Five Methods of Crop Thinning In Pinot Noir

and Their Effects on Fruit Composition and Wine Quality

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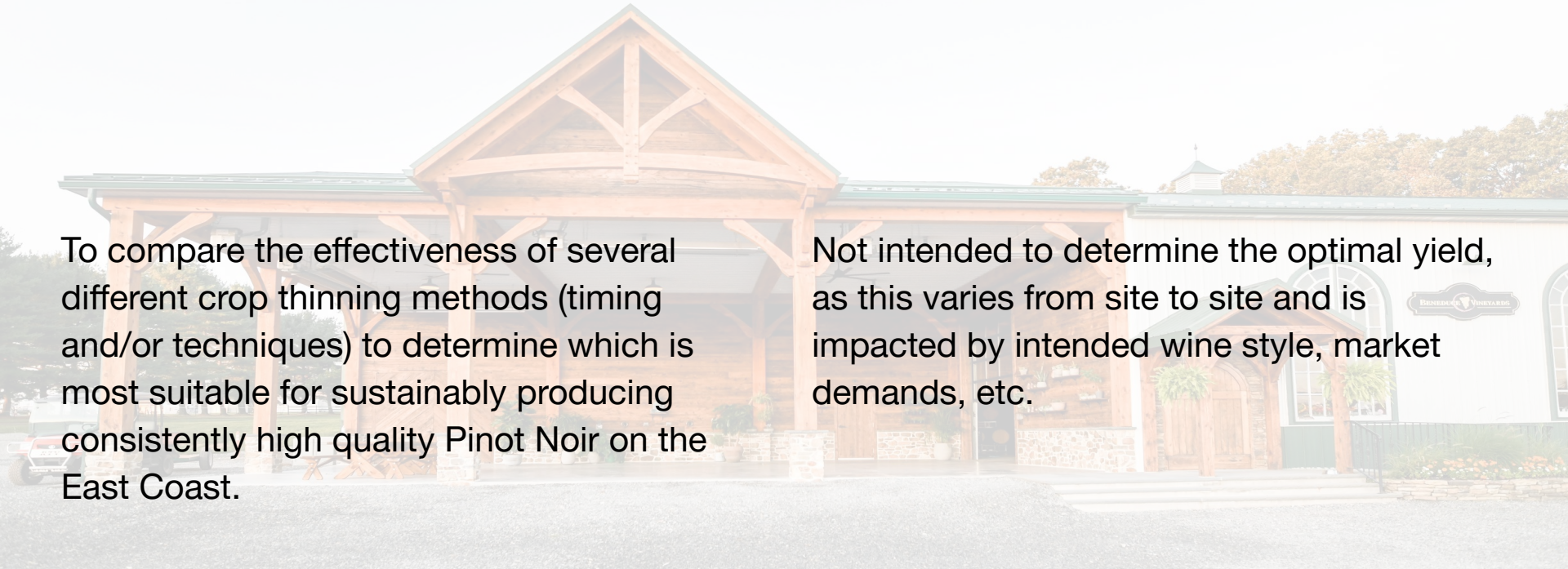
RUTGERS COOPERATIVE EXTENSION
New Jersey Agricultural Experiment Station

NORTHEAST SARE
Sustainable Agriculture Research & Education

BENEDUCE VINEYARDS


Benedum Vineyards

Purpose



To compare the effectiveness of several different crop thinning methods (timing and/or techniques) to determine which is most suitable for sustainably producing consistently high quality Pinot Noir on the East Coast.

Not intended to determine the optimal yield, as this varies from site to site and is impacted by intended wine style, market demands, etc.

Existing Assumptions

By reducing the overall crop load, a vine can distribute more of its resources to the remaining clusters, potentially leading to increased soluble solids, anthocyanins, monoterpenes, and other flavor and aroma compounds

Early crop thinning, while theoretically allowing the vine more time to distribute resources to the final crop load, can also lead to increased cluster and berry size due to vine compensation in the remaining crop

Late crop thinning (i.e. Green Harvest) increases the uniformity of the remaining crop, but also “wastes” more of the vine’s resources on ripening fruit that will ultimately be sacrificed

Why Pinot Noir?

- High value *vinifera* variety that has achieved success in several East Coast regions
- Known to be very sensitive to cropload and therefore typically crop-thinned to some extent
- Second most widely planted variety at our selected research site: Beneduce Vineyards

2017 Vintage

(Pittstown, NJ)

- Generally moderate temperatures (3320 GDDs)
- Fairly wet Spring + Summer (4.8”/month)
- Dry Fall (2.5”/month)
- Average yields (3.4 tons/A)

Project Summary

- It is generally accepted that **a balanced vine produces higher quality grapes** over the long term than one that is either under or overcropped

- While many quality-focused growers on the East Coast practice some form of crop thinning, little research has been done that compares **the “when” and “how” of crop thinning**

- We utilized **five different crop thinning techniques** and measured their effects on grape and wine chemistry as well as overall wine quality

- We followed these treatments **from vine to bottle**, all harvested the same day and treated separately but identically in the cellar


BENEDUCE VINEYARDS
2013
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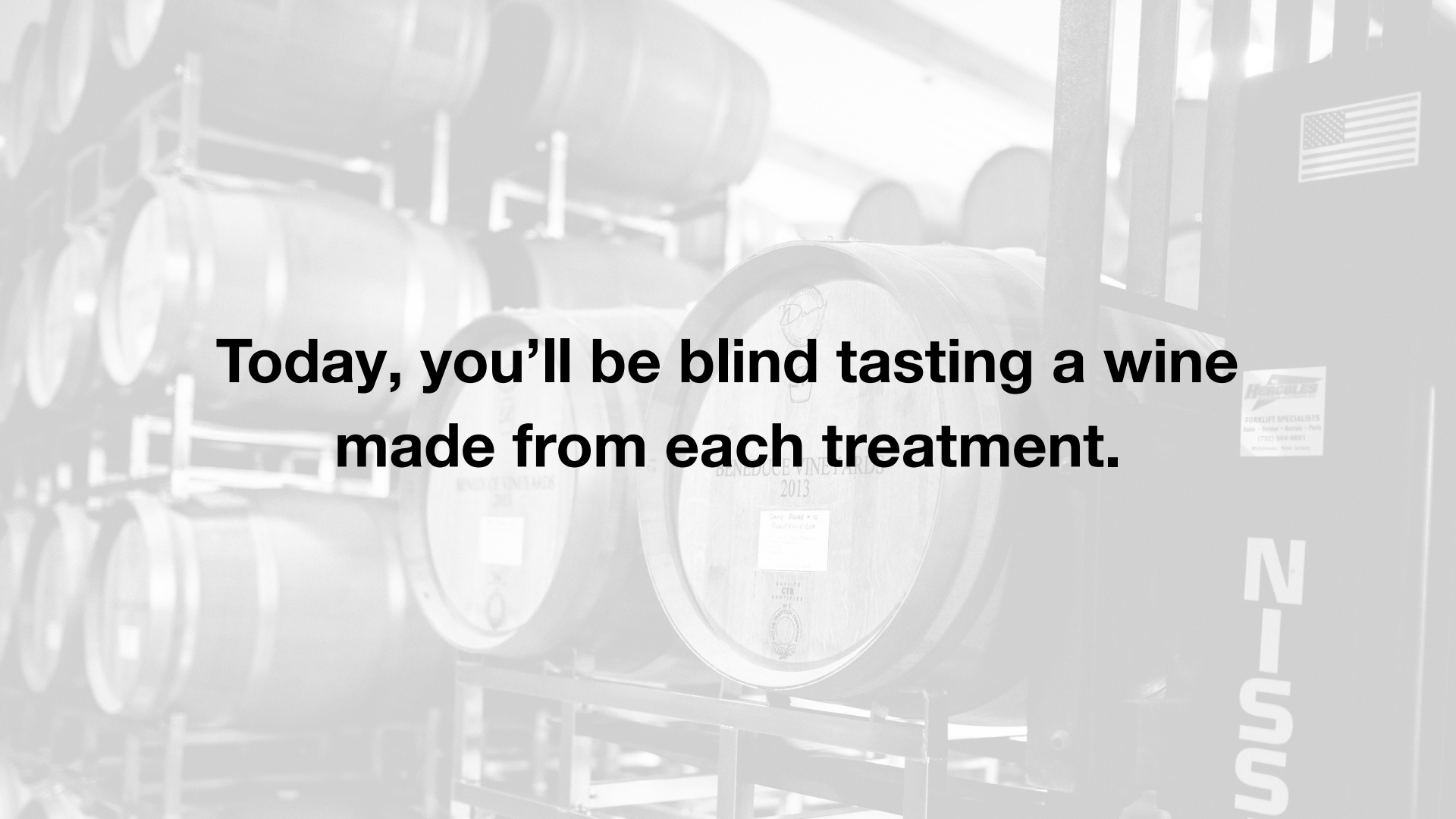


Today, you'll be blind tasting a wine made from each treatment.

Method + Field Design

- Large scale trial, encompassing over 700 vines in a 0.8 acre section of Pinot Noir
- All vines were Pinot Noir 23/3309 planted in 2011 on 5’x10’ spacing, dry-farmed, cane-pruned on a VSP trellis system
- 10 full rows in the same block were randomly assigned crop thinning treatments
- All crop thinning methods were carried out on the same day just prior to the ‘bunch close’ stage of vine development, with the exception of *Green Harvest* (tail end of veraison)

Treatments:

- 2 Clusters / Shoot
- 1 Cluster / Shoot
- Unthinned Control
- Green Harvest
- Austrian method

Thin to 2 Clusters / Shoot

Total Harvest: 1,150 lbs = 3.6 tons/A

Average Cluster Weight= 145.6 g

Average Berry Weight= 1.67g

Brix = 23.6

pH= 3.33

TA= 8.2 g/L

Total Pigment = 5.61 AU

Thin to 1 Cluster / Shoot

Total Harvest: 900 lbs = 2.8 tons/A

Average Cluster Weight= 178.7g

Average Berry Weight= 1.69g

Brix = 23.4

pH= 3.42

TA= 7.2 g/L

Total Pigment = 5.87 AU

Control (Unthinned)

Total Harvest: 1,510 lbs = 4.7 tons/A

Average Cluster Weight= 158.1g

Average Berry Weight= 1.79g

Brix = 23.1

pH= 3.37

TA= 7.4 g/L

Total Pigment = 6.32 AU

Green Harvest to 1.5 Clusters/ Shoot

Total Harvest: 1,040 lbs = 3.2 tons/A

Average Cluster Weight= 136.2g

Average Berry Weight= 1.79g

Brix = 25.6

pH= 3.48

TA= 7.5 g/L

Total Pigment = 5.76 AU

Austrian Method

Total Harvest: 980 lbs = 3.1 tons/A

Average Cluster Weight= 114.1g

Average Berry Weight= 1.7g

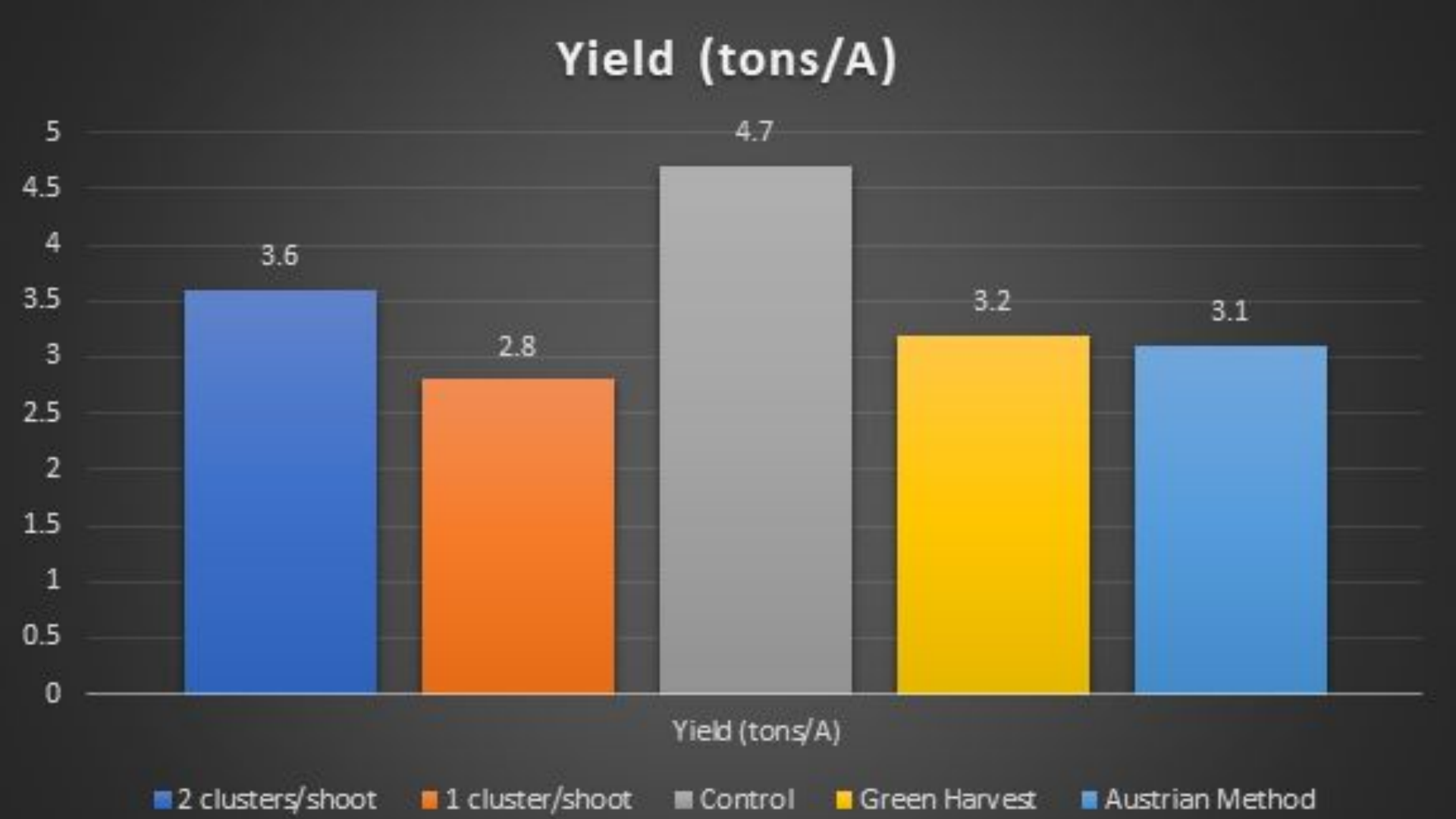
Brix = 24.1

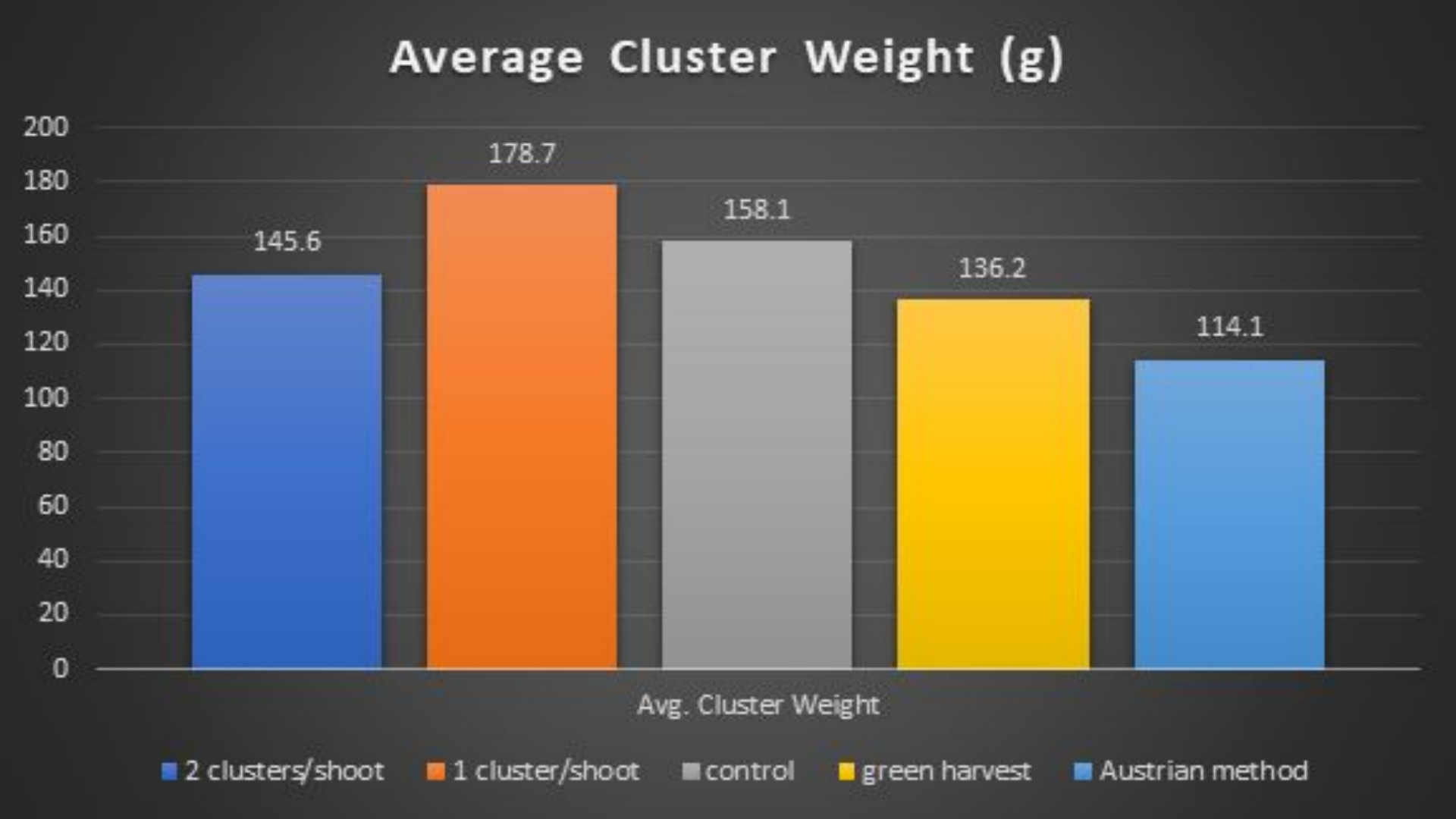
pH= 3.46

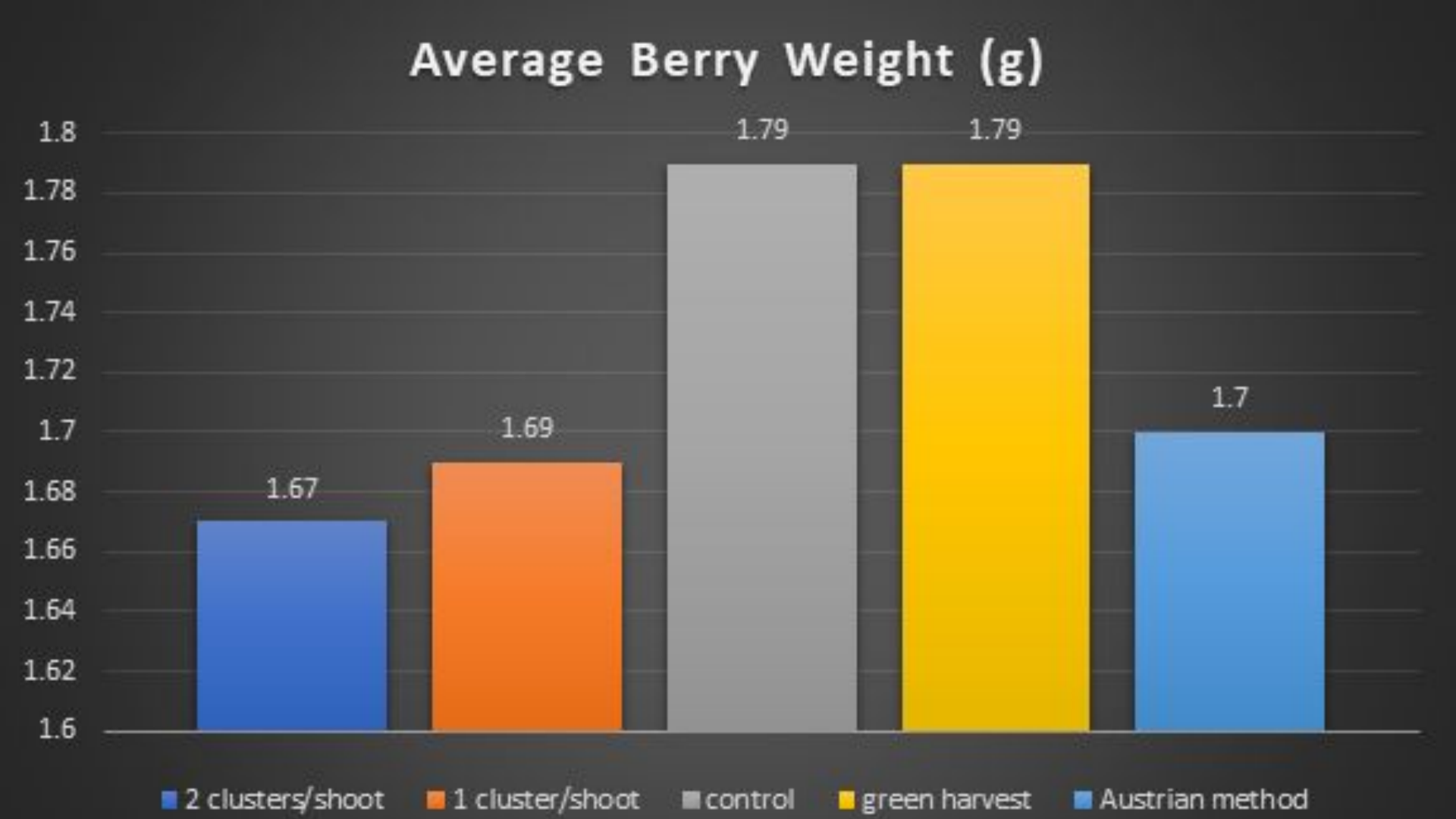
TA= 7.8 g/L

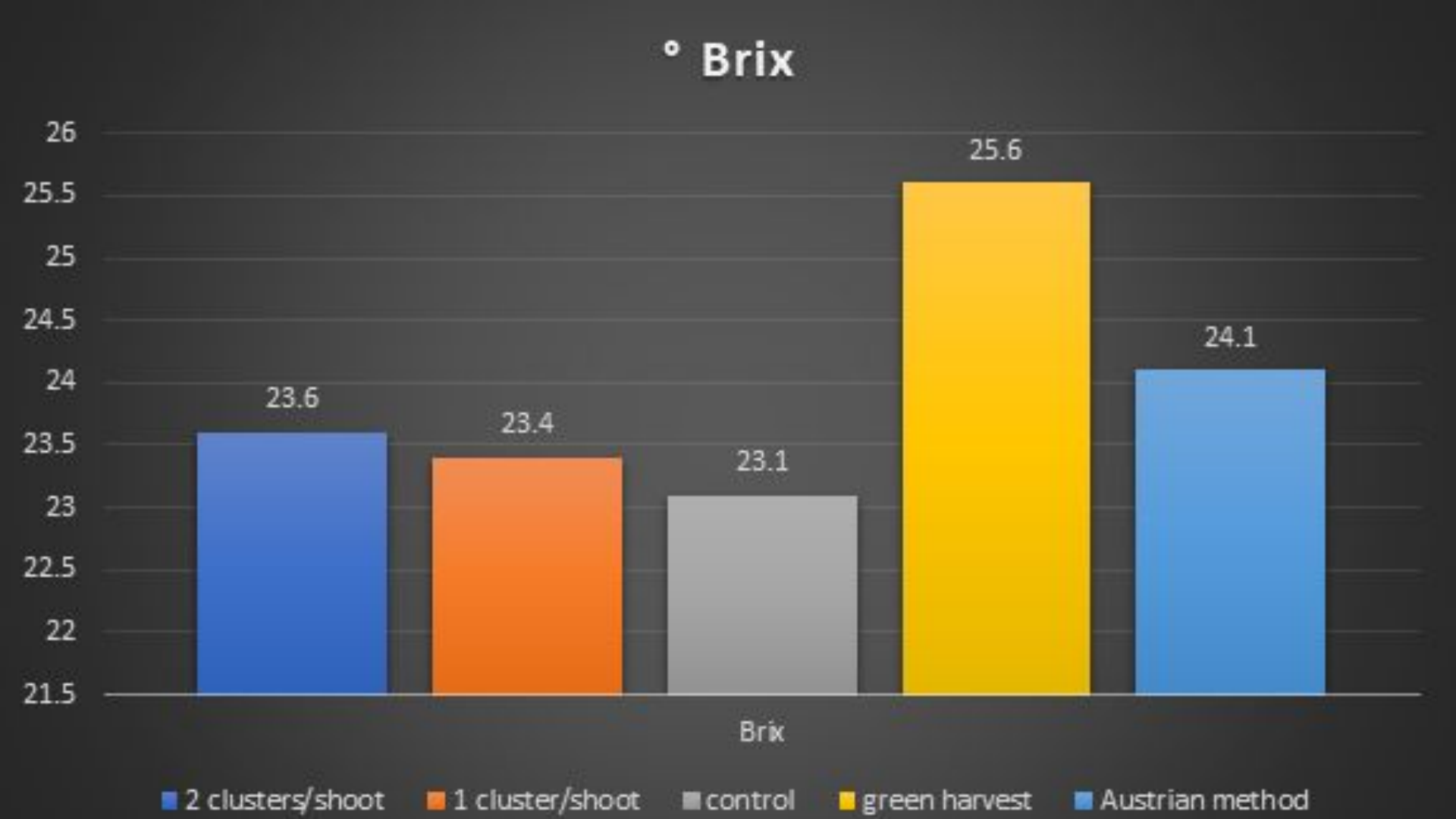
Total Pigment = 6.38 AU

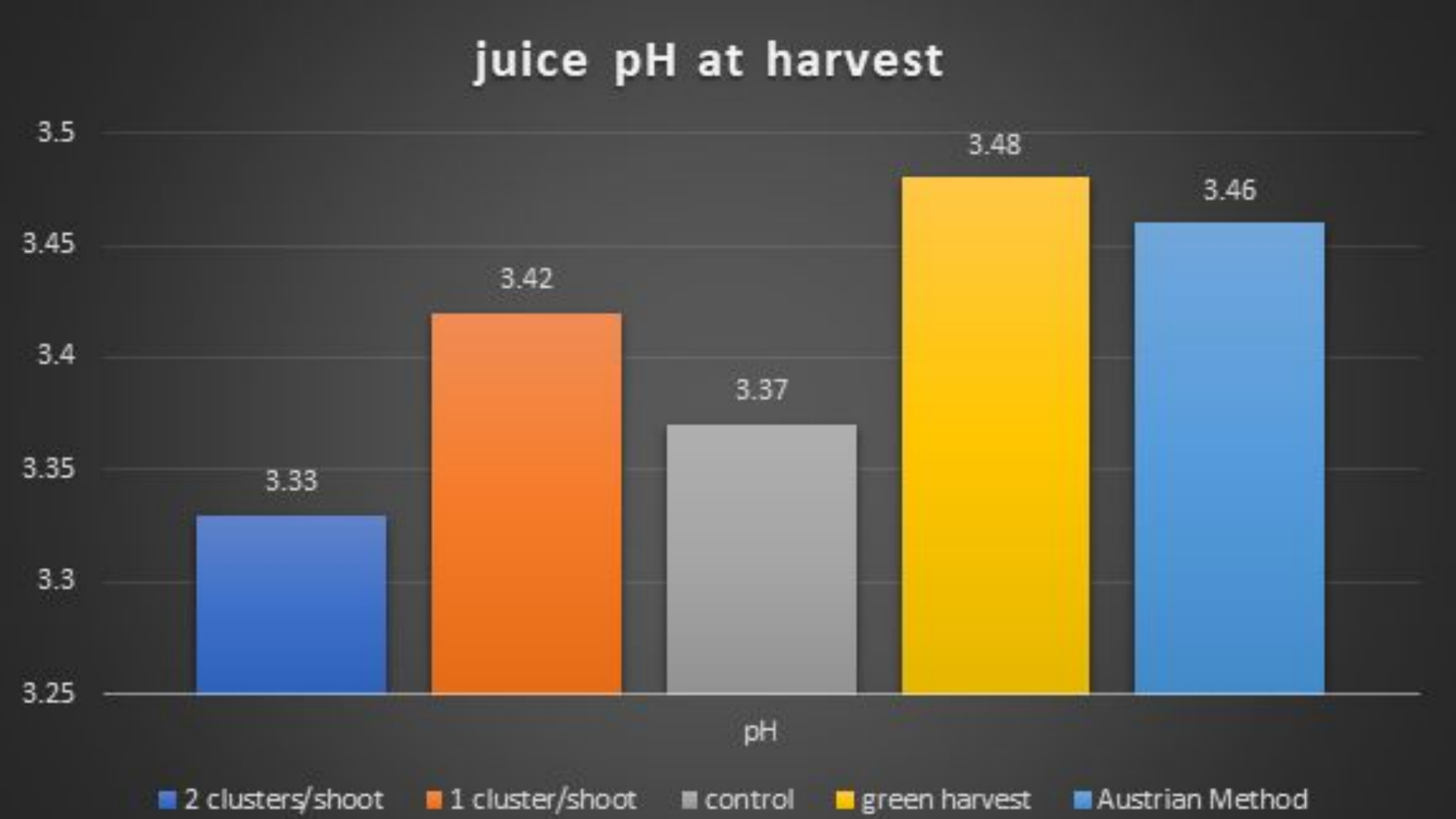
And now, for the results…

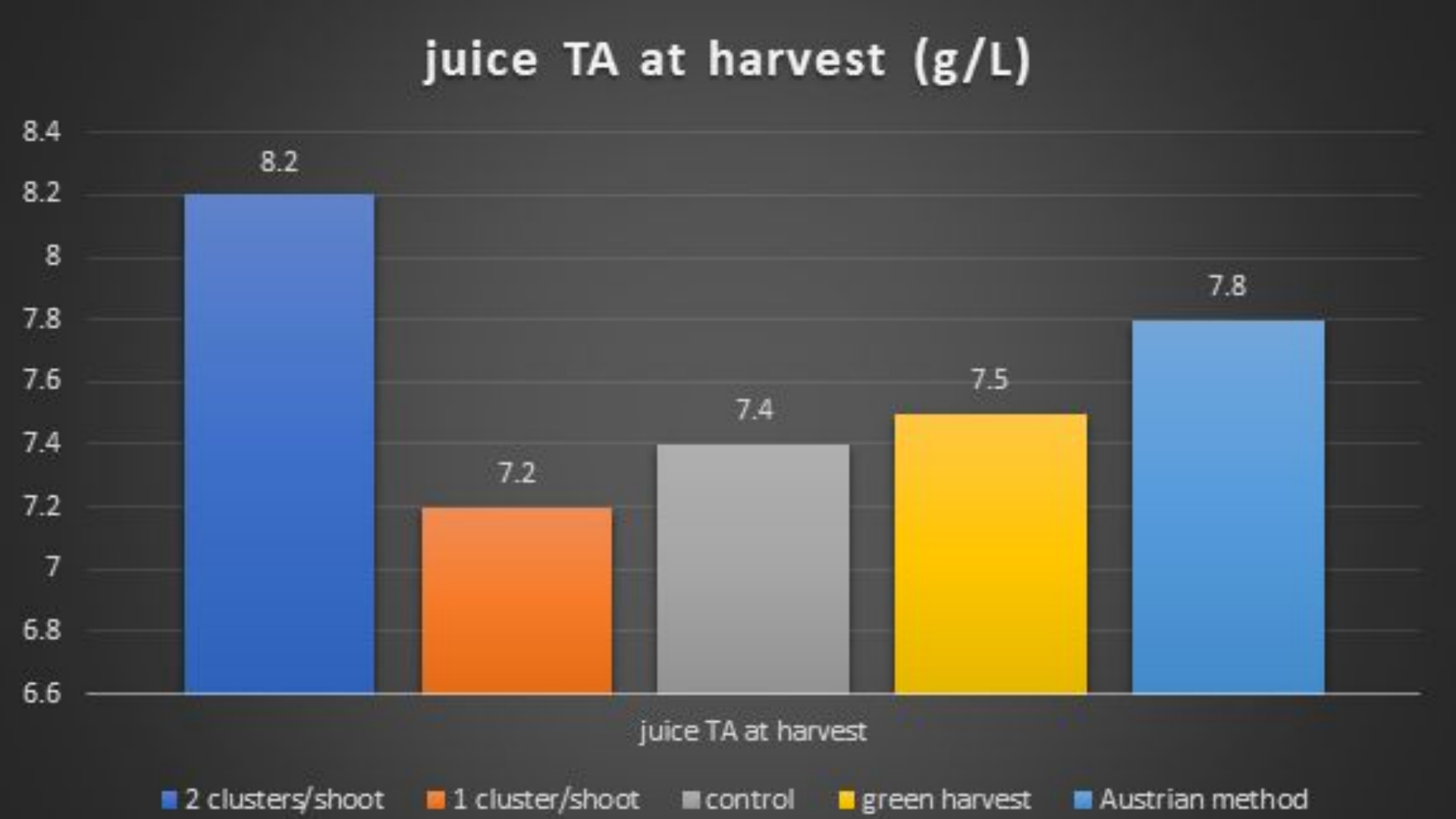

Yield (tons/A)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
3.6
2.8
4.7
3.2
3.1
Yield (tons/A)
2 clusters/shoot
1 cluster/shoot
Control
Green Harvest
Austrian Method


Average Cluster Weight (g)
200
180
160
140
120
100
80
60
40
20
0
145.6
178.7
158.1
136.2
114.1
Avg. Cluster Weight
2 clusters/shoot
1 cluster/shoot
control
green harvest
Austrian method


Average Berry Weight (g)
1.8
1.78
1.76
1.74
1.72
1.7
1.68
1.66
1.64
1.62
1.6
1.67
1.69
1.79
1.79
1.7
2 clusters/shoot
1 cluster/shoot
control
green harvest
Austrian method


° Brix
26
25.5
25
24.5
24
23.5
23
22.5
22
21.5
23.6
23.4
23.1
25.6
24.1
Brix
2 clusters/shoot
1 cluster/shoot
control
green harvest
Austrian method


juice pH at harvest
3.5
3.45
3.4
3.35
3.3
3.25
3.33
3.42
3.37
3.48
3.46
pH
2 clusters/shoot
1 cluster/shoot
control
green harvest
Austrian Method


juice TA at harvest (g/L)
8.4
8.2
8
7.8
7.6
7.4
7.2
7
6.8
6.6
8.2
7.2
7.4
7.5
7.8
juice TA at harvest
2 clusters/shoot
1 cluster/shoot
control
green harvest
Austrian method

Winemaking Practices

- Hand harvested on October 2nd
- Chilled overnight to 40F
- 5% whole cluster inclusion, 15% juice bleed, 30 ppm SO2
- Separate fermentations in open top bins with RA17 yeast
- 15 day maceration with twice daily manual punchdowns
- Free-run wine transferred to identical neutral French oak barrels
- Full MLF in barrel with PN4 bacteria
- 18 month aging with identical racking schedules
- Bottled unfined and unfiltered

Which wine was your favorite?

Beverage Tasting Institute Scores

87 • Beneduce Vineyards : Treatment #1
Silver Medal Panel Feedback: Nice varietal character. Earthy. Great structure. concentrated flavor. Perhaps there's aging potential? Pretty leafy right now, though some soft textural notes, too.

87 • Beneduce Vineyards : Treatment #2
Silver Medal Panel Feedback: Spicier, fruitier. Notes of cranberry. Great structure, great juiciness. Drink now or later. Lengthy. Toastier oak notes. Notes of pomegranate, toasted nut bread.

86 • Beneduce Vineyards : Treatment #3
Silver Medal Panel Feedback: Spa-like aromas, eucalyptus, lavender, etc. Less fruity, more restrained. The acid and harder tannins may need a year or two to settle down as it's quite bracing.

86 • Beneduce Vineyards : Treatment #4
Silver Medal Panel Feedback: Muted. Notes of relish and dill. A bit leafy and stemmy, which can appeal to old world Pinot lovers, but in the meantime is taking away from the fruit that's already muted by more liberal use of oak.

92 • Beneduce Vineyards : Treatment #5
Gold Medal Panel Feedback: Meatier, savory. Notes of tomato. Sanguine, iron-like finish. Sort of the total package for the varietal growing in a cooler climate, with a rich fruit showing depth and also some exotic herbal qualities alongside brandied cherry and juicy citrus.

Beverage Tasting Institute Scores

87 • Beneduce Vineyards : Unthinned Control
Silver Medal Panel Feedback: Nice varietal character. Earthy. Great structure. concentrated flavor. Perhaps there's aging potential? Pretty leafy right now, though some soft textural notes, too.

87 • Beneduce Vineyards : Green Harvest
Silver Medal Panel Feedback: Spicier, fruitier. Notes of cranberry. Great structure, great juiciness. Drink now or later. Lengthy. Toastier oak notes. Notes of pomegranate, toasted nut bread.

86 • Beneduce Vineyards : 1 Cluster / Shoot
Silver Medal Panel Feedback: Spa-like aromas, eucalyptus, lavender, etc. Less fruity, more restrained. The acid and harder tannins may need a year or two to settle down as it's quite bracing.

86 • Beneduce Vineyards : 2 Clusters / Shoot
Silver Medal Panel Feedback: Muted. Notes of relish and dill. A bit leafy and stemmy, which can appeal to old world Pinot lovers, but in the meantime is taking away from the fruit that's already muted by more liberal use of oak.

92 • Beneduce Vineyards : Austrian Method
Gold Medal Panel Feedback: Meatier, savory. Notes of tomato. Sanguine, iron-like finish. Sort of the total package for the varietal growing in a cooler climate, with a rich fruit showing depth and also some exotic herbal qualities alongside brandied cherry and juicy citrus.


Experimental Series
Wine Style
2 CLUSTERS / SHOOT
Alc./ Vol | Vintage | Varietal | Enjoy By
2017 | PINOT NOIR
Experimental Series
Wine Style
1 CLUSTER / SHOOT
Alc./ Vol | Vintage | Varietal | Enjoy By
2017 | PINOT NOIR
Experimental Series
Wine Style
CONTROL
Alc./ Vol | Vintage | Varietal | Enjoy By
2017 | PINOT NOIR
Experimental Series
Wine Style
GREEN HARVEST
Alc./ Vol | Vintage | Varietal | Enjoy By
2017 | PINOT NOIR
Experimental Series
Wine Style
AUSTRIAN METHOD
Alc./ Vol | Vintage | Varietal
2017 | PINOT NOIR

Comparative Study

2 Clusters/Shoot	1 Cluster/Shoot	Control	Green Harvest	Austrian Method
Smallest berries	Lowest yield	Highest yield	Largest Berries (tie)	Smallest Clusters
Lowest pH	Largest Clusters	Largest berries (tie)	Highest sugar	Most Color
Highest TA	Lowest TA	Lowest sugar	Highest pH	Highest Wine Score (BTI)
Least color	Lowest Wine Score (BTI)			


BENEDUCE VINEYARDS
2013
BENEDUCE VINEYARDS
2013
BENEDUCE VINEYARDS
2013
BENEDUCE VINEYARDS
2012
BENEDUCE VINEYARDS
2017
BENEDUCE VINEYARDS
2017
BENEDUCE VINEYARDS
2017
BENEDUCE VINEYARDS
2012

Conclusions

Green Harvest and Austrian Method appear to have been most effective at speeding up ripening (increasing sugar and color, decreasing acidity) with positive sensory effects on final wine quality

Within a narrow band of total yield (2.8-3.6 tons/A) in the thinned treatments, grape chemistry varied greatly, which suggests **timing and methods of crop thinning were important factors**

Vine compensation in **early thinning techniques was not as strong** as we had expected, especially for a relatively dry vintage

Growers and winemakers should **decide on their own goals** for their fruit and wines and adapt their crop thinning techniques accordingly

Thanks!

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