



Eastern Winery

EXPOSITION +
CONFERENCE

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EV 01

DOES CROPSIZE REDUCTION MAKE BETTER WINES?

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Introduction

- Wine quality and crop size in the upper Midwest are challenged by vintage and environmental factors.



Materials and Methods

- Locations: four commercial vineyards in eastern and east-central Nebraska.
 - Miletta Vista Winery, Prairie Creek Vineyard and Winery, Homestead Vineyard and Rich Harvest Vineyard and Winery.



Materials and Methods

- Targeted cultivars:
 - Frontenac (10+ yrs.), Itasca (4-5 yrs.), (Miletta Vista).
 - La Crescent, Marquette (10+ yrs.), (Prairie Creek).
 - Frontenac Gris (10+), (Homestead).
 - Cynthiana/Norton (7 yrs.), (Rich Harvest).

Materials and Methods

- For each cultivar, a rep of 6 plants were selected and repeated 5 times, randomly spaced throughout the vineyard for a total number of 30 plants.
- Clusters for each vine were counted prior to application of each treatment.

Materials and Methods

- For each rep three crop reduction treatments were implemented: **50% crop reduction**, **25% crop reduction** and **no reduction (control)**. This was done at E-L stage 29-31 (peppercorn to pea-sized berries).
- The vines were then treated the same as the rest of the vines within the vineyard throughout the growing season until harvest (grower standard practice).

Materials and Methods

- Harvest: clusters counted per experimental vine and harvested one day prior to commercial harvest.
- The main harvest date was determined by the commercial winery.
- For each plant, cluster count and weight were recorded.
- A 100-berry field sample was collected from each plant to run °Brix, pH and titratable acidity tests.

Materials and Methods

- UNL Food Processing Center processed 100-berry samples testing for juice quality ($^{\circ}$ Brix, pH, titratable acidity, Brix to acid ratio), flavor (volatile composition by GC/MS), and nutritional properties (total polyphenols, proanthocyanidins, individual phenolic compounds by HPLC/MS/MS, and antioxidant activity by DPPH assay).

Materials and Methods

- Fruit was then processed into wine immediately after harvest following established standard protocols at the UNL Food Processing Center (UNL Innovation Campus).

Materials and Methods

- After producing the wine, oenological characteristics were analyzed (Ethanol (% v/v), pH, titratable acidity, color), flavor (volatile composition by GC/MS), nutritional properties (total polyphenols, total anthocyanins, individual phenolic compounds by HPLC/MS/MS, and antioxidant activity by DPPH assay).

Materials and Methods



- Wine sensory analysis was evaluated by an expert panel for aroma, acidity, bitterness, alcohol, and overall acceptability.

Sampling For Berry and Juice Analysis

- 4 cultivars (Itasca, La Crescent, Frontenac and Marquette).
- 3 treatments 25% and 50% reduction and control.
- 2 replicates for 25%, 50% and control in each group and 5 groups for one cultivar.
- Totally, 30 samples for each cultivar.

Sampling For Skin and Seed Analysis

- 4 cultivars (Itasca, La Crescent, Frontenac and Marquette).
- 3 treatments 25% and 50% reduction and control.
- 25%, 50% and control in each group and 3 groups for one cultivar.
- Totally, 9 samples for each cultivar.

Sampling For Wine Analysis

- 4 cultivars (Itasca, La Crescent, Frontenac and Marquette).
- 3 treatments (25% and 50% reduction) and control.
- 25%, 50% and control in each group and 5 groups for one cultivar.
- Totally, 15 samples for each cultivar.

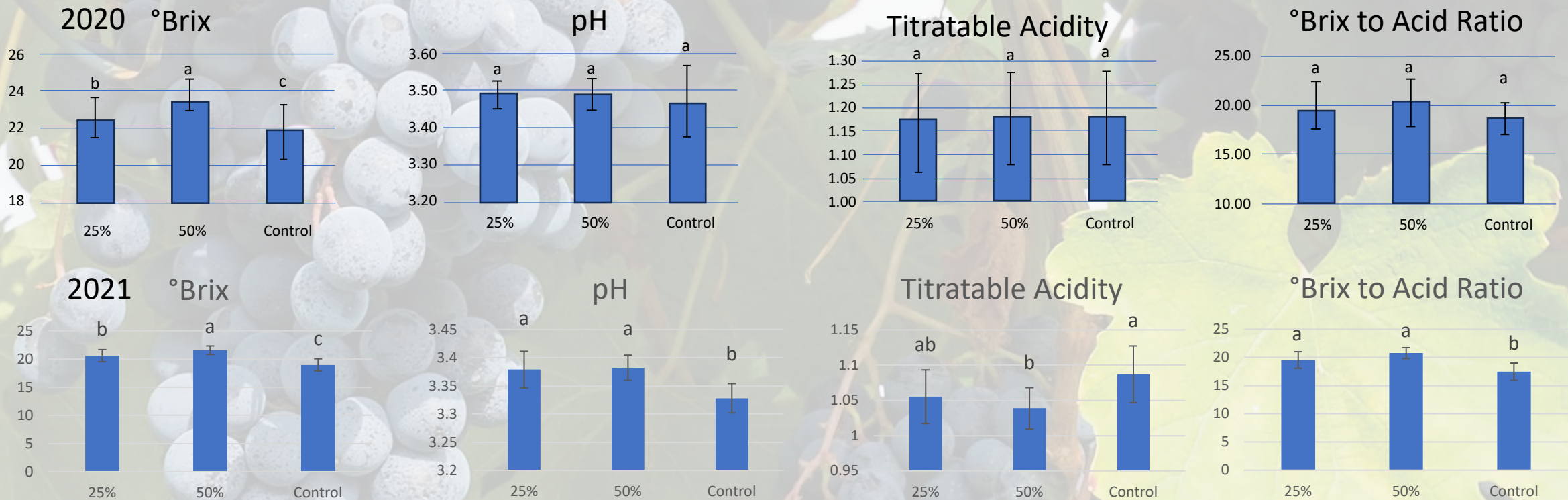
Samples

Cultivar	Drop date	Harvest
Itasca	8-Jun-20 11-Jun-21	11-Aug-20 11-Aug-21
La Crescent	29-Jun-20	19-Aug-20
Frontenac	22-Jun-20	31-Aug-20
Marquette	29-Jun-20	31-Aug-20

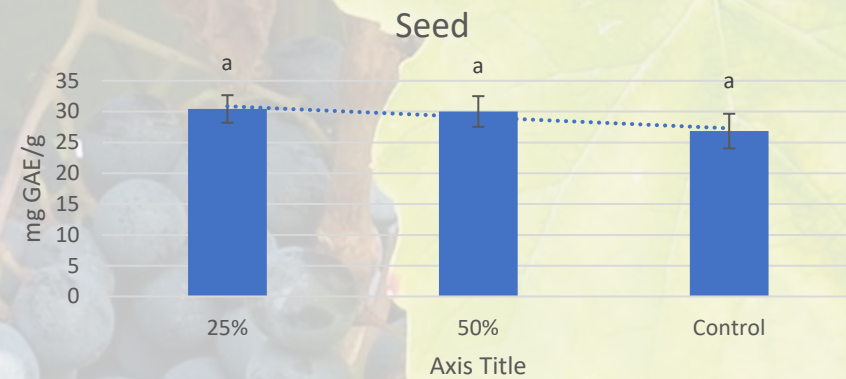
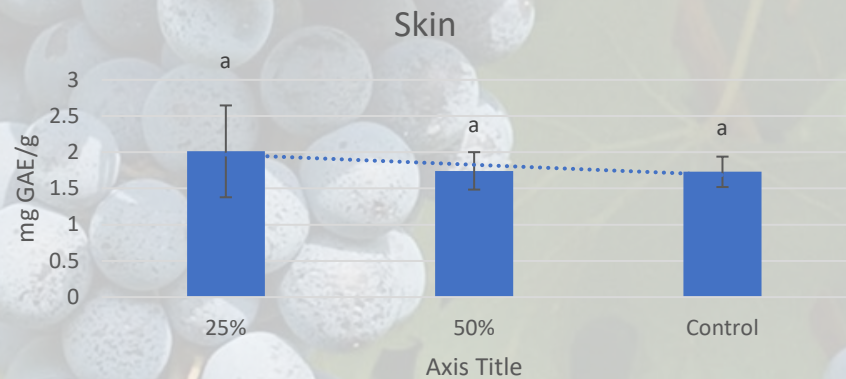
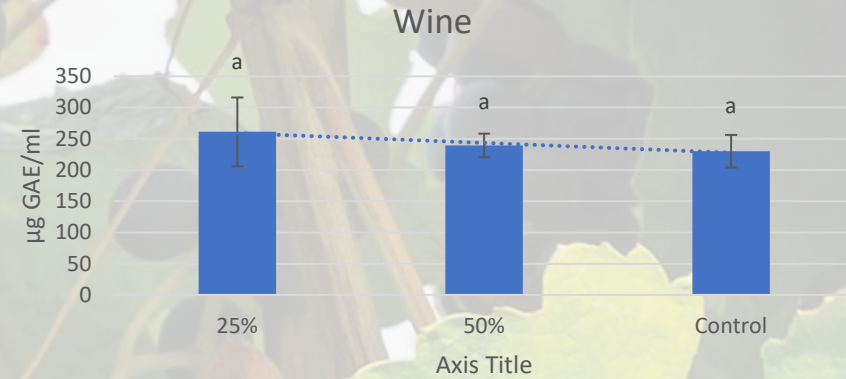
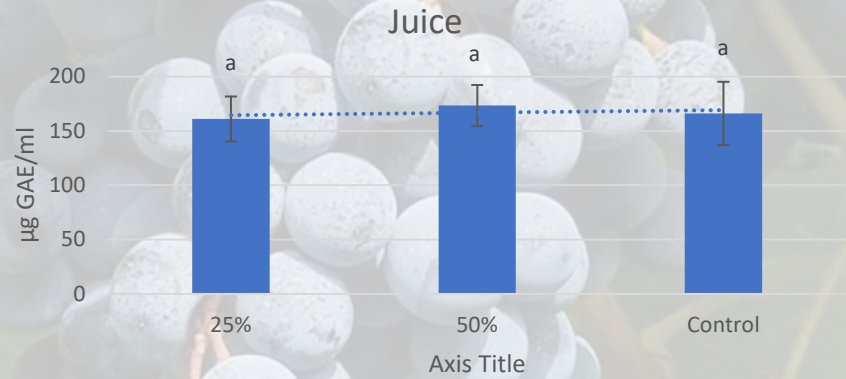
Itasca 2020-2021 Harvest Comparison

Itasca	2020	2021	2020	2021	2020	2021
	Cluster/Plant		Ounces/Cluster		Pounds/Plant	
50%	51.3	106	2.36	3.36	7.66	21.5
25%	66.1	118.6	2.52	3.17	10.56	23.5
control	94	180	2.44	2.40	14.45	27.54

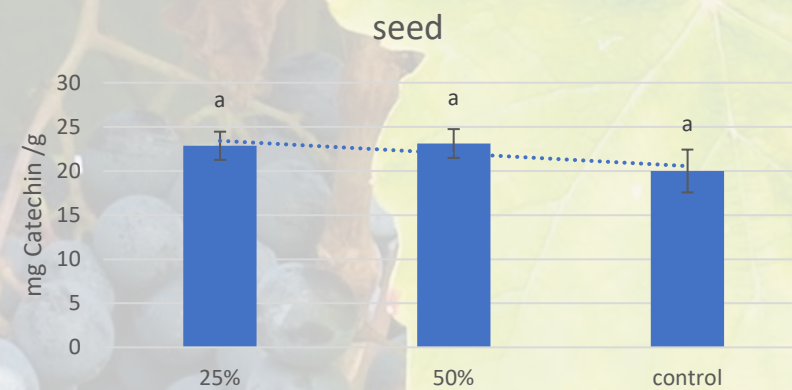
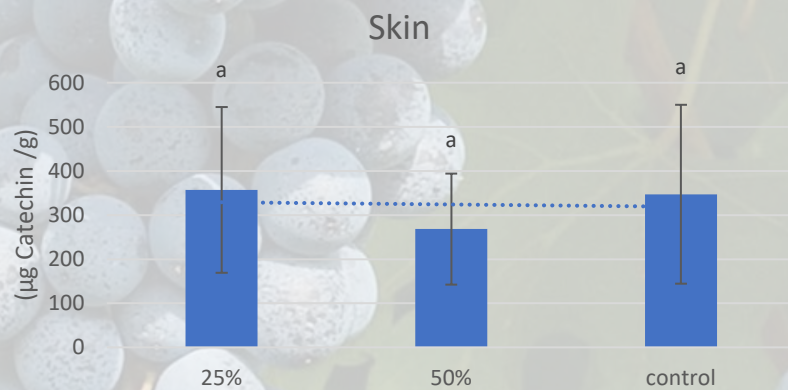
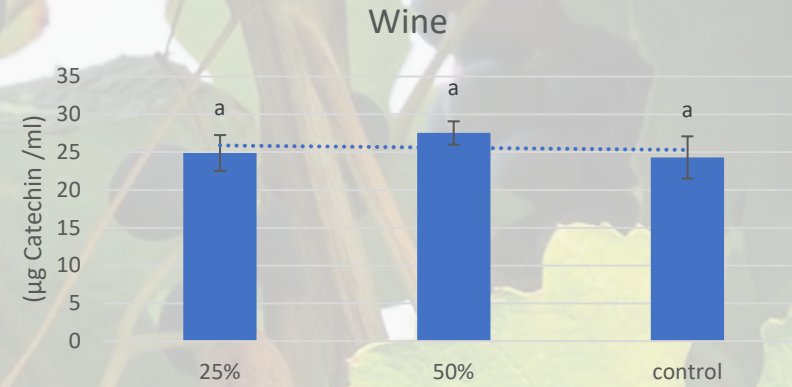
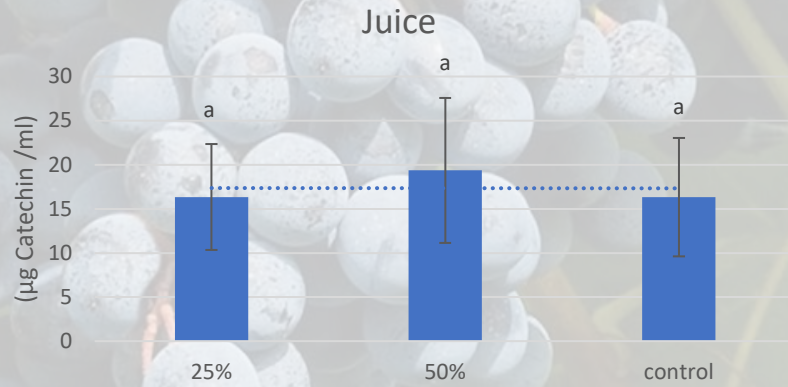
Itasca 2020 – 2021 Juice Comparison



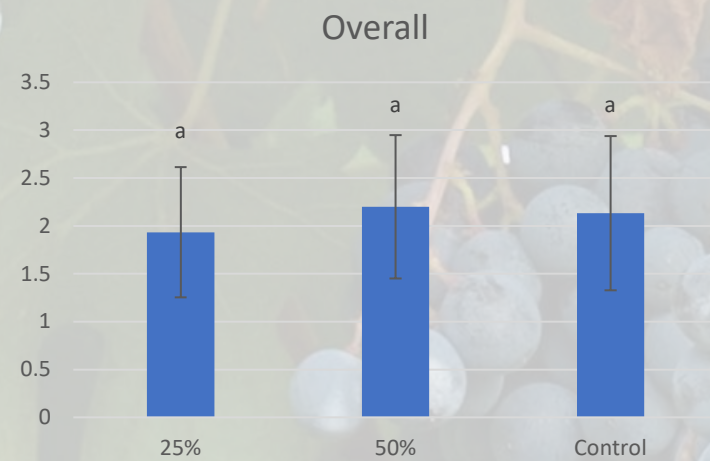
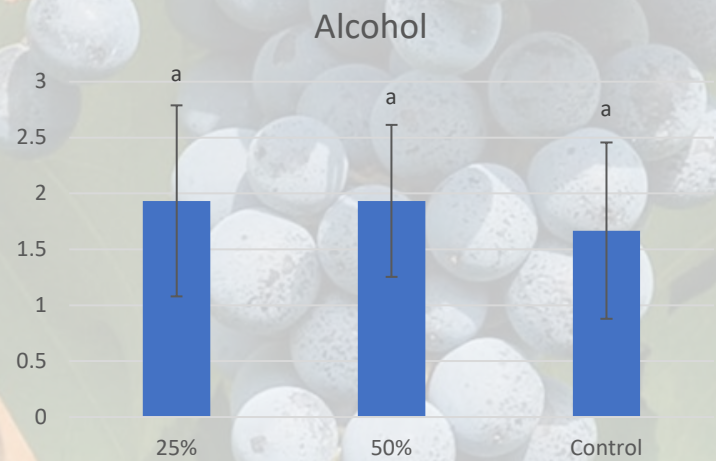
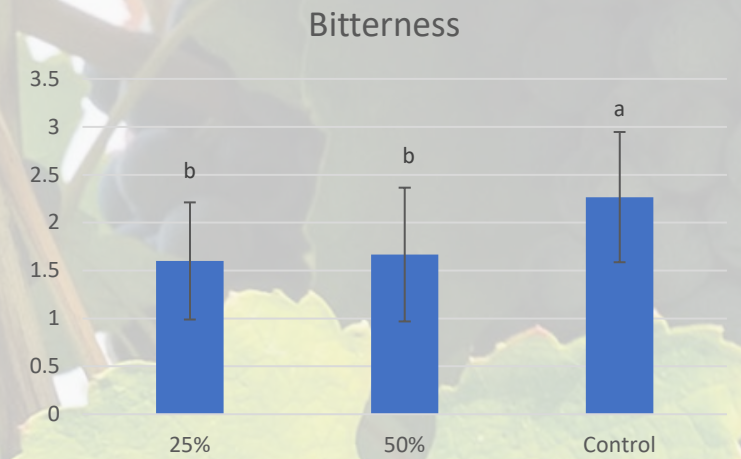
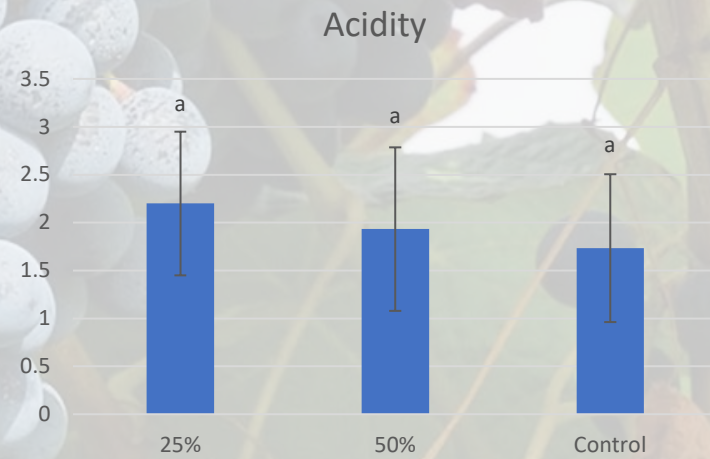
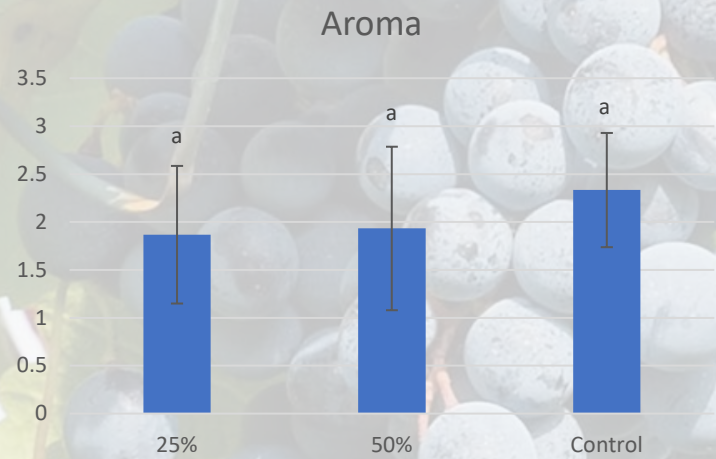
Results Itasca Total Phenolics 2020



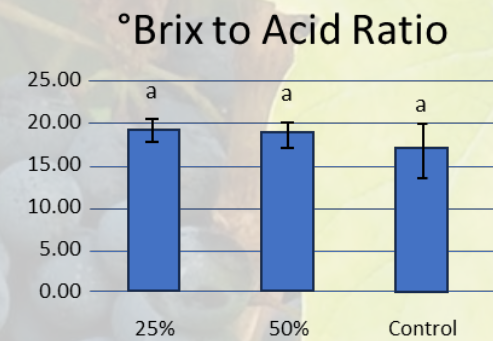
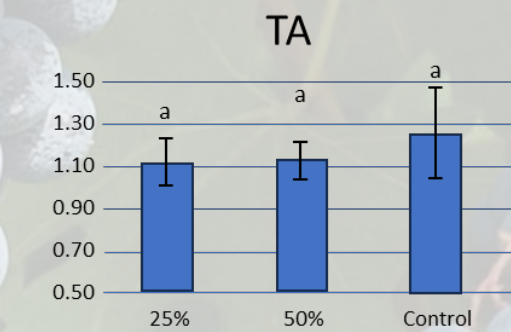
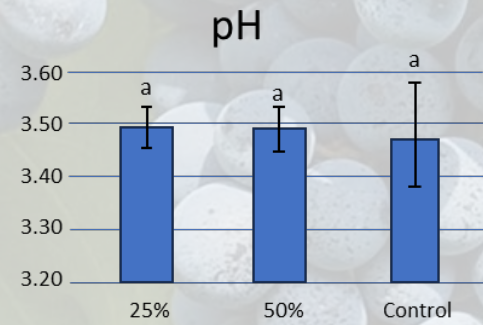
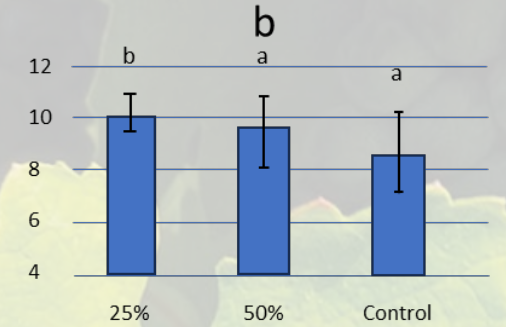
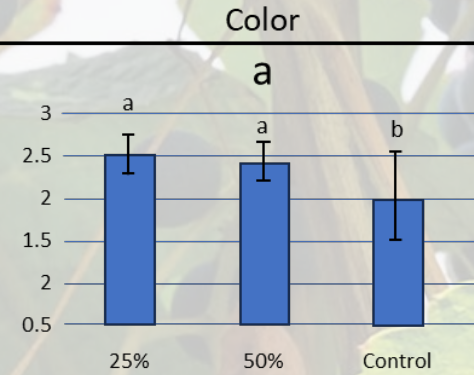
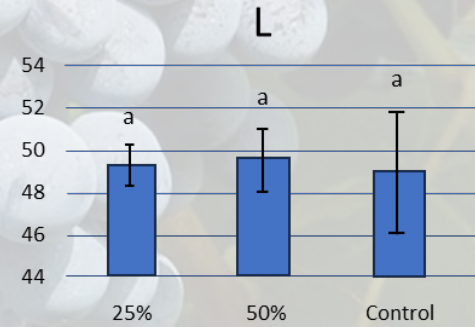
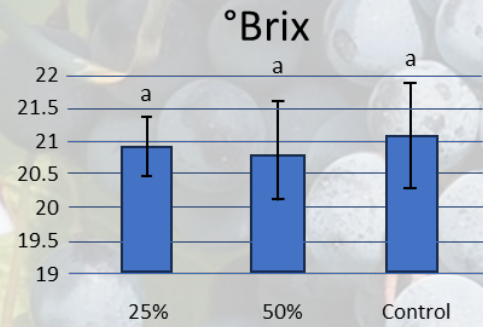
Results Itasca Total Condensed Tannins 2020



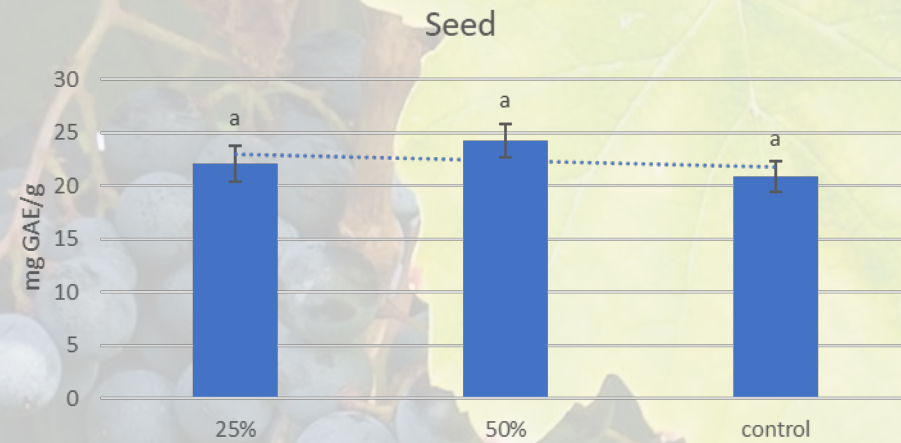
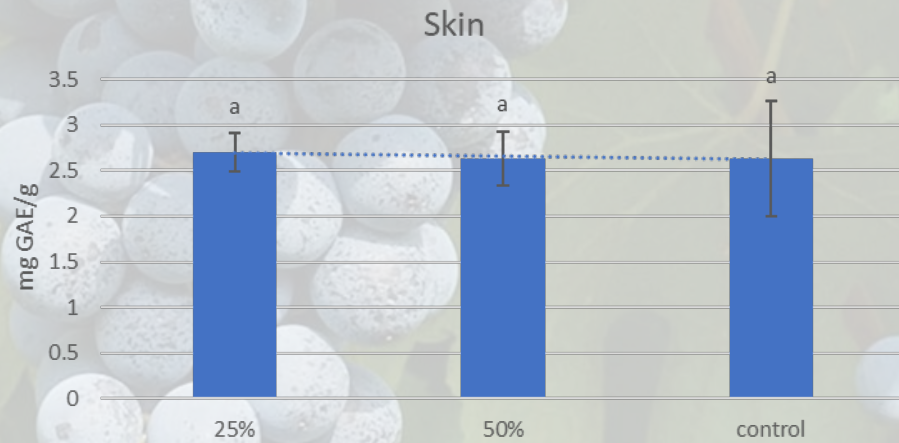
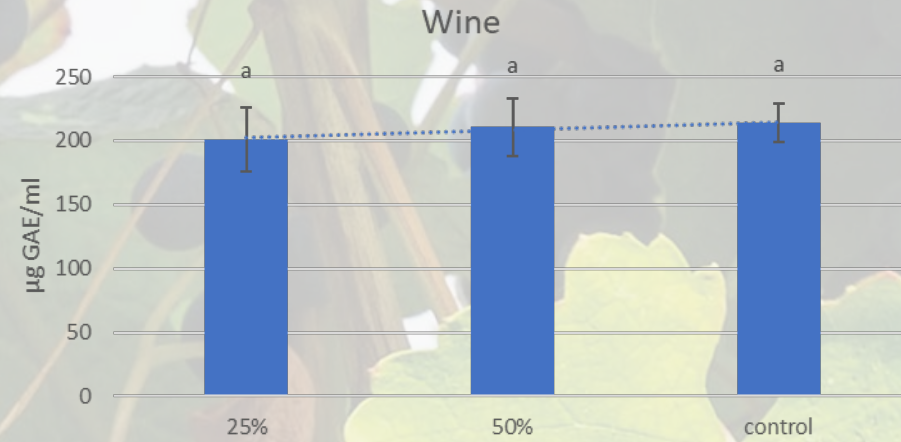
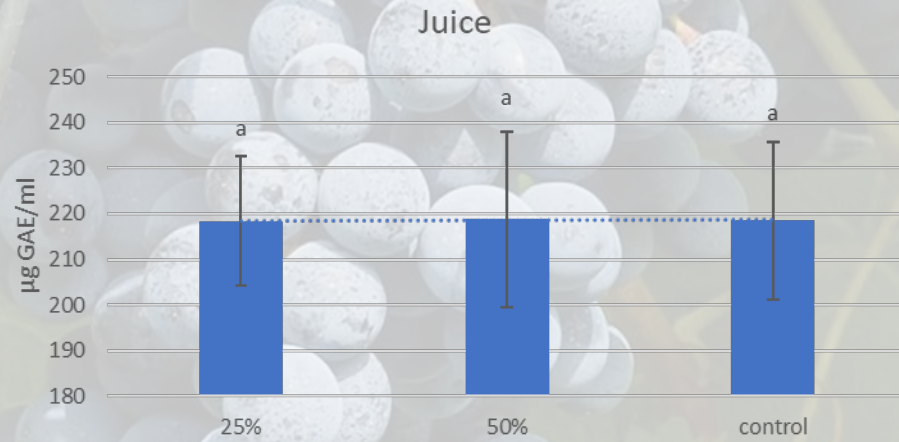
Results Itasca Sensory Evaluation 2020



Results La Crescent 2020



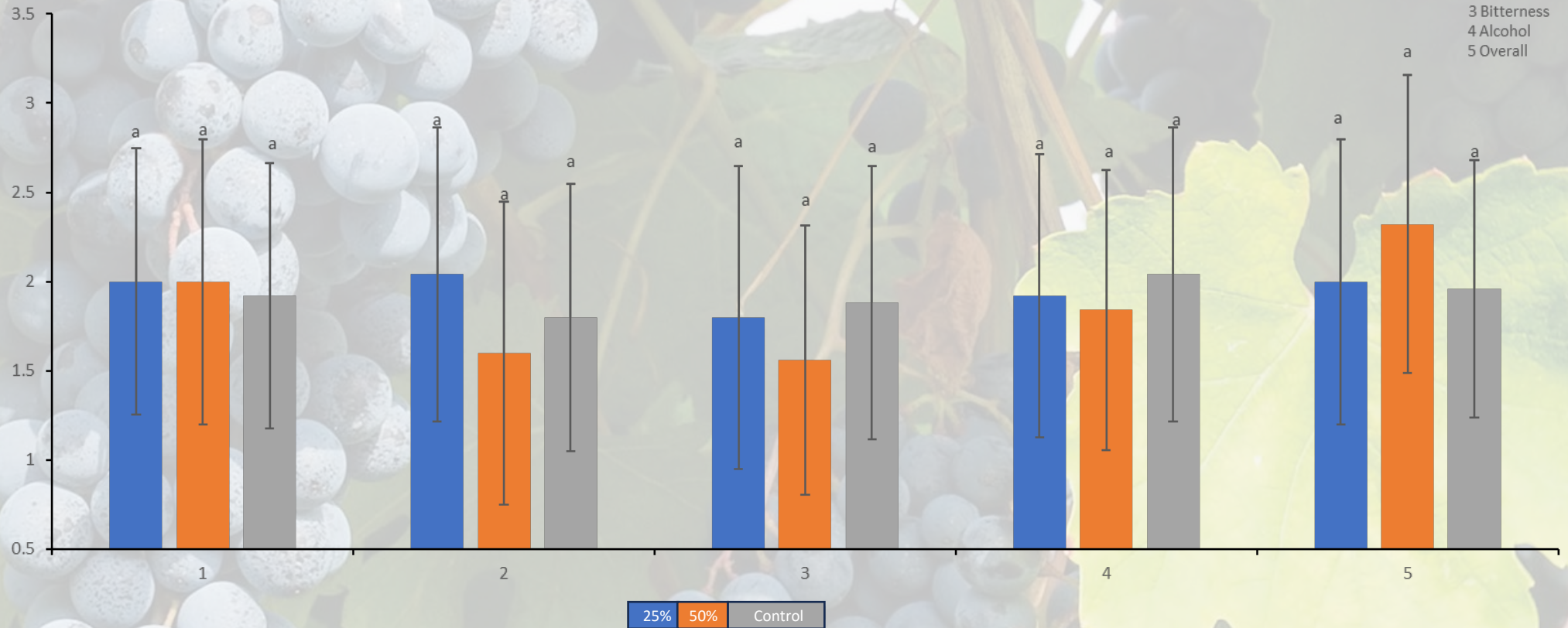
Results La Crescent Total Phenolics 2020



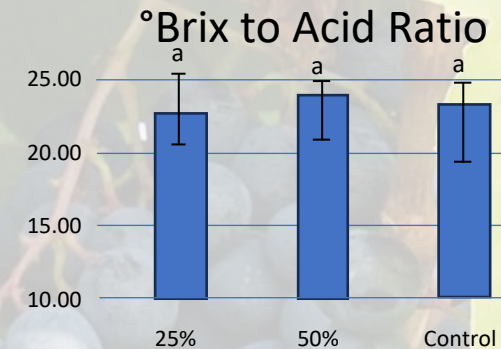
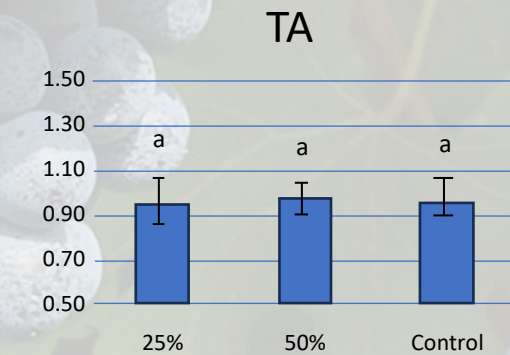
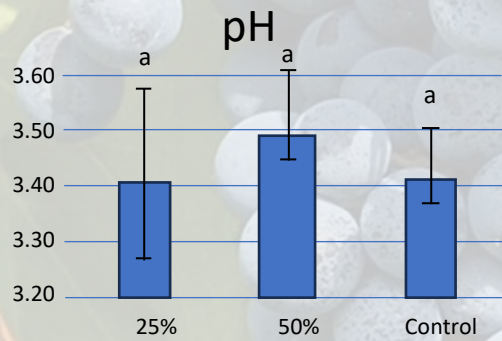
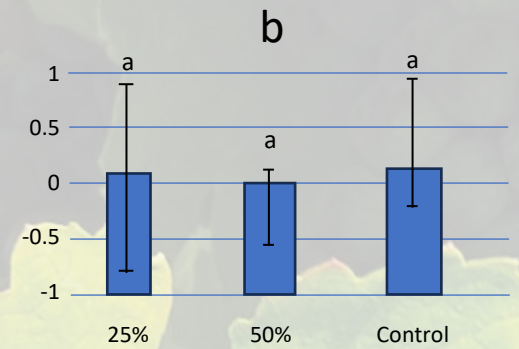
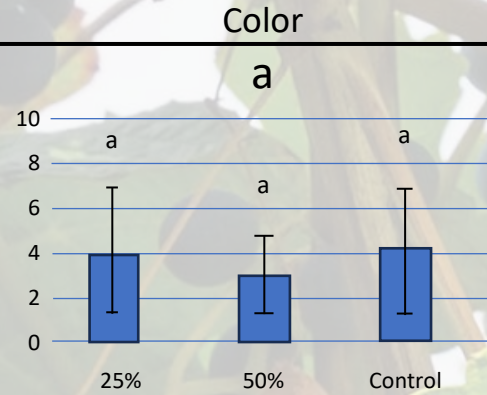
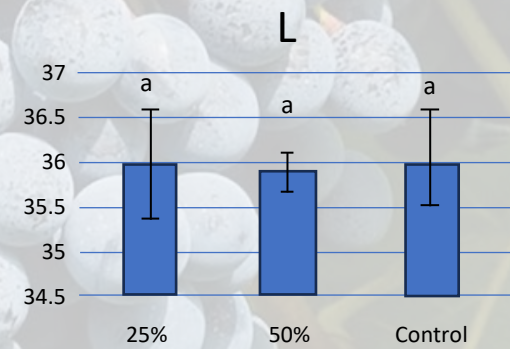
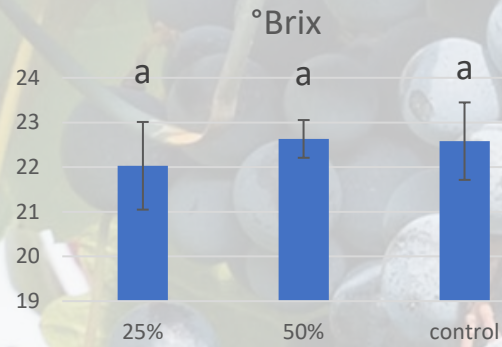
Results La Crescent 2020

Sensory evaluation

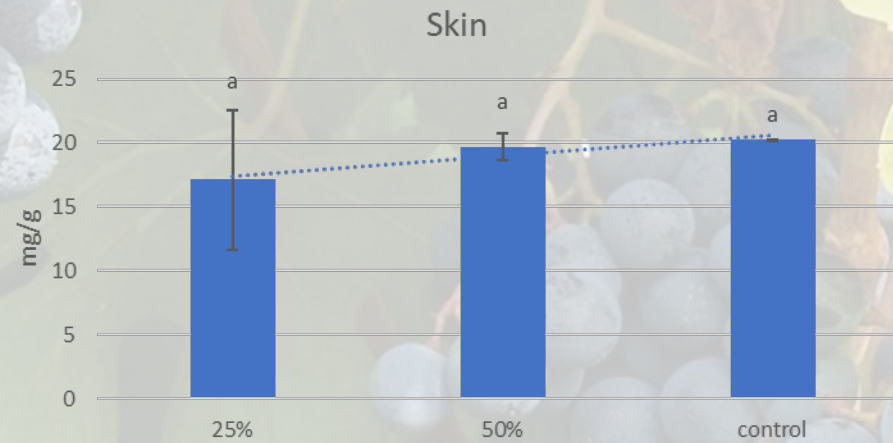
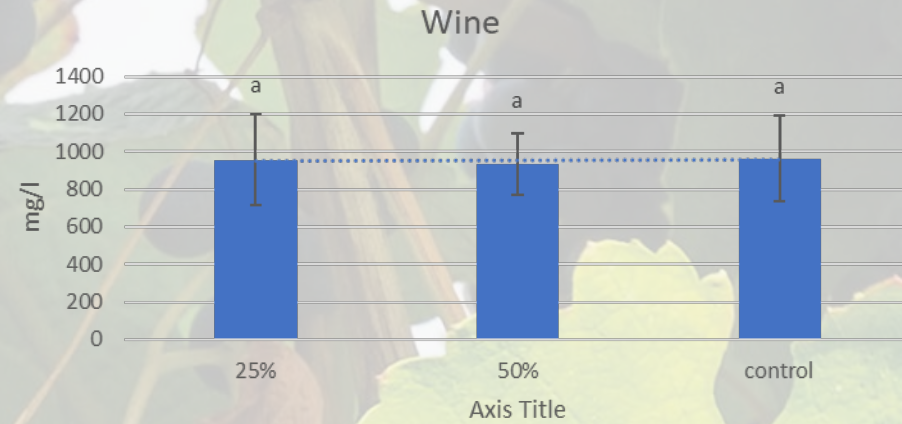
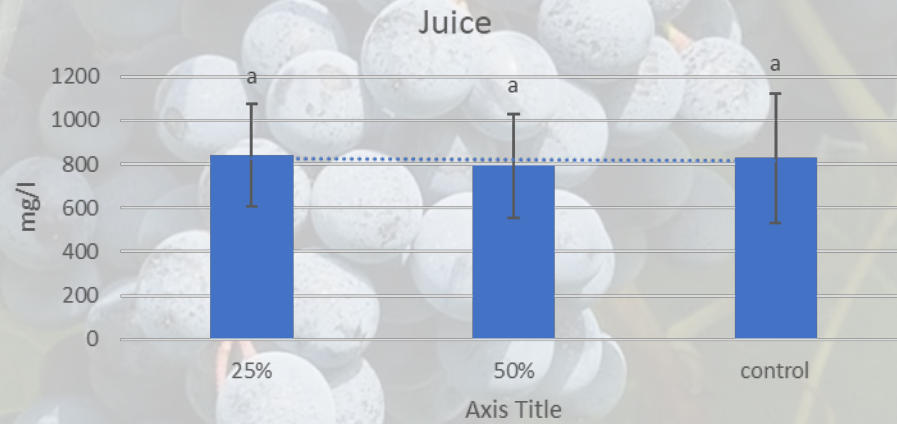
1 Aroma
2 Acidity
3 Bitterness
4 Alcohol
5 Overall



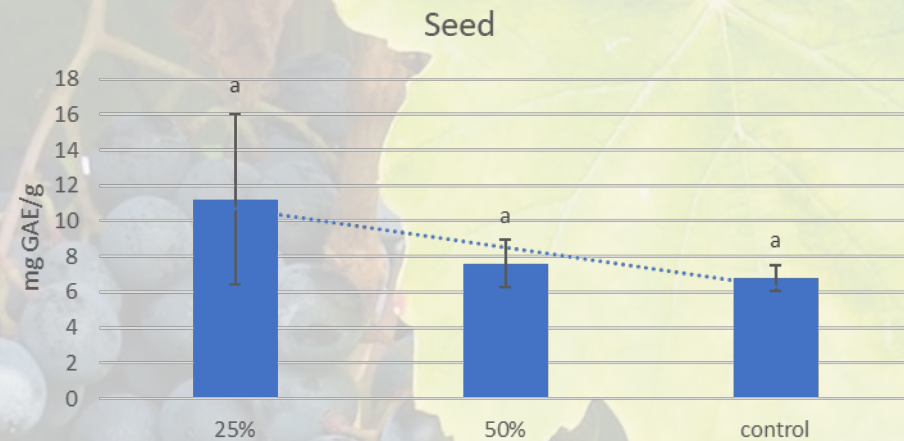
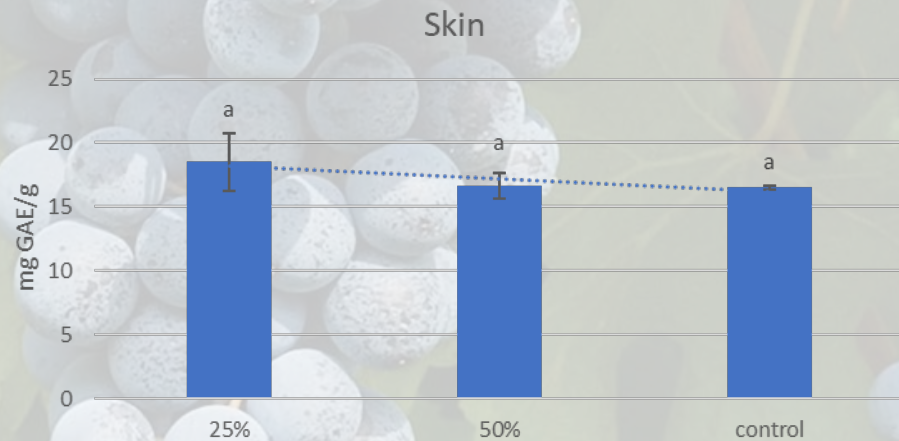
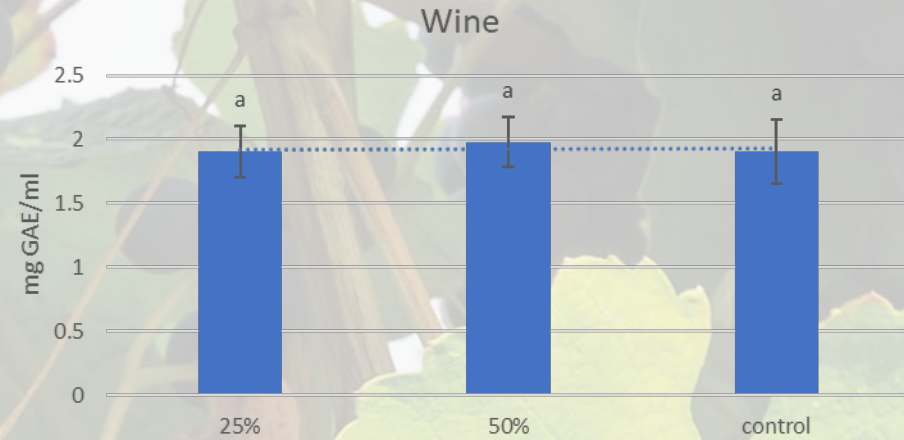
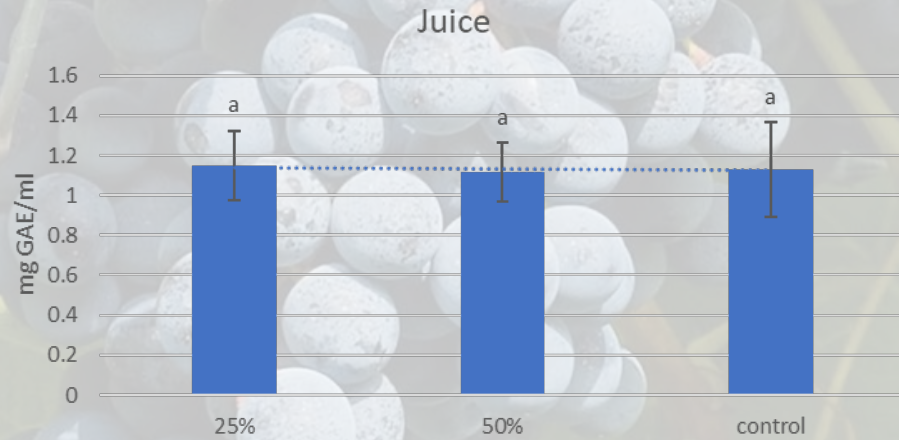
Results Frontenac 2020



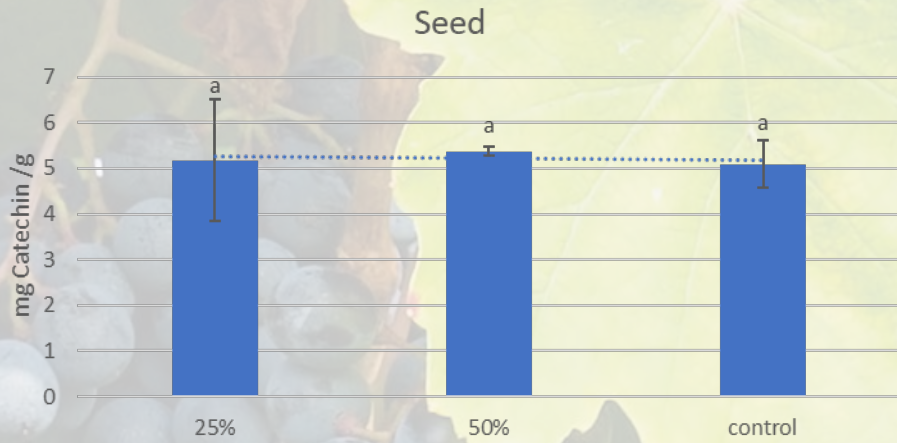
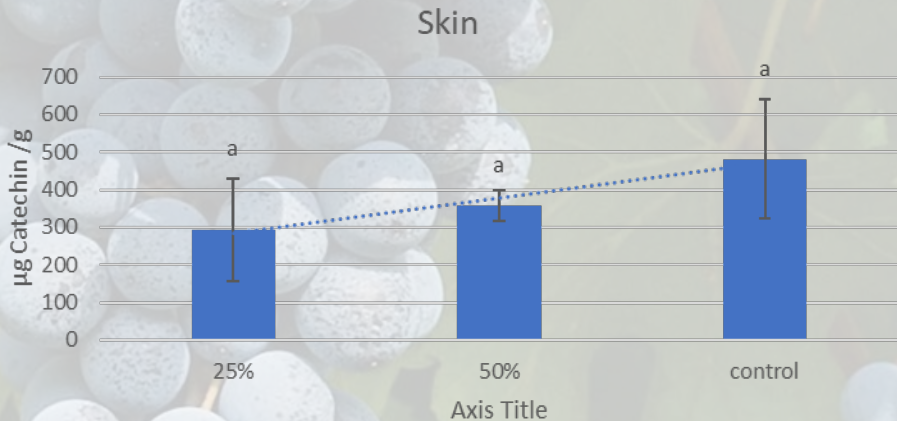
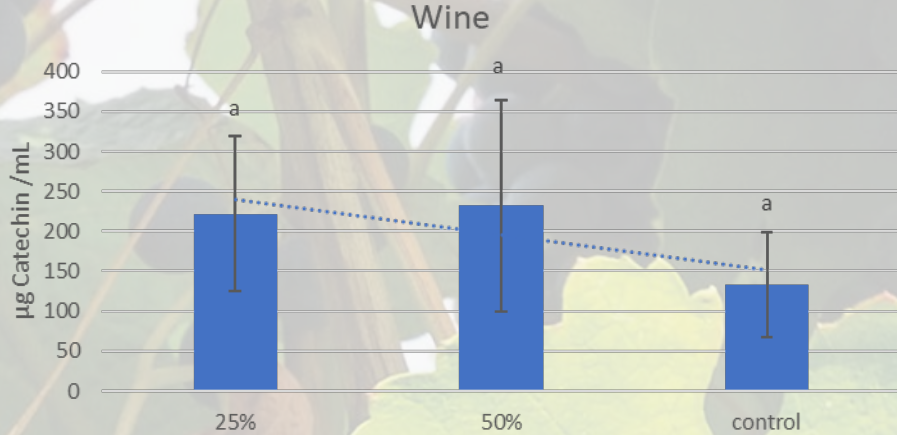
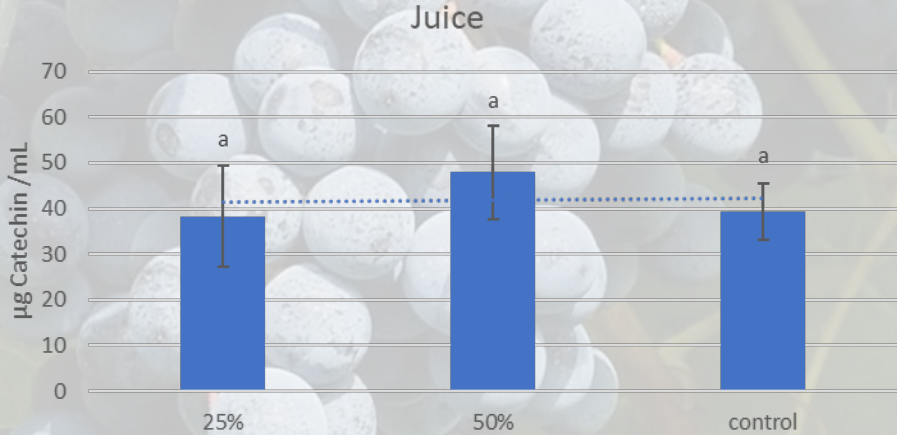
Results Frontenac Total Anthocyanins 2020



Results Frontenac Total Phenolics 2020

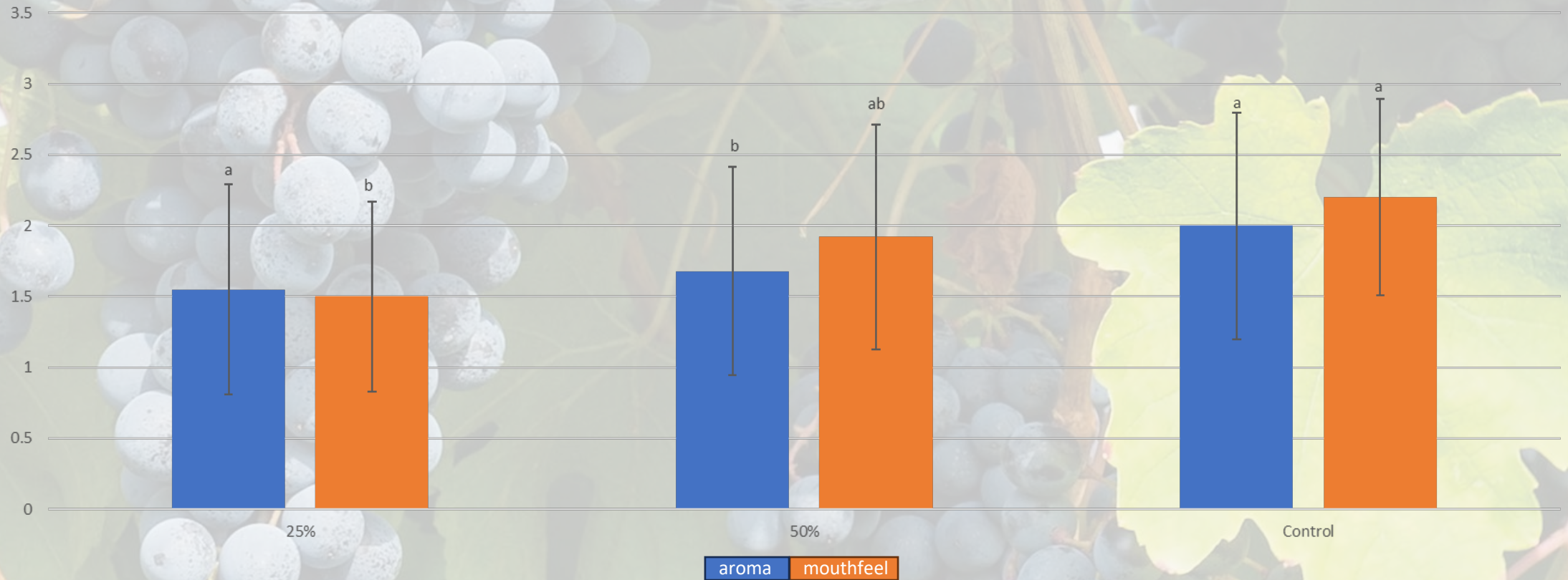


Results Frontenac Total Condensed Tannins 2020



Sensory Results Frontenac 2020

Sensory evaluation

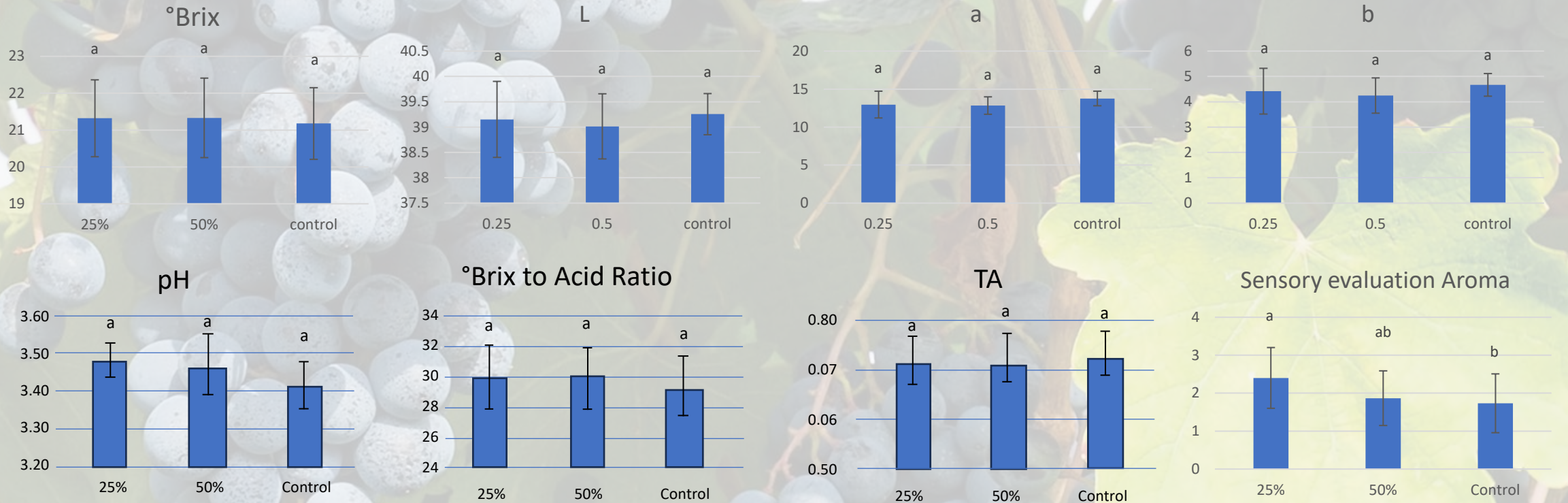


Field Results Marquette 2020

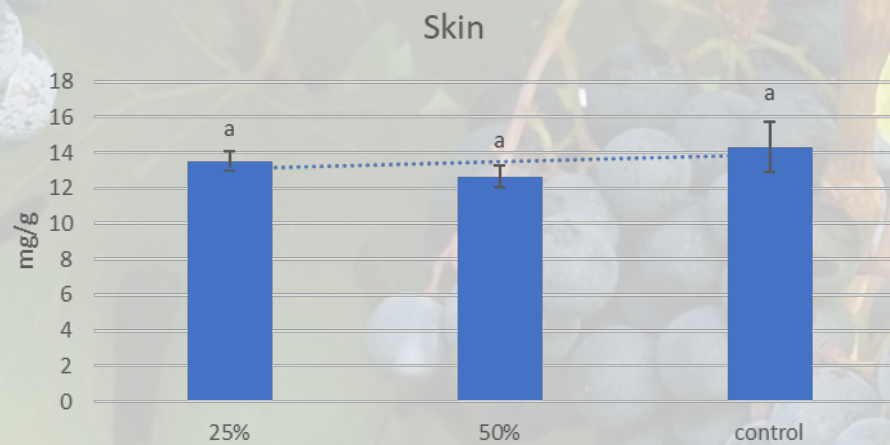
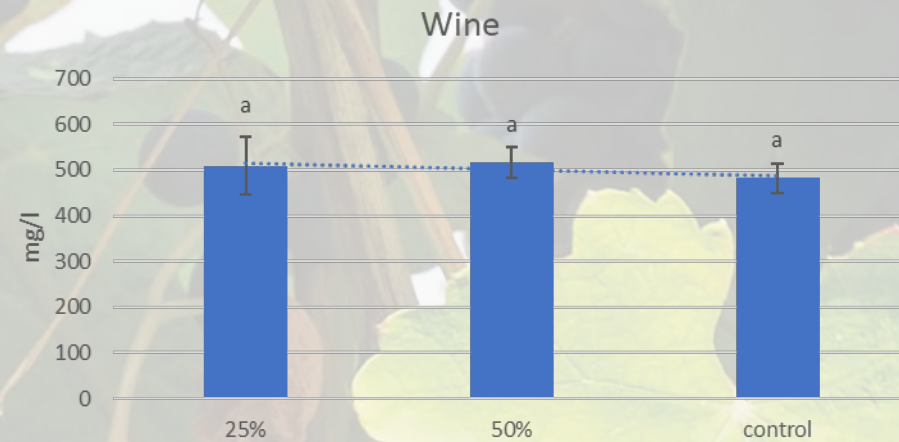
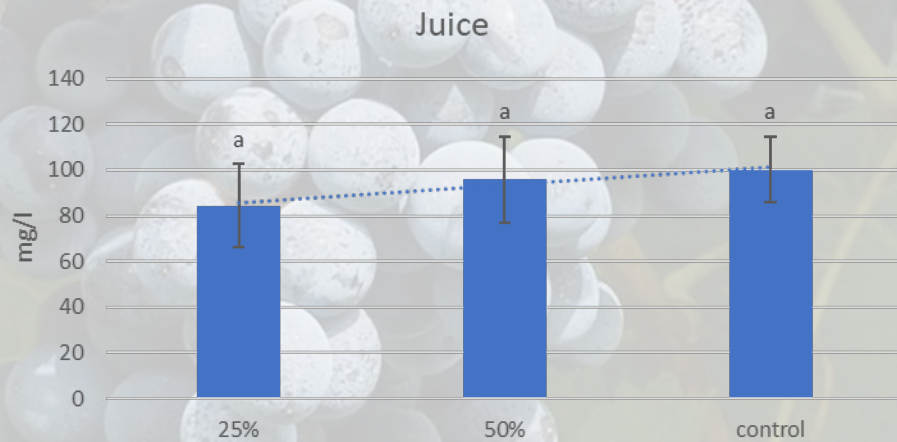
Marquette	2020	2020	2020
	Clusters/Plant	Ounces/Cluster	Pounds/Plant
50%	56.9	1.33	4.72
25%	87.5	1.20	7.19
control	94.1	1.15	6.78

Results Marquette 2020

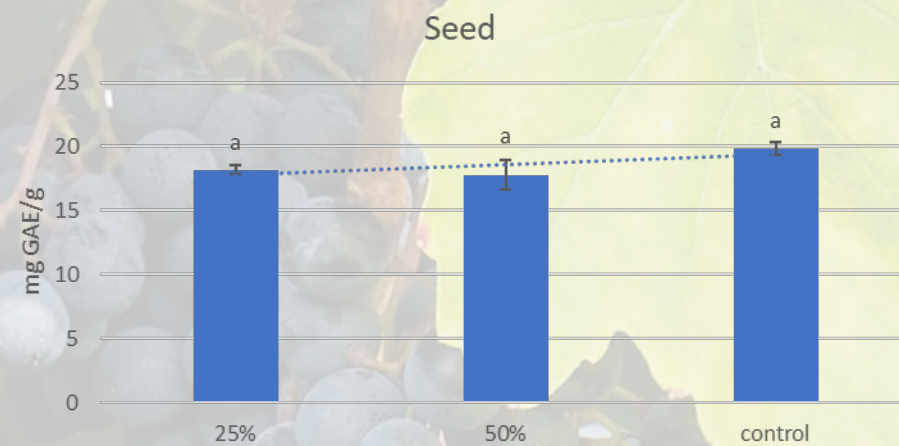
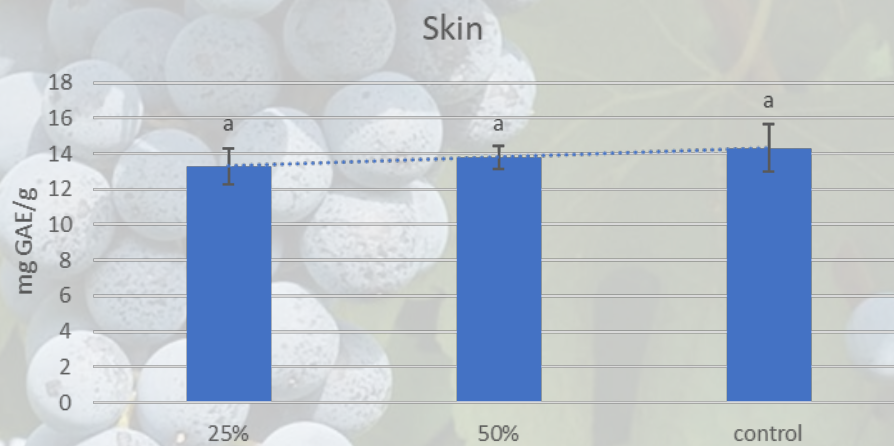
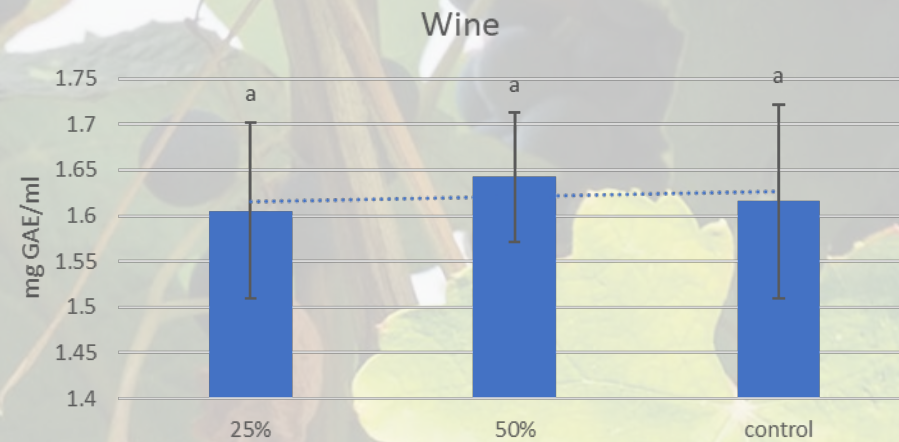
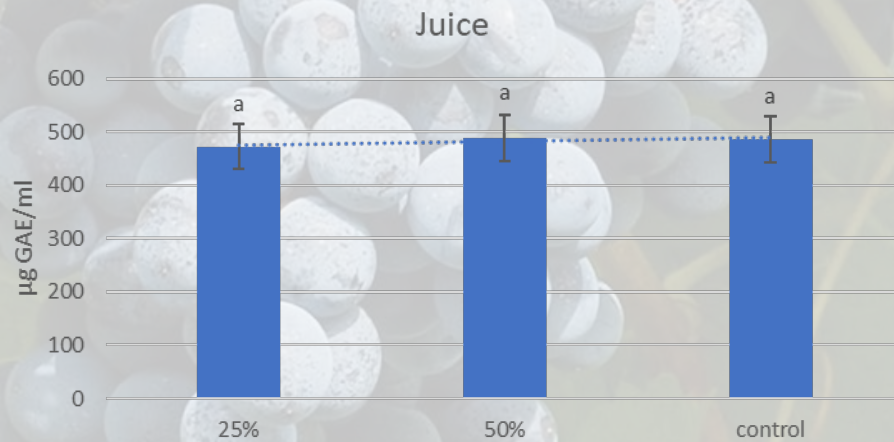
Color



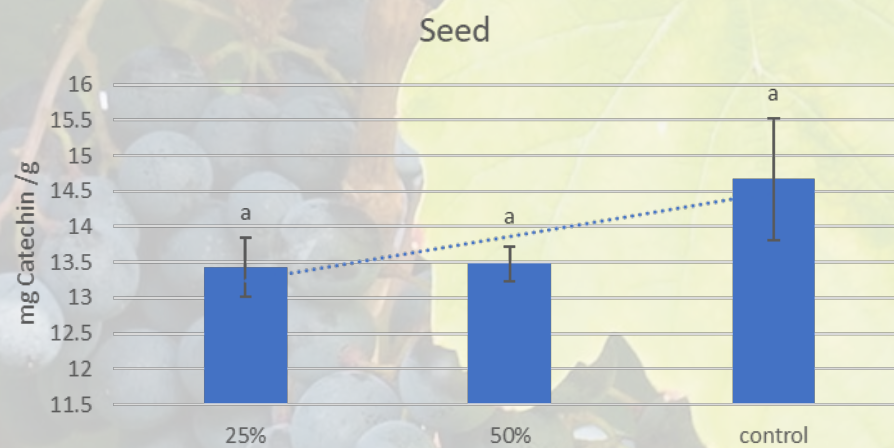
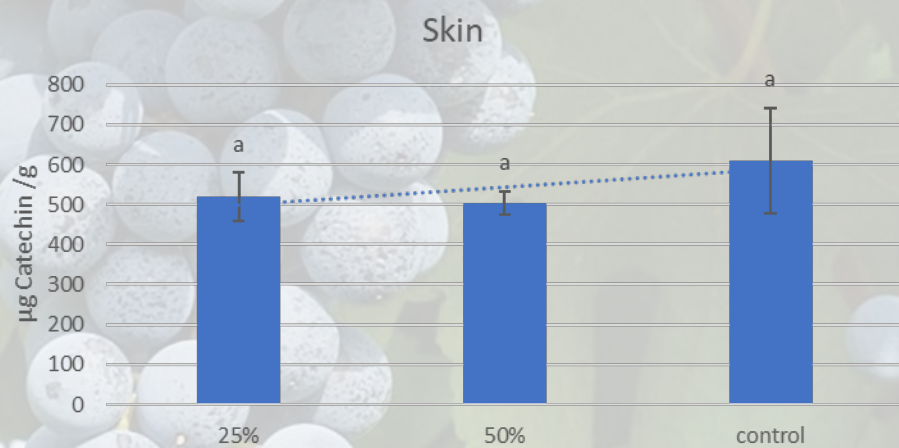
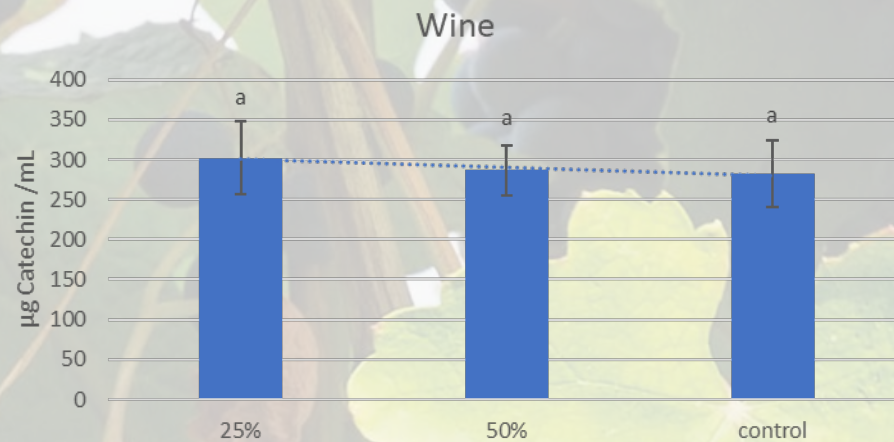
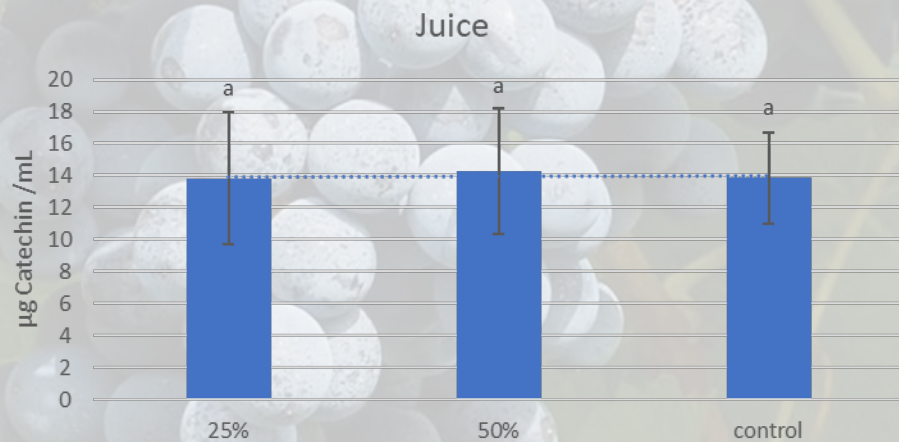
Results Marquette Total Anthocyanins 2020



Results Marquette Total Phenolics 2020



Results Marquette Total Condensed Tannins 2020



Results

- Yield reduction was consistent with crop reduction percentages.
- Berry attributes – differences were not significant for pH, TA, total phenolics, antioxidant activity and proanthocyanidins.



Results

- Soluble solids and Brix to acid ratio were mostly not significant, with the exception of one Itasca experiment (slight increase in Brix with 50% reduction which was reflected in Brix to acid ratio).
- Wine evaluations were inconclusive: no preferences were consistently noted by trained panelists.

Implications

- Because no consistently significant benefits were discerned for crop reduction and because growers are paid by the ton, dropping clusters could be “like throwing money on the ground” (R. Smart quote).

Implications

- If yield has been purposely reduced, yield and therefore profits, will be further reduced in the event of environmental stresses during the growing season (hail, herbicide drift damage, insect damage, etc.).



Future Research

- The same experiment with the same cultivars needs to be repeated to verify results.
- Additional cultivars need to be tested, (e.g., Petite Pearl, Clarion, Verona).
- % reduction rates and alternative timing of treatments should be considered.

Summary

- Itasca, La Crescent, Frontenac and Marquette were used for this study. Each cultivar was treated with 25% and 50% crop reduction respectively at post fruit set (E.L. 29-31) to investigate the impacts of crop reduction on fruit and wine quality.

Summary

- At harvest stage, berries from treatments and control of the four grape cultivars were randomly collected for evaluating the fruit quality ($^{\circ}$ Brix, color, pH, titratable acidity, $^{\circ}$ Brix/TA), nutritional properties (total polyphenols, total anthocyanins, and total condensed tannins), and wine sensory attributes (aroma, acidity, bitterness, alcohol and overall acceptability).

Summary

- Despite differences in yield, fruit quality and nutritional properties did not show consistent statistically significant differences. Therefore, crop reduction may have limited value for growers of these grape cultivars.





Eastern Winery

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March 12-14, 2024 | Syracuse, NY

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