# Oregon Wine Advisory Board
# Research Progress Report

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## Evaluation of the Effects of Yeast Strains on the Composition, Aroma, and Flavor on Several Winegrape Cultivars

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### INTRODUCTION AND OBJECTIVES

Yeast strains used in wine production are known to differ in some fermentation characteristics, including rates of fermentation, alcohol tolerance, degree of foaming, temperature tolerances, volatile acid production, and hydrogen sulfide production. There may also be significant sensory differences in aroma and flavor in wines fermented with different yeast strains.

The objective of this research is to evaluate the effects of different yeast strains of Saccharomyces cerevisiae on wine composition, aroma, and flavor of Pinot noir, Chardonnay, and Riesling, the primary winegrape varieties grown in Oregon. The yeast strains to be studied were selected from commercially available freeze-dried concentrates, many of which are used commercially in Oregon.

### RESULTS AND DISCUSSION

Pinot noir, Chardonnay, and Riesling were harvested from the Lewis Brown Farm (LBF), a university experimental research vineyard. Pinot noir was also harvested from a commercial Willamette Valley vineyard, Beaver Creek Vineyards (BCV) in Corvallis, Oregon. Replicated lots were inoculated with several different yeast strains (Table 1).

Chardonnay and Riesling were crushed, destemmed, and 35 ppm of S02were added. The musts were settled overnight at 7'C and racked from the solids. Pooled juice was subdivided into uniform duplicate lots and inoculated with rehydrated freeze-dried yeasts. During fermentation temperatures ranged from 13-23'C. Yeast strains used for Chardonnay included: Lalvin EC- II 18 Prise de Mousse, Lalvin M Montrachet, Lalvin Bourgoblanc 3079, Lalvin QA 23, and Enofen-n ICV D47. Yeast strains used for Riesling included: Uvaferm Epernay 2 CEG, Lalvin Yzmaflore VL 1, Laivin K- I (V- I 1 16), Laivin CS-2, and Enoferm Simi White.

Pinot noir wines from two vineyards were divided into uniform replicate lots. The fruit was crushed and destemmed, with 50 ppm of SO, added before fermentation, the fruit was inoculated with rehydrated freeze-dried yeasts. Pinot noir wines were fermented at 25-300 C on the skins for 14 days prior to pressing. The wines were punched down twice daily. New wines were inoculated with OSU malolactic bacteria strains. Yeast strains used for Pinot noir included: Laivin Wadenswil WSK-27, Laivin Bourgorouge 212, Lalvin Bourgorouge RA 17, Enoferm Assmanshausen, Enoferm Burgundy (BGY), and Lalvin 2056.

The new wines are being analyzed for alcohol, titratable acidity, pH, volatile acidity, absorbance at 420 nm (white wines), color intensity as absorbance at 420 + 520 nm, anthocyanin content (red wines), and for total phenolic content (Folin-ciocalteau, and absorbance at 280 nm). Phenolic profiles will also be analyzed by high performance liquid chromatography (HPLC).

Preliminary observations include differences in fermentation rates in Chardonnay, Riesling, and Pinot noir as well as differences in anthocyanin content, color intensity, and phenolic content in Pinot noir (Tables I & 2).

Chardonnay fermentation rates ( based on the time required to reach -1.0 degrees Brix) ranged from 45 to 106 days. EC- III 8, D47, and QA-23 were the fastest ferrnentors while Montrachet (M) and 3079 were the slowest. Riesling fermentation rates ranged from 23 to 64 days with CS-2 and KI being the fastest fen-nentors, and Simi White, VL-1, and CEG being the slowest. In Pinot noir, 71B, 212, and 2056 were the fastest fermentors while WSk 27, Assmanshausen, and BGY were the slowest.

The highest concentration of anthocyanins was in Pinot noir wines fermented with 71B, 2056, and 212. The lowest anthocyanin concentrations were in wines fermented with BGY, WSK- 27, RA 17, and Assmanshausen. The highest color intensity (420+520 nm) was in wines fermented with 2056 followed by 212. The lowest color intensity was in wines fermented with RA 17 and 71B. Interestingly, wines fermented with 71B had a high anthocyanin content, but a relatively low overall color intensity. Wines fermented with 71B and RA 17 also had lower total phenolics than the other wines. The ratio of anthocyanin content to the total phenolic content (A/P) in the new wines also varied from as low as 0.083 for BGY (low anthocyanin content, high phenols) to as high as 0.153 for 71 B (high anthocyanin content, low phenols).

The wines will undergo preliminary sensory evaluation this winter by an OSU-industry trained panel for color, aroma, flavor, and body using descriptive analysis. Wines with significant sensory differences will be analyzed by a gas-chromatography (GC) sensory technique developed in our laboratory. Trained panelists will identify and describe aroma intensive compounds as they elute from the GC to provide a bioassay of aroma activity and an aroma profile of wines fen-nented with different yeast strains.

Table 2. 1992 Pinot Noir Yeast Trials, Lewis Brown Farm and Beaver Creek Vineyards, Corvallis, Oregon

| Yeast Strain | Ferm. Time days[1] | Anthocyanin[2] mg/L | Total[2] Phenols mg/L | Ratio[3] A/P | Color Intensity[4] 420 + 520 nm |
|---|---|---|---|---|---|
| WSK 27 | 12 | 177 | 1,836 | .096 | 3.31 |
| Assm. | 13.5 | 187 | 1,854 | .101 | 3.57 |
| 2056 | 10 | 224 | 1,900 | .118 | 4.23 |
| 212 | 10.5 | 211 | 2,019 | .104 | 3.93 |
| 71B | 9.5 | 231 | 1,510 | .153 | 3.13 |
| RA17 | 11.5 | 182 | 1,617 | .113 | 2.96 |
| BGY[5] | 12.0 | 162 | 1,954 | .083 | 3.26 |

1 Ave. time to reach -1.0 °Brix, 25-30°C, maceration on skins 14 days
2 Average of 2 reps each of two wine lots
3 Ratio anthocyanins/phenolics
4 Optical density, 420 + 520 nm, 1 mm cuvette (wine pH) X 10
5 Average of 2 reps of one wine lot