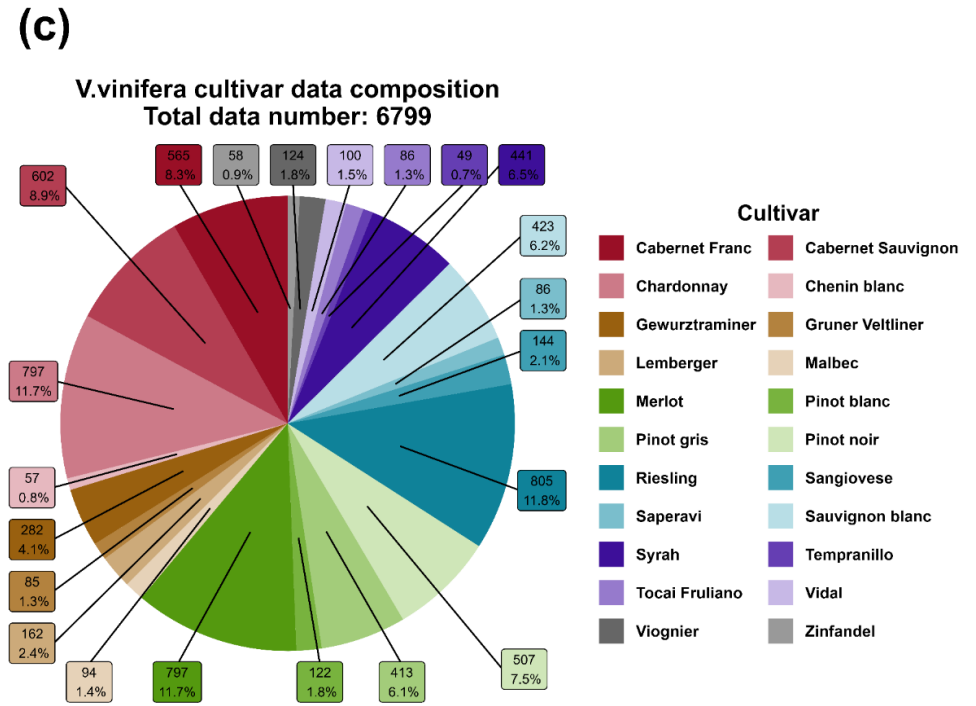


Leveraging multisite cold hardiness programs to develop cold hardiness models

22 vinifera cultivars
23 hybrid cultivars





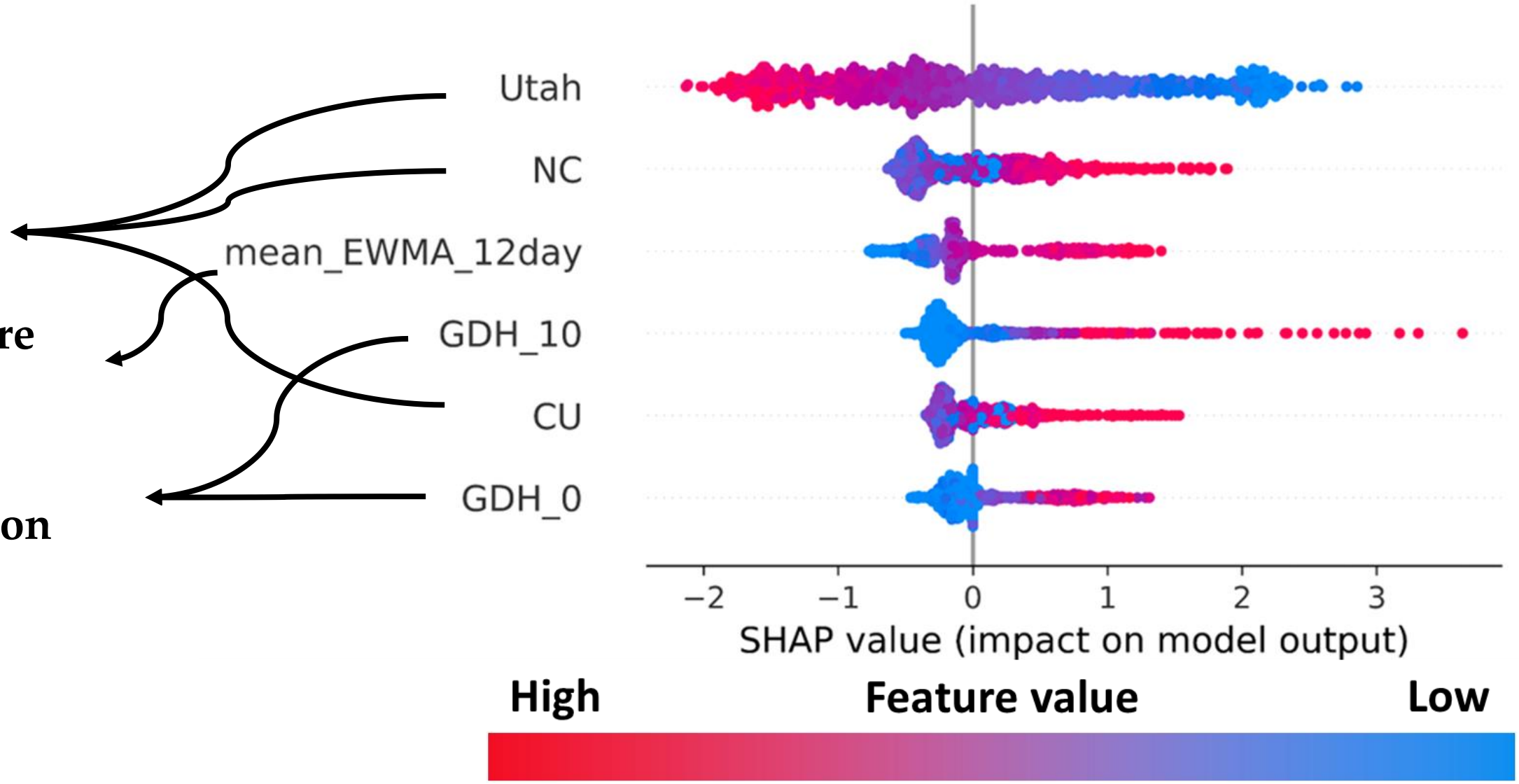


Key climate parameters

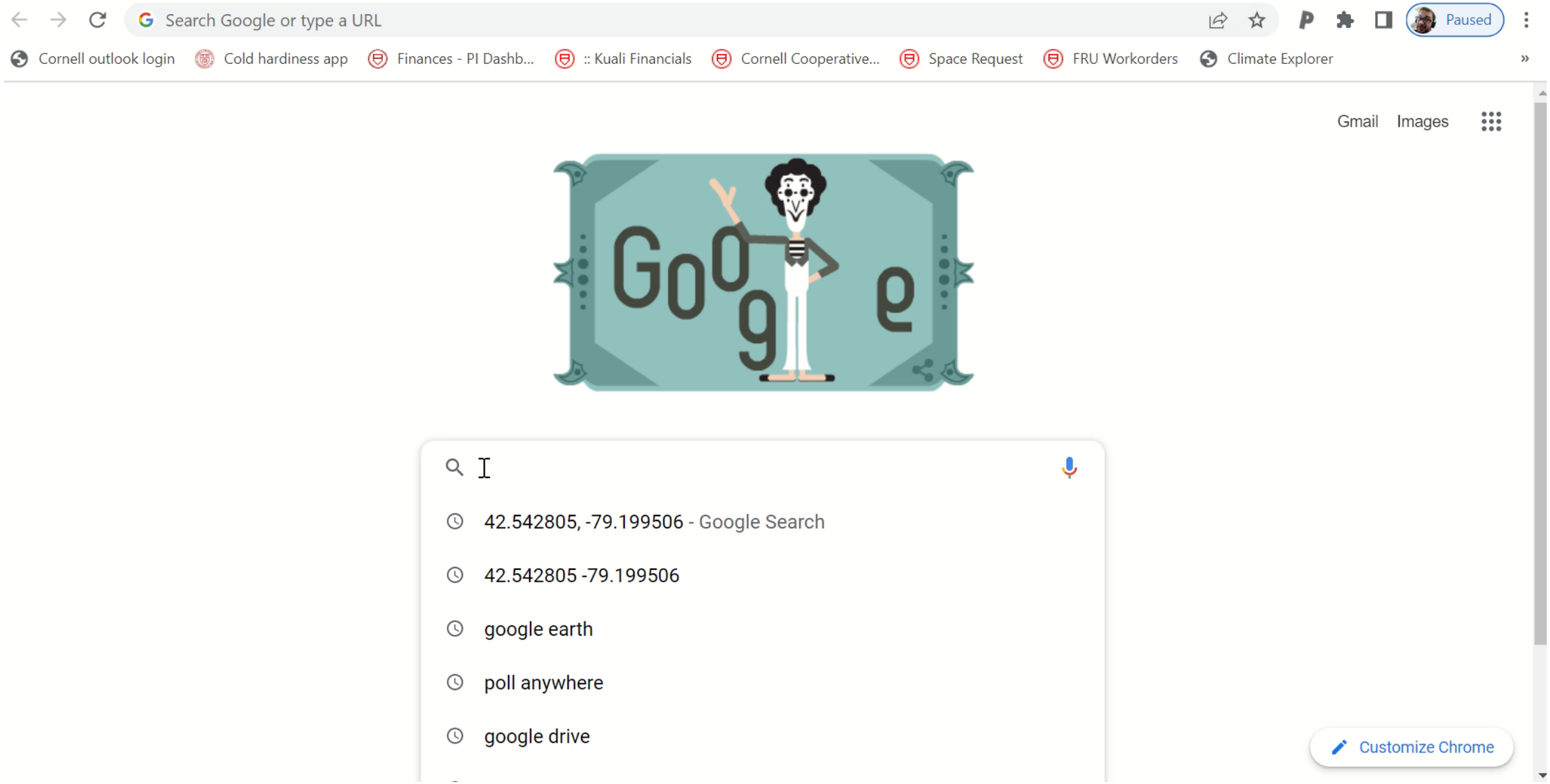
Chilling models

Temperature window

Heat accumulation



Cornell cold hardiness monitoring and prediction models



How often have you gone to the Bud Hardiness website to check how the grapes are doing during winter?

Often, I'm interested in how the grapes change throughout the season.

Rarely, I only check the site if there is a predicted freeze event.

I didn't know about the site, but now I'm interested in using it more.

I didn't know about the site but I'm not really interested in this kind of data.

Besides mobile access, what is the most important feature to include in the website as we migrate it to a cloud server?

Adding in more weather sites, such as NEWA or weather underground?

Being able to download the model and run it on my own.

The ability to compare multiple cultivars at the same time.

The addition of a site suitability tool, to help me choose which cultivars are most appropriate for my geographic location.

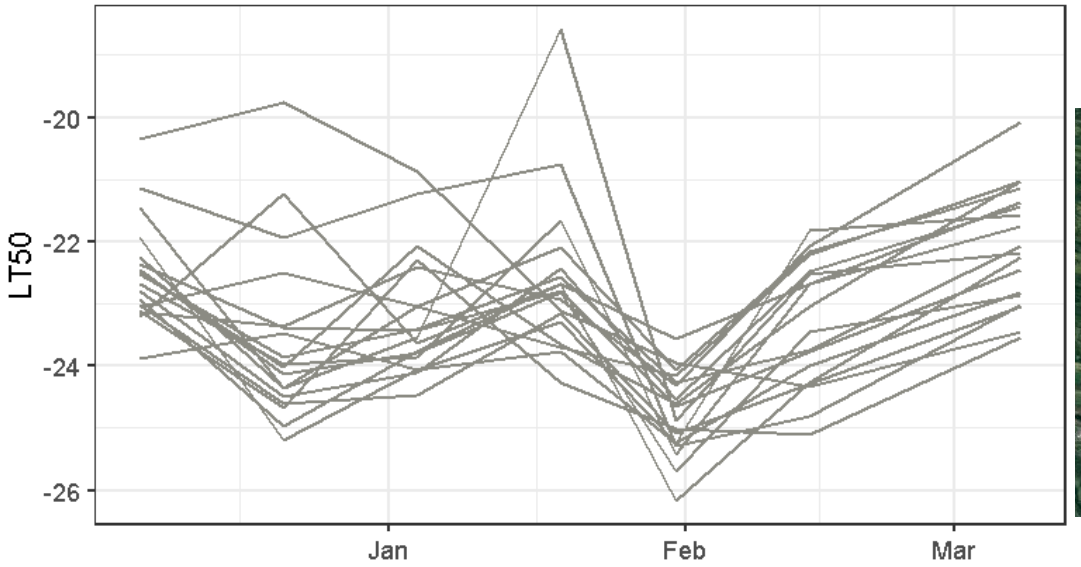
Ongoing research in cold hardiness

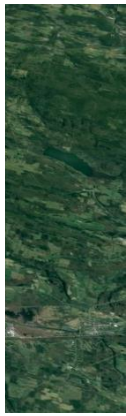
Microclimate impacts on cold hardiness and deacclimation (NYWGF; 2022-2023…)

Two sensors at each location:
One at head height
One at "graft" height

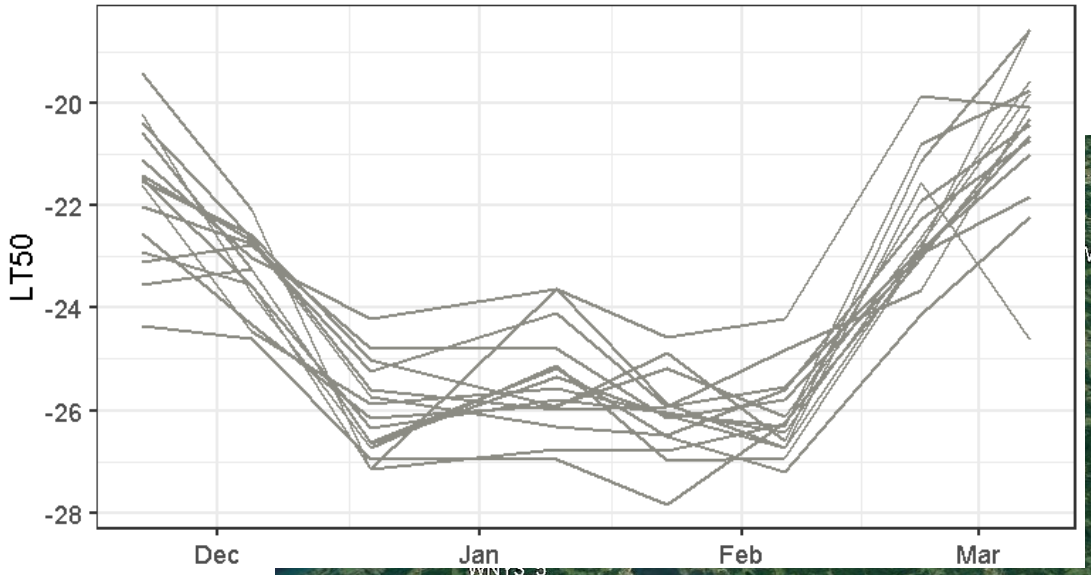
Temperature, humidity and pressure tracking in 1 min intervals. Bluetooth enabled.

Riesling



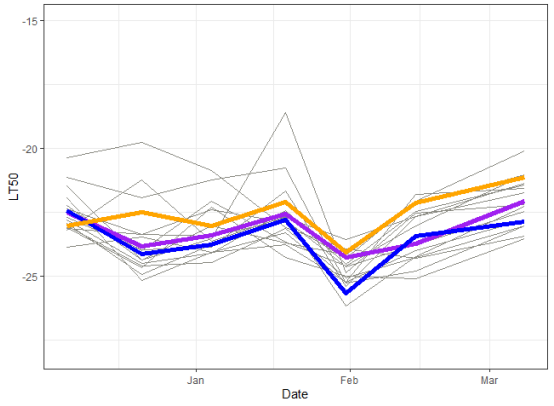


Concord



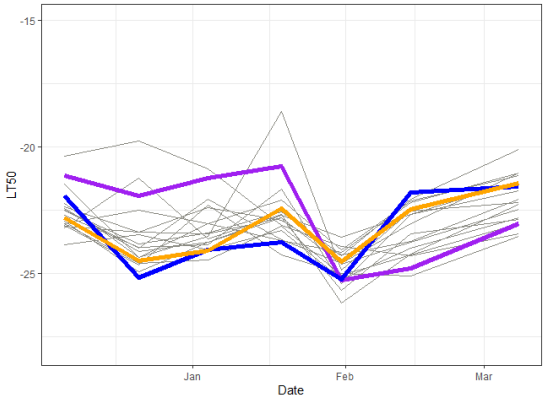
Prejean Vineyard

Miles Vineyard

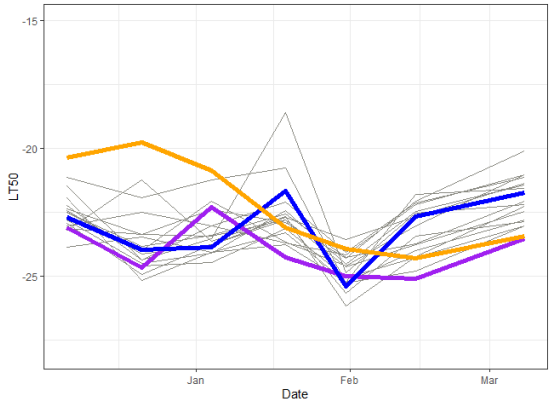


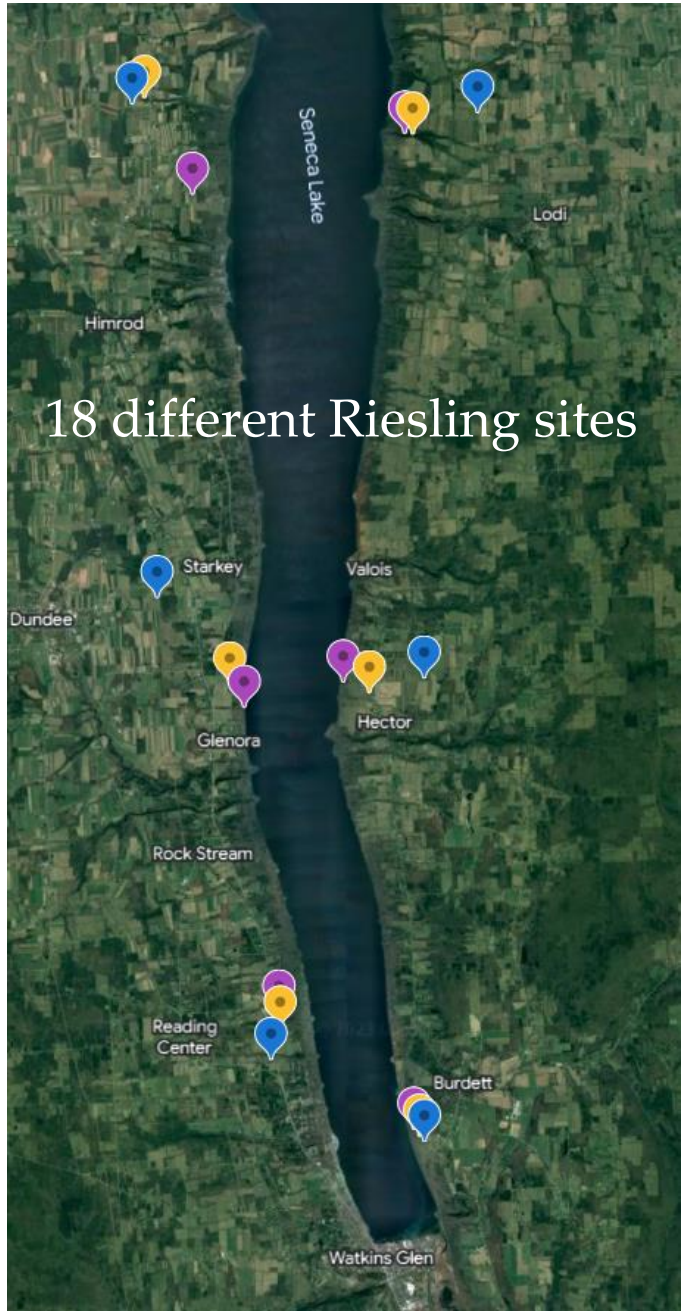
Tabora Vineyard

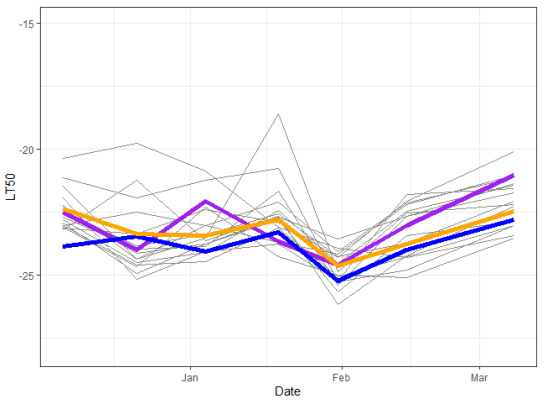
Glenora Vineyard



Lakewood Vineyard

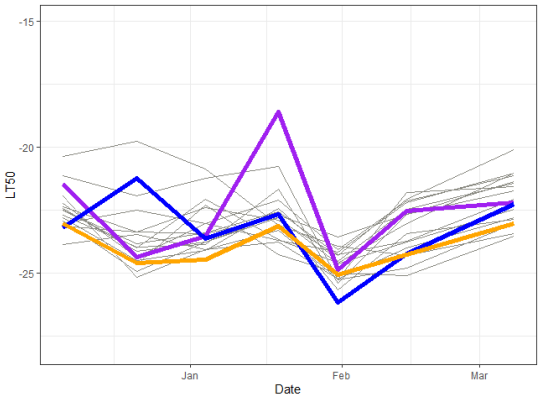




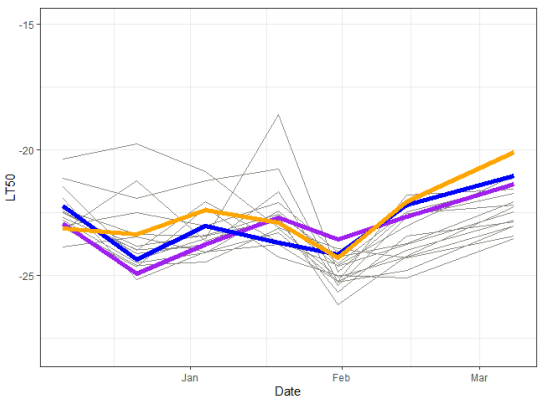


Dalrymple Farms

Boundary Breaks Vineyard



Sawmill Creek Vineyard



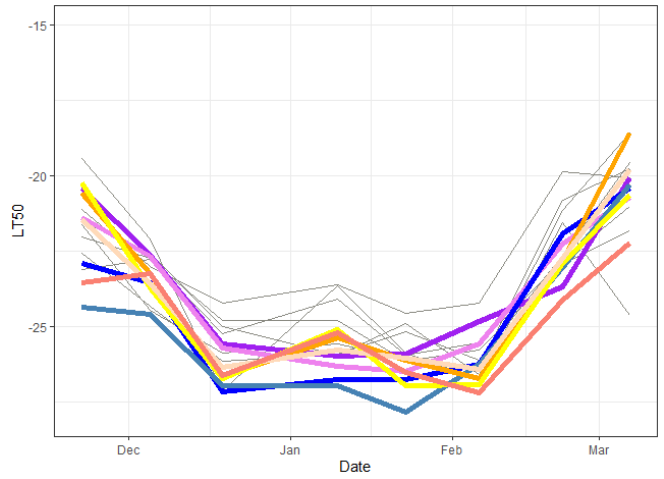
Hillick and Hobbs Vineyard

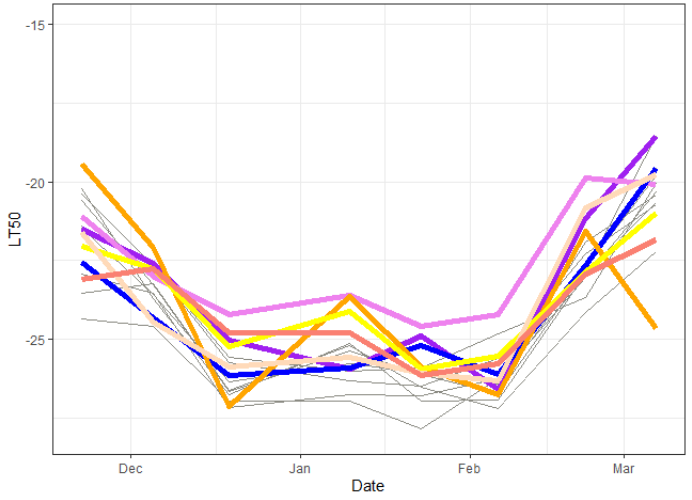
Portland, NY region
15 Concord locations

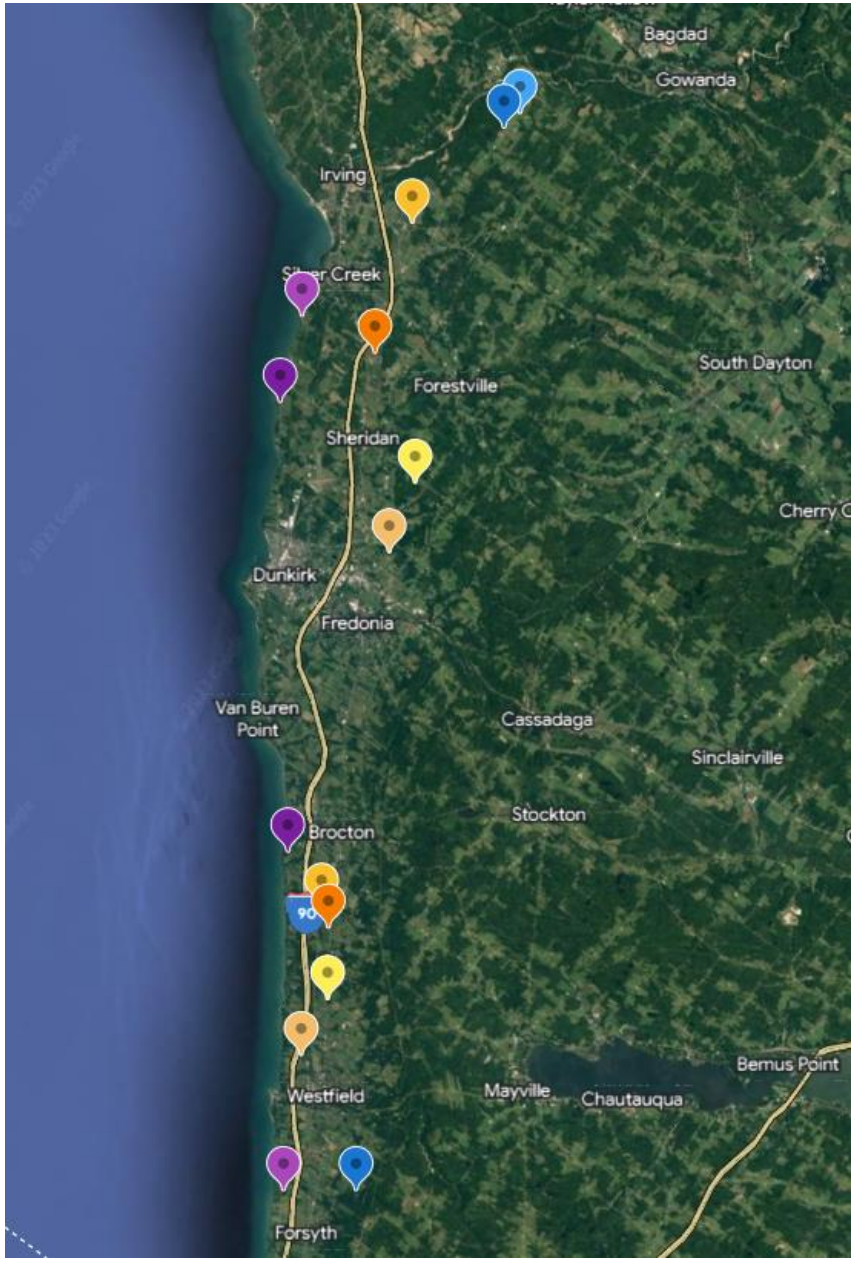
Evidence for 2 different microclimates

Clear lake->Escarpment shift in cold hardiness

Also, a clear difference between the Southwestern and Northeastern portion of the transect







Enhancing cold hardiness and delaying budbreak with foliar sprays

Using foliar calcium as a dehydration enhancing treatment for increased cold hardiness. NYFVI-SCBG 2022-2024

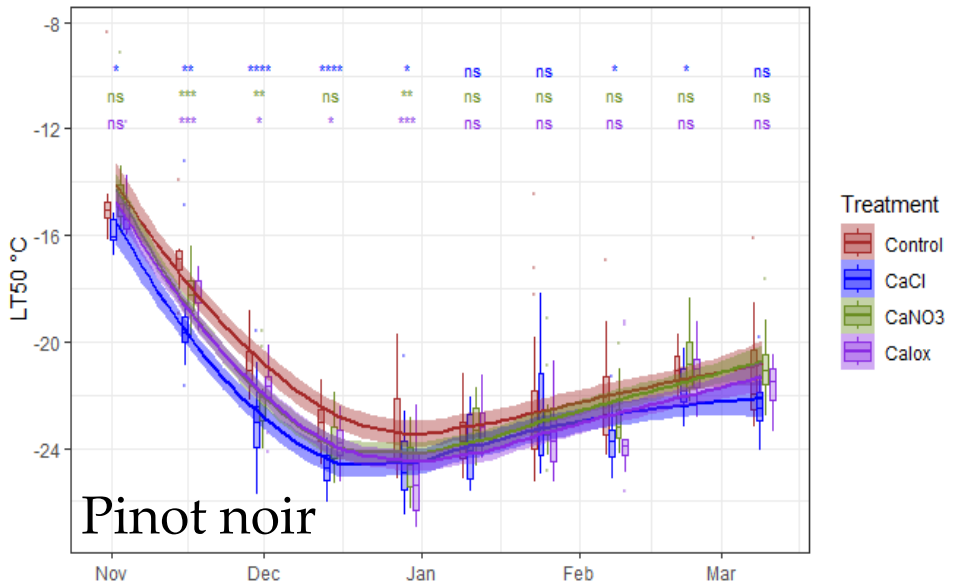
Finger Lakes Region:
Chardonnay
Pinot noir
Lemberger
Melody
Gewurztraminer
Gruner Veltliner
Seyval blanc
Corot noir

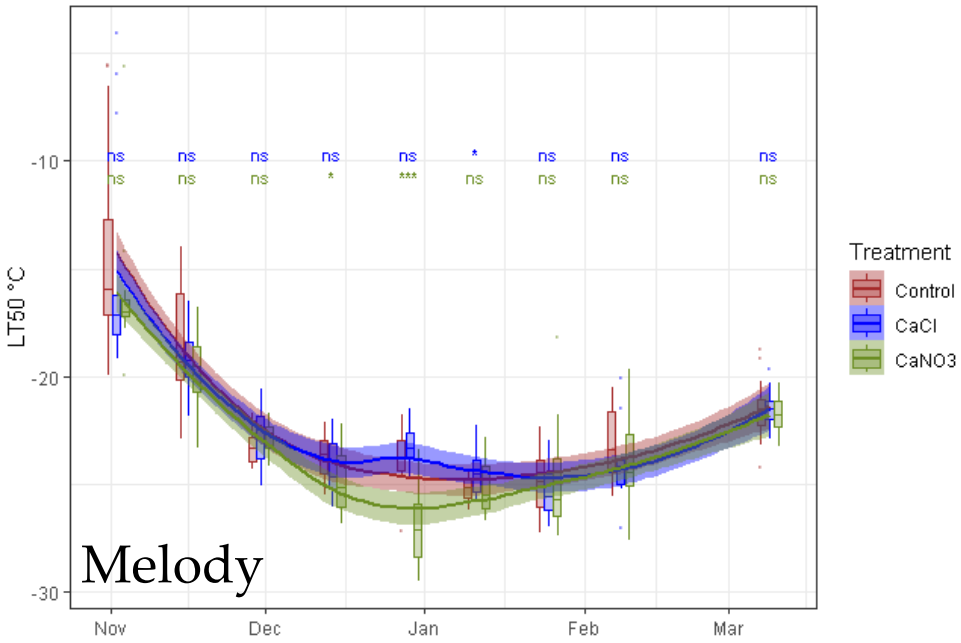
Portland NY Region:
Chardonnay
Cabernet Sauvignon
Concord
Riesling

Calcium Chloride: $CaCl_2$
Calcium Nitrate: $CaNO_3$
CalOx (Biosafe product)

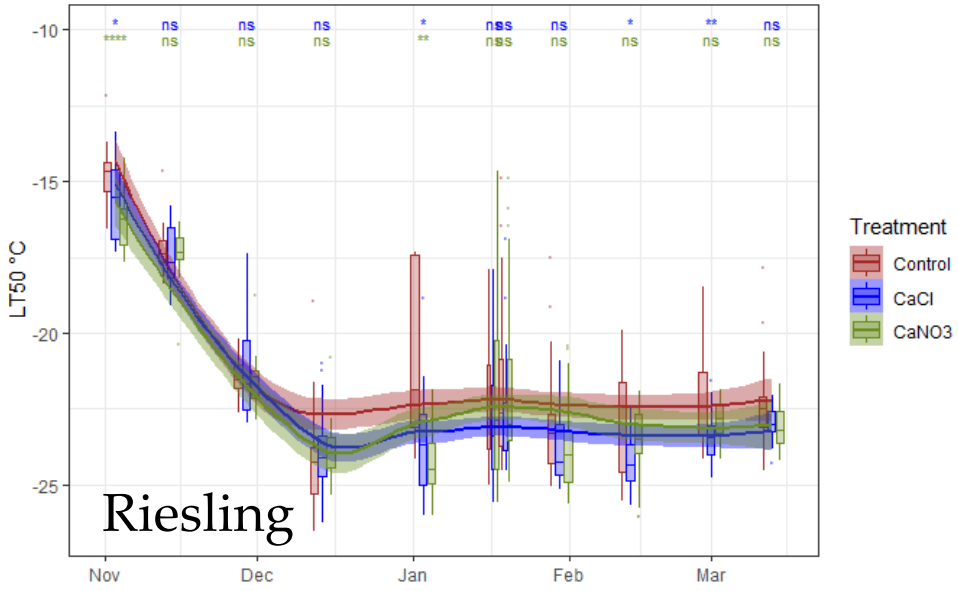
Preliminary Results suggest some cultivar specific potential for Calcium treatments to shift cold hardiness

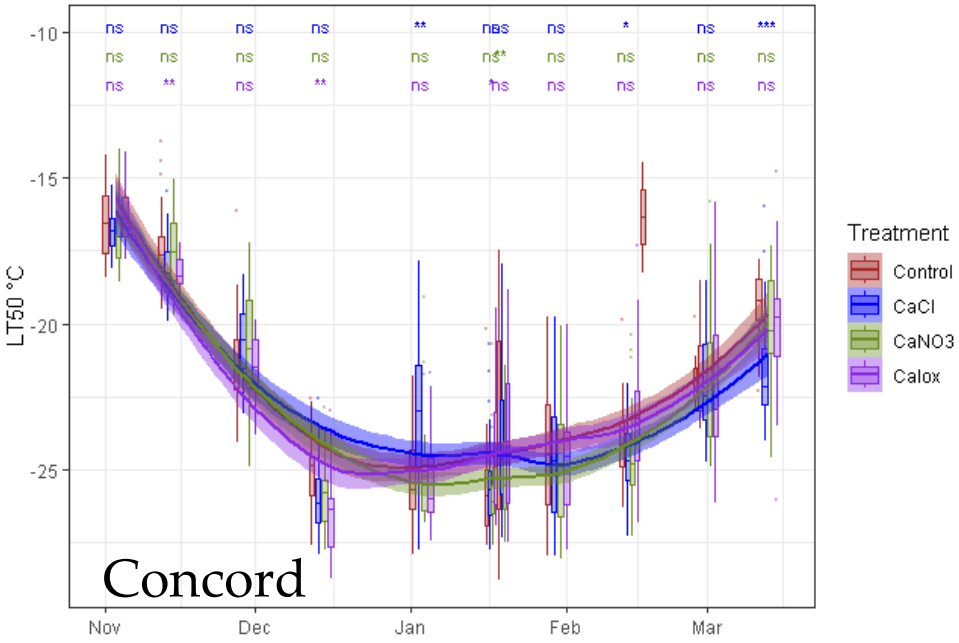
Finger Lakes





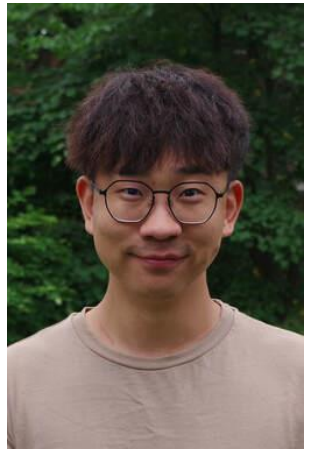
Portland





Enhancing cold hardiness and delaying budbreak with foliar sprays

Evaluation of Tetralone Abscisic Acid as a Novel Budbreak Delay and Spring Frost Damage Mitigation Product in Vineyards.
NESARE 2022-2023

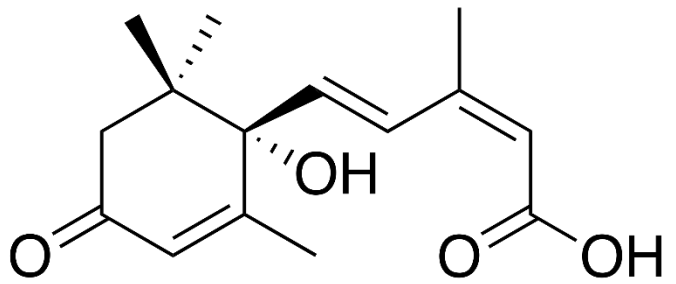


Riesling x Cayuga White

↓

NY81

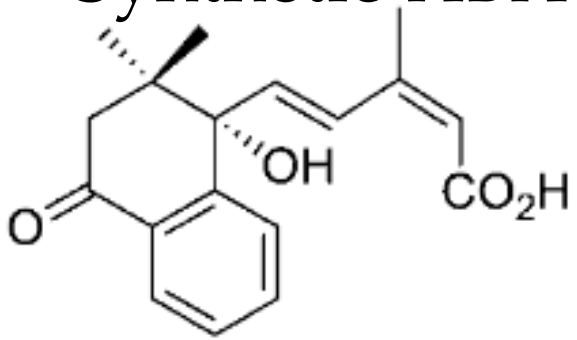
ABA



Key regulator

Enhances acclimation and slows deacclimation

Synthetic-ABA



Analog to ABA

functions similarly in plants, but degrades much slower

Tetralone-ABA applied on 10/05/2022

One week

Control

Tetralone-ABA

Three weeks

Control

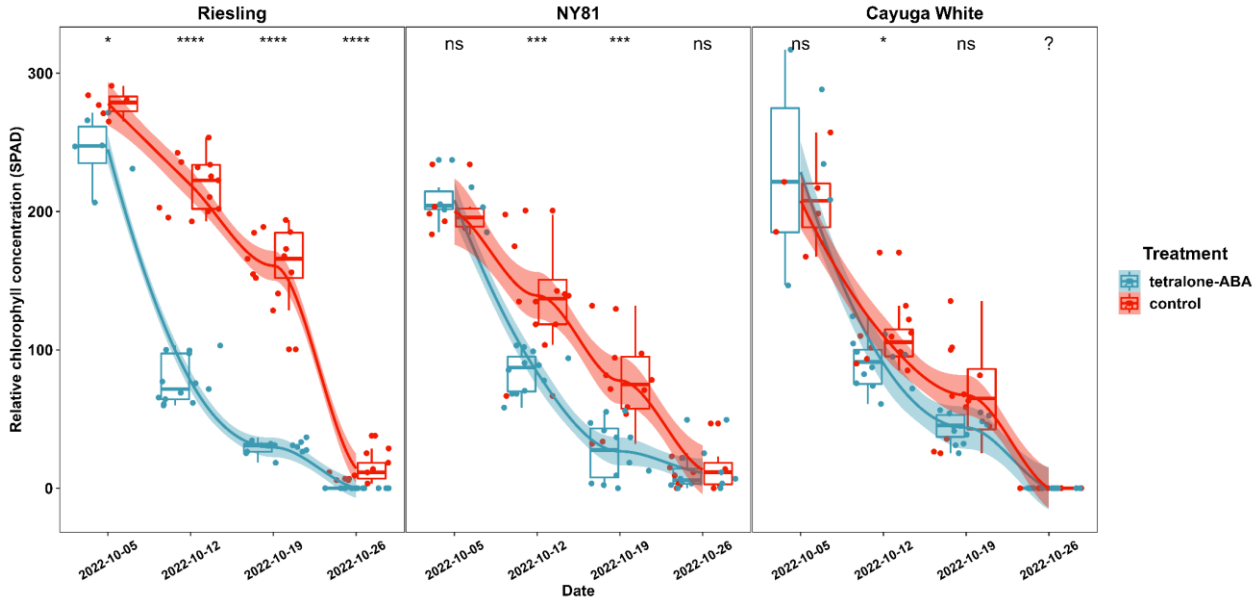
Tetralone-ABA

Two weeks

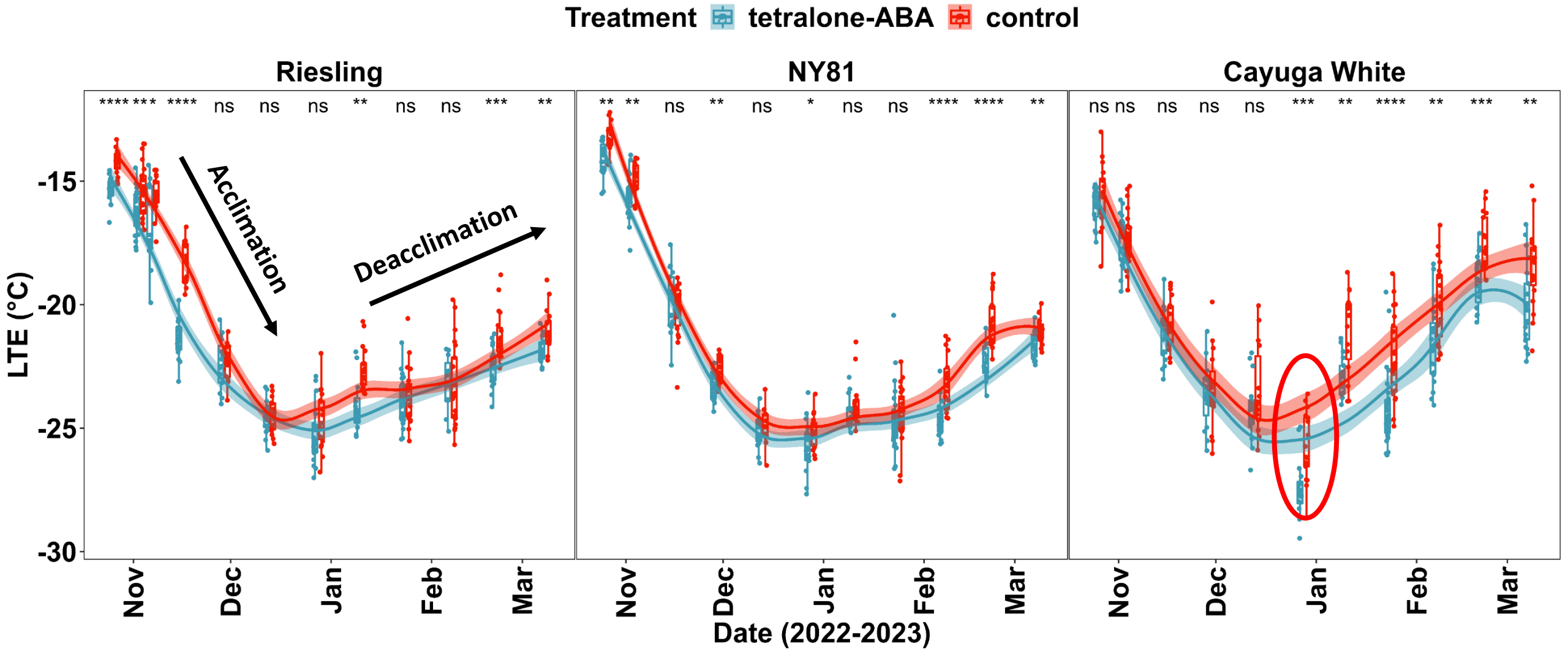
Control

Tetralone-ABA

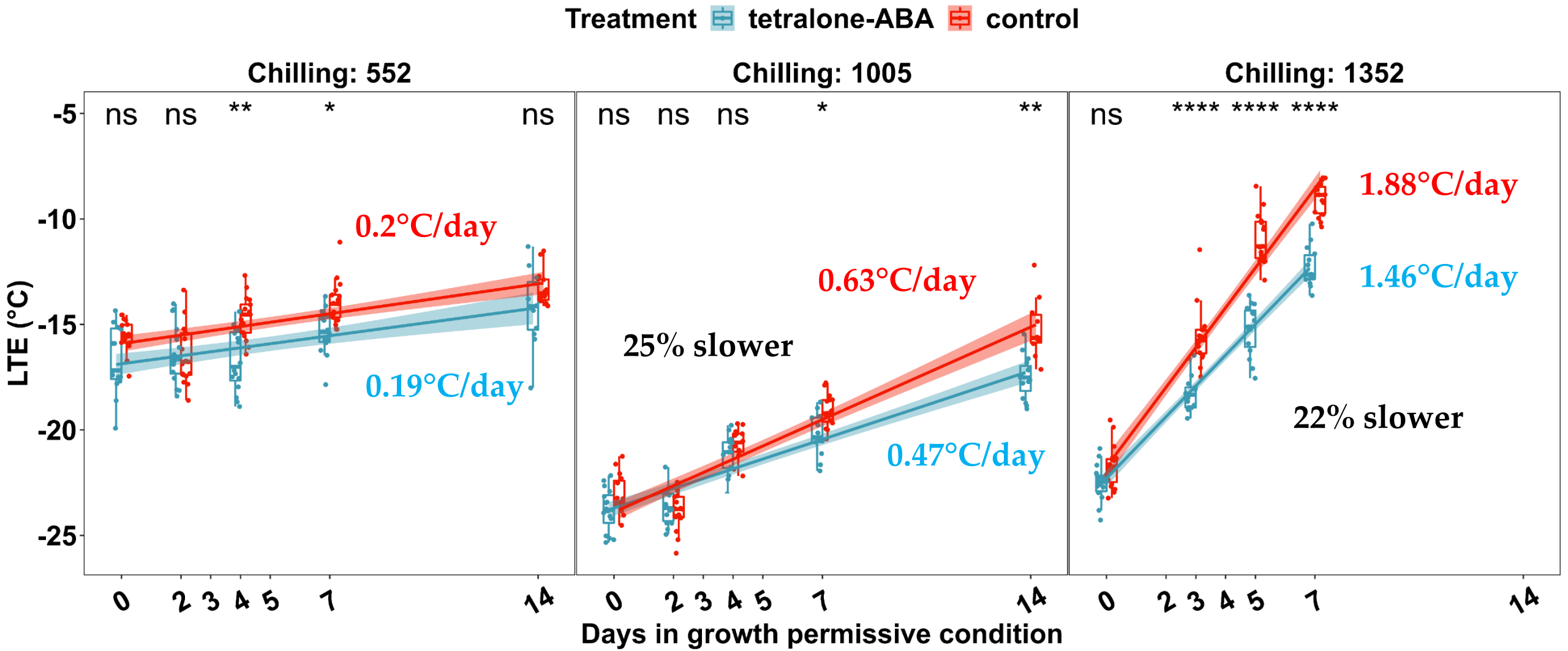
Photosynthesis



Cold Hardiness



Deacclimation of ‘Riesling’ at different chilling hours



When you think about climate change impacts in your vineyards, what events are you seeing with greater frequency, or what are you most concerned about?

Episodic drought events and potential vine losses

Increasing temperatures during ripening, and the potential for reductions in fruit quality

Freeze damage during midwinter as a result of milder winters, but continued polar vortex events.

Heavy rains and water logging, weakening vine growth and increasing fertilizer leaching

Frost and hail events causing damage and yield losses

Thank you

@shiversherlock
jpl275@cornell.edu

Hongrui Wang
Cornell University

Dr. Al Kovaleski
University of Wisconsin

Jennifer Russo
CLERL CCE

Hanna Martens
Cornell University

Ravines Wine Cellars
Anthony Road Wine Co.
Ventosa Vineyard
Standing Stone Vineyard
Wagner Vineyard
Swedish Hill Vineyard
Prejean Vineyard
Three Brothers Vineyard
Boundary Breaks Vineyard
Sawmill Creek Vineyard
Lakewood Vineyard

Miles Vineyard
Tabora Vineyard
Dalrympl Farms
WNY Concord Growers: Ortolano, Bell, Jordan, Betts, Mobilia, Cross, Rak, Sprague, Schneider, Szumigala, McGuinn

Dr. Bruce Reisch
Dr. Tim Martinson
Hans Walter-Peterson
Don Caldwell

Northeast SARE Sustainable Agriculture Research & Education

Boldly, NY. www.newyorkwines.org

NY farm viability INSTITUTE

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