Five Methods of Crop Thinning in Pinot Noir and Their Effects on Fruit Composition and Wine Quality

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One of the most labor intensive aspects of wine grape production is crop thinning. An average vineyard requires nearly 24 man hours per acre for this task alone. Although the task is time consuming and labor intensive, it is also necessary to ensure that vine capacity is appropriately balanced with crop load.

Crop load / vine capacity is particularly challenging to manage in pinot noir, a high value *Vitis vinifera* (European Wine Grape) grown throughout New Jersey. Pinot noir has a strong tendency towards over-cropping, and it is sensitive to high crop loads.

In 2018, Beneduce Vineyards (Franklin Township, Hunterdon County, NJ), led by Mike Beneduce, was awarded a SARE Farmer grant (FNE 18-885 https://www.nesare.org/Dig-Deeper/Newsroom/2018-Northeast-SARE-Awards) to investigate the impact of five thinning methods on fruit composition, wine quality, and profitability of pinot noir grape production.

Preliminary results in 2018 show the effect of cluster-thinning methods on the crop load (Tons/Acre), average cluster weight, average berry weight and fruit composition characteristics including brix, pH, and titratable acidity.

Field Design

A block of 7-year-old Pinot Noir clone #23 on Couderc 3309 rootstock was used for the study. Ten 350-foot rows were selected for the demonstration trial. Five thinning treatments were identified, including an untreated control for the study. There was a single replication for each treatment consisting of two 350-foot rows. Because there were no treatment replications, significant differences could not be calculated, rather trends observed.

Treatments

Two Clusters Method (two clusters per shoot), was thinned on July 24. The result was removal of approximately 90 lbs per row. Rot hazards were selected and removed first, and subsequently, the third cluster was removed on any shoots that had it (there were very few).

One Cluster Method (one cluster per shoot), was thinned on July 24. The result was removal of approximately 270 lbs per row. Rot hazards were prioritized and removed, followed by removal of any cluster with shot berries or those that would impede air flow.

Green Harvest Method was thinned to 1.5 clusters per shoot on August 8. Approximately 200 lbs per row of green clusters were removed for this method, leaving behind those that had started veraison.

Austrian Method thinned by removing the bottom portion of all clusters on July 25. This method resulted in removal of approximately 180 lbs of fruit per row. The bottom 40% of all clusters was removed, which helped to space out the remaining clusters and seemed to result in a reasonable crop load. This method was the most time consuming, and also left cut berries at the bottom of each cluster. These were hand removed (rubbed out) but left tissue exposed that could cause disease issues. No disease evaluation was made.

Untreated Control - no thinning treatments were made on the control. However, some clusters had to be removed because they were considered to be "hazard clusters." These clusters were wrapped around vines or grew into each other in such a way that they were certain to cause rot issues. Approximately 30 lbs of hazard clusters were removed per row, that amount could have impacted the fruit quality and yield measurements.

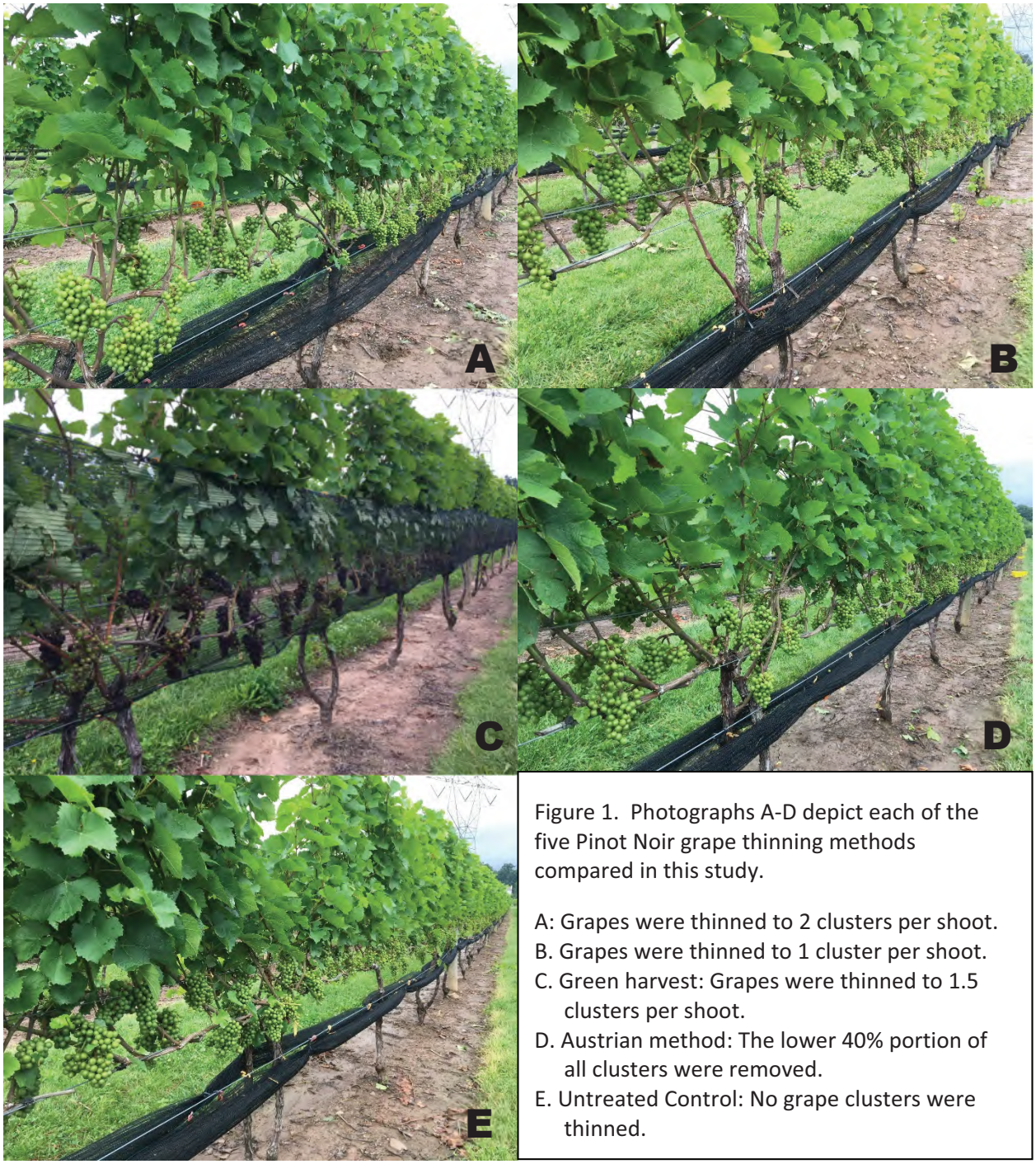

Figure 1. Photographs A-D depict each of the five Pinot Noir grape thinning methods compared in this study.

A: Grapes were thinned to 2 clusters per shoot.
B. Grapes were thinned to 1 cluster per shoot.
C. Green harvest: Grapes were thinned to 1.5 clusters per shoot.
D. Austrian method: The lower 40% portion of all clusters were removed.
E. Untreated Control: No grape clusters were thinned.

Data Collected

Total yield was harvested for each treatment/two rows per treatment. Twenty clusters were collected equally across the two rows, weighed, and averaged for a cluster weight per treatment. One hundred berries were collected equally across the two rows of each treatment, weighed then divided by 100 to calculate the average berry weight per treatment. All of the fruit per treatment/two rows, were crushed. A fruit sample was collected from each crush for the determination of °Brix, pH and titratable acidity.

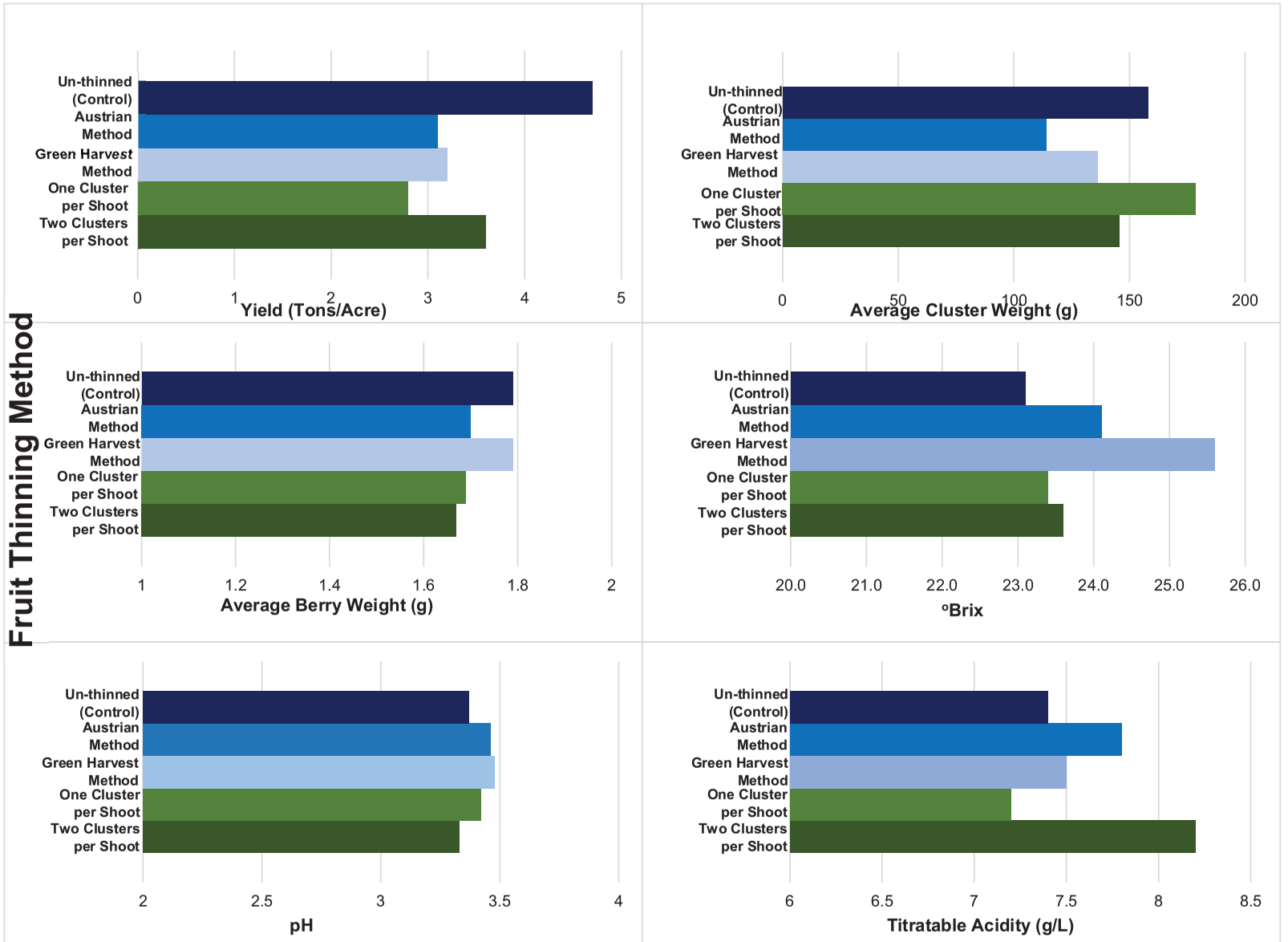

Figure 2: Yield at harvest, average cluster weight, average berry weight, sugar content (°Brix), pH, and titratable acidity as a result of each thinning method.

Preliminary Results & Discussion

Several observations were made regarding treatments. The Austrian Method may not be suitable for clones of pinot noir or other tight-clustered varieties because of the difficulty in getting scissors into the clusters. This method might be better suited on the cultivars Blaufränkisch and Cab Franc.

The grower also noted that the One Cluster Method resulted in too much thinning for the amount of total vegetation contained on the vines.

The highest yield per acre was with the Untreated Control at 4.7 Tons/acre followed by the Two Clusters Method at 3.6 Tons/acre. The One Cluster, the Austrian, and the Green Harvest Methods all showed similar yields of ~3Tons per acre.

The average weight of clusters ranged from 114g for the Austrian Method and up to 178g for the One Cluster Method. The range of weights for individual berries showed less variability, and appeared not significant with only a 0.1g difference between treatments.

Total grape yield by treatment was inversely correlated with the degree of thinning. Treatments that removed the greatest number of clusters resulted in lower yields. This relationship was not consistent, however, when looking at cluster weight. The lowest yielding method was the One Cluster Method but it resulted in the highest cluster weight. The highest yielding method, the Untreated Control, resulted in the second highest cluster weight.

In terms of fruit chemistry, all of the methods resulted in a pH of ~3.4 at harvest with no difference between treatments. The titratable acidity was highest in the Two Clusters Method at ~8.3 and lowest in the One Cluster Method at ~7.2. All methods resulted in a higher titratable acidity than the One Cluster Method. Overall there was not a great difference in titratable acidity between treatments.

The °Brix (sugars) were highest (>25) in the Green Harvest Method and lowest in the Untreated Control (~23). All methods resulted in higher °Brix than the Untreated Control. Note that for production of pinot noir, there is no industry standard for yield per A, cluster weight, berry weight, pH, °Brix, or TA.

We found the Green Harvest and the Two Clusters Methods to be potential new thinning approaches for handling pinot noir grapes in Hunterdon County, northern New Jersey. It is also important to begin to understand the implications of each thinning method on crop load and berry characteristics.