



Viticulture, enology and marketing for cold-hardy grapes



Influence of Crop Load on the Quality of 'Frontenac', 'La Crescent' and 'Marquette' Grapes

Snus Hill Winery, Madrid, IA
Hickory Creek Vineyard, Adel, IA
Penoach Vineyard & Winery, Adel, IA

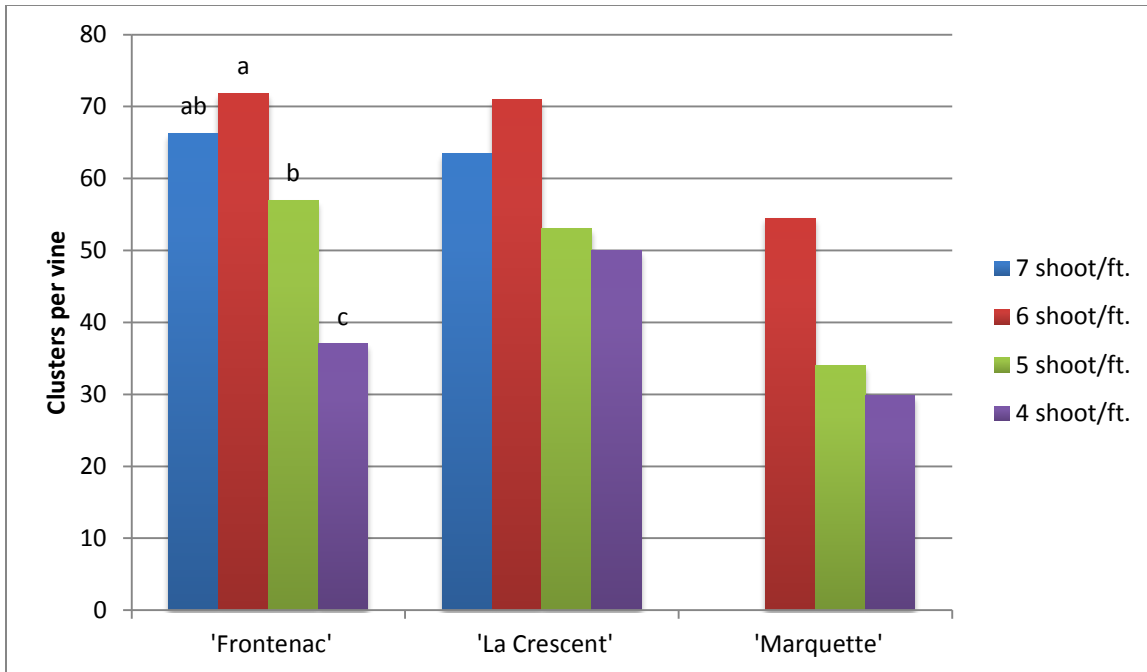
Dylan Rolfes, Paul Domoto and Gail Nonnecke
Dept. of Horticulture, Iowa State University

Background and Rationale: Cold-hardy *Vitis riparia* hybrids have allowed the recent expansion of the wine industry into the upper Midwest, impacting the economy and culture of the region. While these hybrids have created new opportunities, they also present several challenges; they are cold-hardy, but often more vigorous than the traditional *V. vinifera* hybrids and tend to produce fruit with quality characteristics that challenge winemaking. During maturation, the fruit tend to retain high levels of acids, exhibit a rapid rise in pH, possess a different profile of malic to tartaric acid than other hybrids, and wines from these grapes often have an “herbaceous” character. These characteristics also have been associated with grapes from overly cropped vines. Little is known about how heavy a crop load vines from these cold hardy cultivars can carry and still produce quality fruit. This study was undertaken to determine if crop load affects the fruit and winemaking characteristics of 'Frontenac', 'La Crescent' and 'Marquette' grapes.

Treatments: In 2013 different cropping level treatments achieved by shoot thinning were applied to vines trained to a top wire cordon (TWC) system. Due to drought conditions that prevailed in 2012, cluster counts per shoot were below normal in 2013; to attain projected crop loads, additional shoots per foot of cordon were retained. Treatments consisted of 4, 5, 6 and 7 shoots per foot of cordon. Due to limitations within the trial vineyards, 'Marquette' vines only received three treatments: 4, 5, and 6 shoots per foot of cordon.

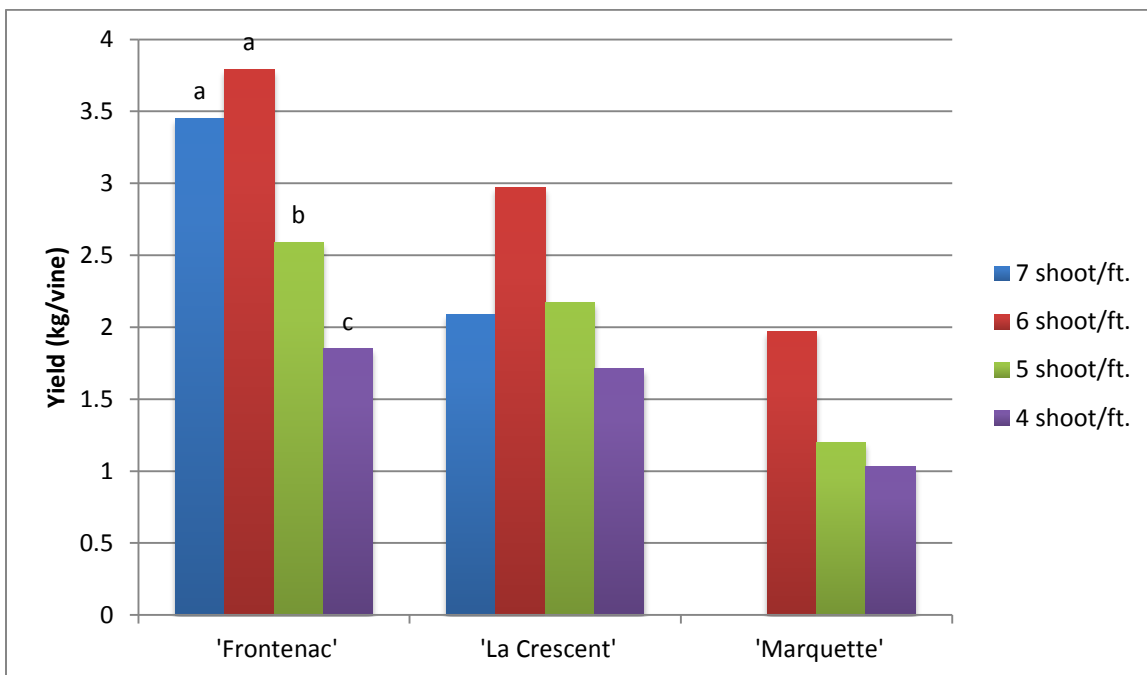
Methods: Following bloom, shoot thinning treatments were applied to 3-vine groups and replicated 4 times in a randomized complete block design. All vines were maintained under best management practices (pre-bloom shoot thinning, post-bloom shoot positioning, post-bloom axillary shoot removal in the fruiting zone, and skirting). Fruit were harvested, weighed and a 300-berry sub-sample was collected to analyze fruit quality characteristics (Brix, pH, TA, and malic and tartaric acids). Data were analyzed using Tukey's adjustment for multiple comparisons. Analysis of fruit quality characteristics is currently being conducted.

Results: 'Frontenac' vines showed the only treatment effect regarding cluster number (Figure 1) and total yield (Figure 2). Six shoots per foot was the most effective thinning technique for promoting fruit growth, followed by 7, 5, and 4 shoots per foot. There were no significant treatment effects regarding the weight of the individual clusters (Figure 3).



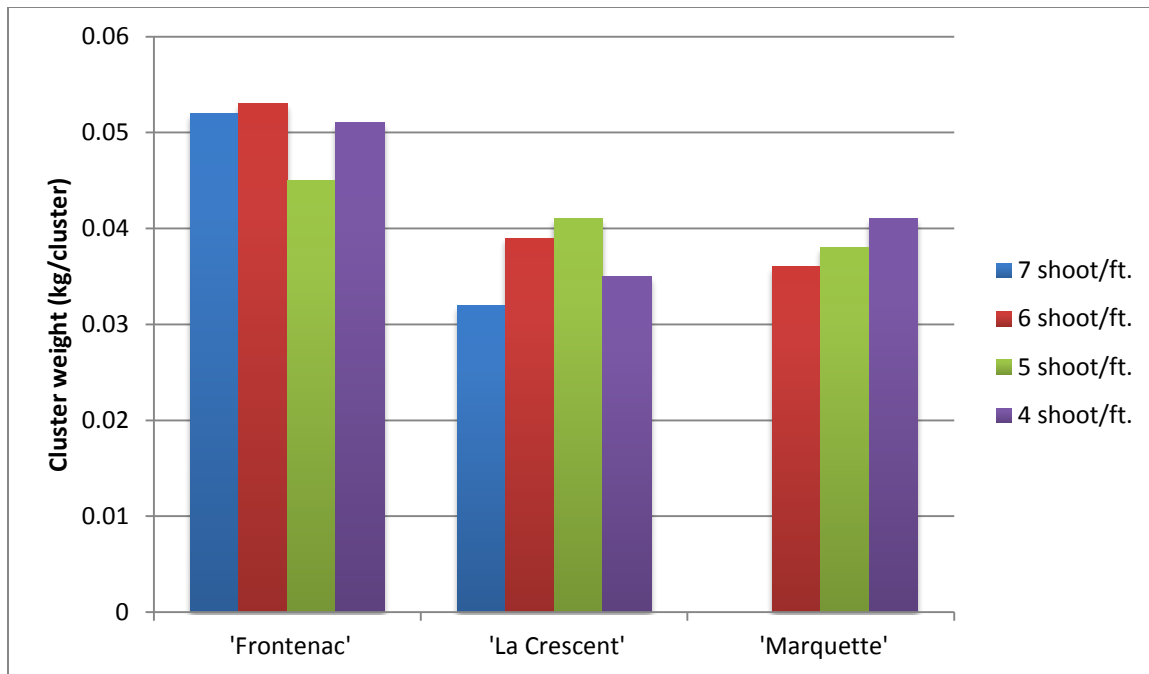
Treatment means followed by the same letter within a column are not significantly different at the $\alpha=0.05$ level. Columns where no letters are present indicate a lack of significant differences among all treatments.

Figure 1. Clusters per vine under the different crop load treatments from shoot thinning on 'Frontenac', 'La Crescent', and 'Marquette' trials, Adel and Madrid, IA, 2013.



Treatment means followed by the same letter within a column are not significantly different at the $\alpha=0.05$ level. Columns where no letters are present indicate a lack of significant differences among all treatments.

Figure 2. Yield at harvest (kg/vine) under the different crop load treatments from shoot thinning on 'Frontenac', 'La Crescent', and 'Marquette' trials, Adel and Madrid, IA, 2013.



Columns where no letters are present indicate a lack of significant differences among all treatments.

Figure 3. Cluster weight at harvest (kg/cluster) under the different crop load treatments from shoot thinning on 'Frontenac', 'La Crescent', and 'Marquette' trials, Adel and Madrid, IA, 2013.

What the results mean:

- Shoot thinning to a rate of 6 shoots per foot of cordon produced the greatest number of clusters as well as the highest total yields in 'Frontenac' and did not differ from 7 shoots per foot of cordon.
 - Thinning to any rate below 6 shoots per foot of cordon reduced the potential shoot area for clusters and resulted in lower yields.
- Vine growth and winter hardiness indices will be obtained with grapevine pruning weights to determine if the optimal fruit growth treatment (6 shoots per foot of cordon in 'Frontenac') has provided an adequate balance of fruit growth and development, vegetative growth, and winter acclimation over the past growing season.