

**AGRICULTURAL RESEARCH FOUNDATION
INTERIM REPORT
FUNDING CYCLE 2019 – 2021**

TITLE: Does whole-bunch fermentation increase the risk of Pinot Noir wine spoilage?

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EXECUTIVE SUMMARY:

Whole-bunch or whole-cluster fermentation is a winemaking technique where, rather than destemming the grapes prior to fermentation (the standard modern method of red winemaking), the stems are retained until pressing. The inclusion of stems during fermentation may affect susceptibility of wine to microbial spoilage, as it can increase the pH of resultant wine and may alter the availability of certain nutrients. Of particular interest is the potential for stem-inclusion to increase the nitrate concentration – this may favor growth of the spoilage yeast *Brettanomyces bruxellensis*. We have adapted a method for analysis of nitrate in wine and have generated Pinot Noir wines intentionally made with varying inclusion of stems. Analysis of nitrate content in these wines will guide experiments to determine whether this increases susceptibility of wine to spoilage by *Brettanomyces*.

OBJECTIVES:

Evaluate the impact of whole-bunch fermentation of Pinot noir grapes on wine nitrate concentration

Evaluate the potential for residual nitrate in wine to enhance growth rate of *Brettanomyces* and decrease the length of time necessary for wine to become spoiled

PROCEDURES:

Benchmarking of Oregon Pinot Noir nitrate content

Winemakers who performed fermentations from single-vineyard sourced grapes with varying proportions of whole-bunches will be identified, and representative wines obtained. Additional wines made from grapes in vineyards known to vary in overall nitrogen content will be identified and obtained. Wines will be sampled for analysis of nitrate, amino acids and ammonium.

Analysis of grape must/wine for nitrate and other nitrogen sources

Nitrate concentrations in grape must and wine will be measured using published spectrophotometric or high-performance liquid chromatography (HPLC) methods. These methods will be established during the first half of year 1 of the project. Ammonium and amino-acid content will be measured using methods established in the Osborne laboratory.

*Laboratory-scale test of nitrate stimulation of *Brettanomyces* growth in Pinot Noir wine*

Two representative Oregon Pinot Noir wines will be chosen from the preliminary benchmarking study, with overall high and low residual nitrogen content. For both wines, a series with low, medium or high nitrate concentrations will be established. The resultant set of 6 wines will be inoculated in triplicate with two genetically similar *Brettanomyces* strains that differ in their capacity to assimilate nitrate. Growth of the two strains will be monitored using standard microbiological techniques.

Pilot-scale whole-bunch fermentation winemaking trial

Single-vineyard hand-harvested Pinot Noir bunches will be randomized and then either destemmed and fermented in triplicate, or left as whole bunches and fermented. A further treatment with equal proportions of destemmed fruit and whole bunches (by weight) will be established. Following standardized winemaking the wines will be sampled for analysis of nitrate, amino acids and ammonium.

SIGNIFICANT ACCOMPLISHMENTS TO DATE:

A spectrophotometric method for analysis of nitrate concentration in wine was not able to be validated due to COVID-19 related laboratory closures and loss of samples. We are working with the Crop and Soil Sciences core laboratory to adapt their standard method to wine samples.

Once a method is finalized nine pilot-scale Pinot noir wines made during the 2019 harvest season with either; destemmed grapes, destemmed grapes with 1x stem mass added back into ferments, or destemmed grapes with 2x stem mass added back will be analyzed. We will also analyze two sets of whole-cluster vs. destemmed grape Pinot noir wines made by an industry partner.

ADDITIONAL FUNDING RECEIVED DURING PROJECT TERM:

None.

FUTURE FUNDING POSSIBILITIES:

We anticipate the data generated in these preliminary analyses to support a funding request in 2022 to the American Society for Enology and Viticulture or the Oregon Wine Board.