The Effects of Heat Treatment on Grapevine Performance and Berry Quality in a Merlot Vineyard

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Background:

Agro-thermal heat-treatment technology in grapevines has been shown to increase yield, decrease the use of agro-chemicals used to fight pests, enhance wine quality and improve profits, but this technology has not been tested in the Okanagan Valley or Canada. Heat treatment is applied by driving a tractor through the vineyard rows that blows extreme heat into the canopy. During the growing seasons of 2019 and 2020, heat treatment was applied to a Merlot vineyard in the Okanagan valley six times during the growing season with application ten days apart from each other. Treatments were:

1. Heat (red)

2. Control (no heat, green)

We are studying the effect of heat treatment on:

Leaf greenness, veraison, number of grape clusters/vine, total grapevine yield/vine, average cluster weight/vine, average berry weight/vine, average number of berries/vine and berry quality (berry TA, berry pH, berry Brix, brown seed color). The hypothesis is that heat treatment will improve grapevine performance and berry quality.

Cluster = grapevine bunch

Subsample = individual treatment vine

The variables were measured as follows:

SPAD (leaf greenness):

Ten leaves/treatment vine (=subsample) were measured using a SPAD device in July, the number given in the data file is the average measurement. Leaf greenness is a measure of leaf health that could be influenced by heat.

Veraison: 50% veraison is determined by estimating the % of berries on a treatment vine that have changed from green to red. This assessment is done three times and the 50% veraison calculated via regression analysis. Missing raw data for 2019 is because berries were already red (100%) on the first assessment day and we could not determine the 50% value. The values represent days:

2019: August days, e.g. a value of 25 stands for August 25th

2020: August days, but numbers higher than August 31st are in September, e.g. a value of 32 stands for Sept.1st, 33 for Sept.2nd…). Higher numbers mean veraison was delayed.

Cluster number: all clusters of each treatment vine were harvested in October of each year and the clusters counted for each vine.

Yield (kg): all clusters of each treatment vine were harvested in October of each year and the clusters weighed for each vine.

Cluster weight (kg): total grapevine yield (kg) was divided by number of grape clusters

Berries/cluster: cluster weight (in g) divided by berry weight (in g)

Berry weight and berry quality:

Thirty berries were randomly sampled in October from all clusters/vine (about 1-2 berries from each cluster) and weighed. Average berry weight was calculated. The same berries were used by an analytical laboratory to determine berry TA (acidity), berry pH and berry Brix, which can all influence quality of the wine.

Pruning weight (only available for 2019): after dormancy and when the vines have lost all leaves, the canes were pruned in winter and weighed (kg).

Ravaz index (only available for 2019): yield divided by pruning weight.

In 2020, additional data was collected, that was not assessed in 2019:

Fruitfulness: The number of clusters that emerged in Spring divided by the number of new shots.

Bloom: 50% bloom was determined by estimating the % of flowers on a treatment vine that have started to bloom. This assessment is done three times and the 50% bloom value calculated via regression analysis. The values represent June days (a value of 28 stands for June 28th, but values higher than 30 (=June 30st) are in July, e.g. a value of 31 stands for July 1st, 32 for July 2nd…). Higher numbers mean bloom was delayed.

Brown seed color: seed color changes according to maturity of the grape, this was assessed visually.

Experimental design:



Treatments were applied into the whole rows (about 60-80 vines), always two rows at a time, but samples only taken from five treatment vines (=subsamples) per row. Treatment vines were chosen randomly. Treatments were randomized within each block. Blocking is important, as there can be gradients (water/nutrients…) within the vineyard that influence the results.

**Note**: I’m interested in the effects heat had on the measured variables for each year individually, but also if there was an effect if both years were combined in the analysis (where we have data for two years). The same treatment vines were used for each year. We flagged them with tape so we were able to identify them each year.

I will receive pruning weight in February 2021, and am happy to pass this data along if it’s not too late then. This would allow for pruning weight and Ravaz index to be assessed over two years.