Oregon Wine Advisory Board
Research Progress Report

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Evaluation of Pinot noir Clones in Oregon

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INTRODUCTION

Pinot noir research in Oregon is aimed at improving wine quality and production and at increasing the diversity of virus-free clonal material available to our wine industry. Numerous clones of Pinot noir have been identified in France where the cultivar is known for its wide range of genetic variability. Because Pinot noir performance can vary dramatically from one wine growing region to another, it is important for us to evaluate a selection of Pinot noir types in our region of Western Oregon. In the mid 1970's a program was started by the Oregon wine industry and Oregon State University to introduce and evaluate a selection of virus-free Pinot noir clonal material. Several clones were obtained from the University of California at Davis (UCD) and additional clones were obtained directly from France and indexed virus-free at OSU.

The primary commercial clones in Oregon are the 'Pommard' and 'Wadenswil'selections from the Davis collection. Both can produce excellent Pinot noir in Oregon and they are the standards by which we judge the other clones. Several of the UCD clones have recently been indexed positive for stem-pitting virus (SP), including UCD 4 (and its heat-treated version UCD 5), UCD 12, and UCD 17. However, these clones appear to be healthy under Oregon growing conditions.

Viticulture Conditions

Twelve vines of each clone were planted in 1979 (Colmar 538 in 1980) at two grower-cooperator sites in the Willamette Valley, the Knudsen-Erath Vineyard and Five Mountain Vineyard. The vines were planted on their own roots with a plant and row spacing of 1.3 x 3.0 meters. The vines were trained to a double cane system on an upright single canopy and pruned to the same bud level of 20 buds per vine (4.85 buds/ m^2).

Growth and production data were gathered in 1985, 1986, and 1987. Differences observed among the clones included: growth habit, vine vigor, yield, cluster morphology, and composition of fruit at harvest. The data presented here are from the Knudsen Erath Vineyard site (Table 2).

Table 1

PINOT NOIR CLONES AT OREGON STATE UNIVERSITY

Clone	Name	Origin	Status*
UCD 1	Pinot Franc	Wadenswil	R
UCD 2A	Wadenswil	Wadenswil	R
UCD 4	Pommard	Pommard	SP
UCD 12	Spain	France?	SP
UCD 13	Martini	California	R
UCD 17	Clevner Mariafeld	Switzerland	SP
UCD 29	Jackson	California	R
Esp 236	Espiguette	Burgundy	R
Esp 374	Espiguette	Burgundy	R
Col 538	Colmar	Alsace	R

*R Registered virus free
SP Stem pitting positive

Table 2

PINOT NOIR GROWTH, VIGOR AND PRODUCTION 1985-1987

Clone	Growth[1]	Pruning Weight[2] Kg/vine	Clusters/Node No.	Yield Kg/vine
UCD 1	P	1.1	1.6	3.2
UCD 2A	P	0.9	2.1	3.4
UCD 4	P	1.6	2.0	3.5
UCD 12	P	1.8	2.1	3.1
UCD 13	P	1.8	2.2	2.7
UCD 17	MU	1.8	1.7	1.7
UCD 29	P	1.3	1.8	2.9
Esp 236	MP	1.3	2.2	4.6
Esp 374	U	1.2	2.0	4.2
Col 538	MU	1.1	1.6	1.8

[1] P - Prostrate, MP - moderately postrate, U - upright, MU - moderately upright
[2] 1985-1986

Growth habit of the clones varied from prostrate (P) to upright (U) with the 'Pommard' clone (UCD 4) being the most prostrate in growth and Espiguette 374 being the most upright. Differences in vine vigor were also noted as indicated by the pruning weights which ranged from 0.9 to as high as 1.8 kg/vine. The clones with the most shoot growth were UCD 4,12,13, and 17.

Clusters per node (or bud fertility) averaged from a low of 1.6 to a high of 2.2. Most of the clones

averaged approximately two clusters per node, with the exception of UCD 17, 29, and Colmar 538 which averaged less than two clusters per node. Yields varied more than two-fold from a low of 1.7 and 1.8 kg/vine for UCD 17 and Colmar 538 to 4.2 kg/vine for Esp 374 and 236, respectively.

Many of the clones have a distinct cluster morphology with respect to cluster size, berry size, and degree of cluster tightness; however, we have observed that these characteristics may vary somewhat with both vineyard site and season. (Table 3)

Table 3

PINOT NOIR CLUSTER MORPHOLOGY
1985-1987

Clone	Cluster Weight g	Berry Weight g	Cluster Tightness
UCD 1	99	1.12	loose
UCD 2A	83	0.93	tight
UCD 4	82	0.97	tight
UCD 12	70	0.93	tight
UCD 13	60	0.88	tight
UCD 17	48	0.85	loose
UCD 29	79	1.04	loose
Esp 236	103	0.97	tight
Esp 374	103	1.03	tight
Col 538	53	0.85	tight

Cluster weights averaged from as low as 50 grams (UCD 17, Colmar 538) to as high as 100 grams (UCD 1, Esp 236, Esp 375). Berry weights averaged from as low as 0.85 grams (UCD 12, Col 538) to greater than 1 gram (UCD 1, UCD 29, Esp 374). The degree of cluster compactness also ranged from tight to very loose. UCD 2A and UCD 4, the Wadenswil and Pommard clones, tend to have average sized tight clusters with average sized berries; UCD 12 (Spain) and UCD 13 (Martini) tend to be smaller but to have similar cluster morphology. UCD 1 (Pinot franc) and UCD 29 (Jackson), on the other hand, both have larger berries and looser clusters which may lower their susceptibility to botrytis infection; UCD 17 (Clevner Mariafeld) also tends to be loose but has small clusters and small berries and possible fruit set problems in Western Oregon. Espiguette 236 and 374 tend to have large tight clusters with average to large berry size while Colmar 538 has small, tight clusters with small to averaged sized berries.

Yield tends to increase with cluster size (weight). UCD 17 and 538 consistently have the lowest yields and the smallest clusters, while Esp 236 and 374 have the heaviest yields and the largest clusters. Among the clones with average yields (2.5 to 3.5 kg/vine), however, there is a wide range in cluster size from small (UCD 13) to large (UCD 1). (Fig. 1).

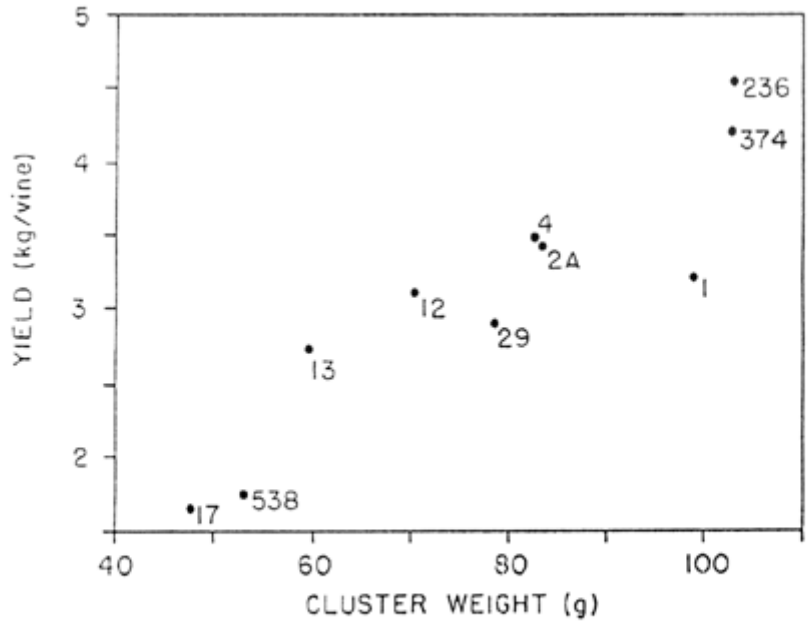

Fig 1 Yield and cluster weight for Pinot noir clones, 1985-1987 Knudsen-Erath Vineyard.

Clones with larger clusters also tend to have larger berries, although among the clones with the average to large sized clusters (80 grams or greater) there is a fairly wide range in berry size, from moderate to large, depending upon the clone. (Fig. 2).

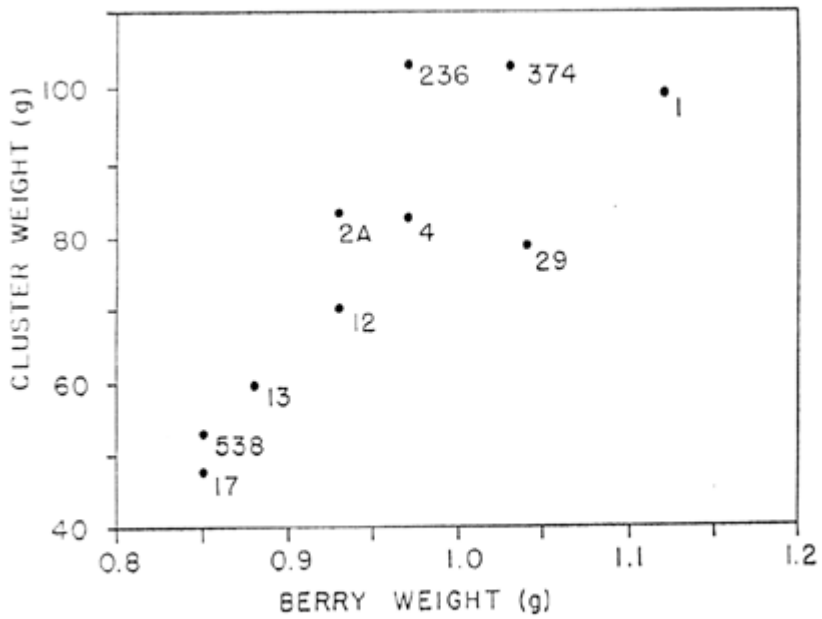

Fig. 2 Cluster weight and berry weight for Pinot noir clones, 1985-1987 Knudsen-Erath Vineyard.

Composition at Harvest

The clones were usually harvested in early October and were analyzed for soluble solids (degrees Brix), titratable acidity (T.A.), pH, malic and tartaric acid content, and anthocyanin content. (Table 4 & 5)

Table 4

PINOT NOIR FRUIT COMPOSITION AT HARVEST
1985-1987

Clone	Brix g/100g	T.A. g/L	pH
UCD 1	22.5	9.4	3.22
UCD 2A	21.9	8.8	3.24
UCD 4	21.6	8.4	3.37
UCD 12	22.9	8.1	3.40
UCD 13	21.8	8.7	3.36
UCD 17	22.5	8.9	3.34
UCD 29	21.7	10.1	3.20
Esp 236	20.2	9.5	3.26
Esp 374	20.8	8.2	3.33
Col 538	22.8	8.3	3.35

Table 5

PINOT NOIR FRUIT COMPOSITION AT HARVEST
1985-1987

Clone	MAL g/L	TAR g/L	Anthocyanins mg/100g
UCD 1	3.9	7.0	47.4
UCD 2A	3.6	6.2	45.9
UCD 4	4.0	6.2	42.9
UCD 12	4.2	6.4	44.0
UCD 13	4.1	6.9	33.7
UCD 17	4.3	6.8	47.8
UCD 29	4.2	6.9	48.3
Esp 236	4.1	6.5	31.3
Esp 374	3.6	6.3	38.6
Col 538	4.1	6.6	48.6

Soluble solids averaged 21.5 degrees Brix or higher for all the clones with the exception of the Esp 236 and 374 which averaged 20.2 and 20.8 degrees Brix, respectively. Titratable acidity averaged from 8.1 to 10. 1 g/L (as tartrate) and pH averaged from 3.2 to 3.4. Clones UCD 1 and UCD 29 both had higher acidity and lower pH than other clones of similar soluble solids content; Esp 236 and 374 had relatively low to moderate titratable acidity at a degree of maturity considerably lower than the other clones. Malic acid content at harvest averaged from 3.6 g/L to 4.3 g/L. UCD 2A and ESP 374 had the lowest malate levels. Tartaric acid content averaged from 6.2 g/L to 7.0 g/L. UCD 2A and UCD 4 had the lowest

tartrate levels.

In general, soluble solids are lower in clones with higher yields. The lowest yielding clones, UCD 17 and Colmar 538, have high soluble solids, while the heaviest yielding clones, Esp 236 and 374, have the lowest. Among average yielding clones, however, soluble solids varied from about 21.5 to as high as 23 degrees Brix depending on the clone (Fig. 3).

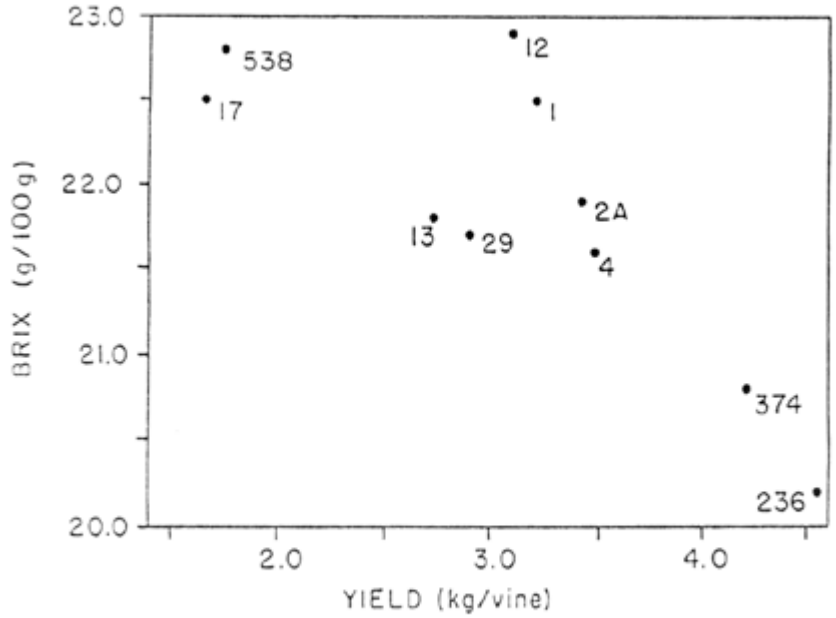

Fig. 3 Brix and yield for Pinot noir clones, 1985-1987 Knudsen-Erath Vineyard.

Anthocyanin content, expressed as mg of pigment per 100 grams of berries, averaged from as low as 3l.3 to 48.8. Esp 236, 374, and UCD 13 had the lowest anthocyanin content and Colmar 538 and UCD29 had the highest. Anthocyanin content tends to be higher in clones with low to moderate yields, and lower in high yielding clones with the exception of UCD 13 (Fig. 4).

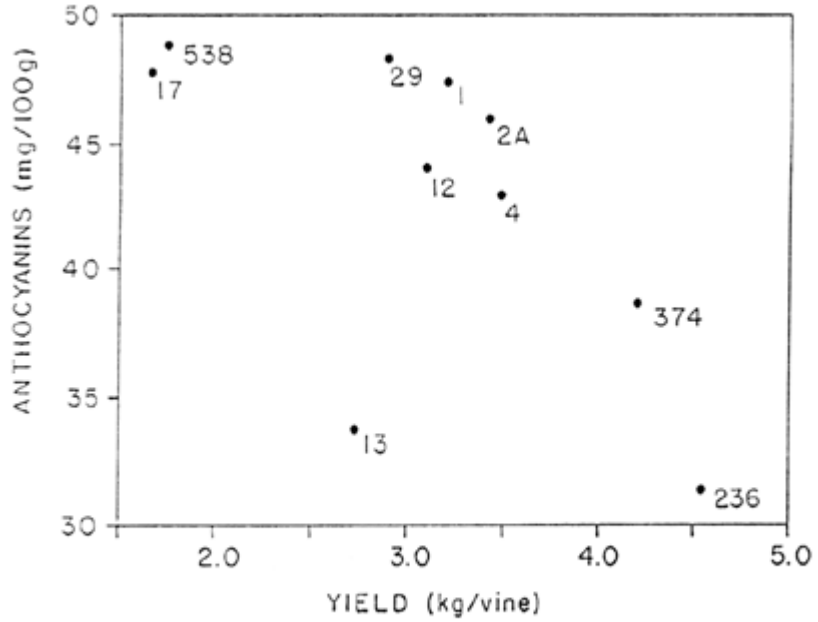

Fig. 4 Anthocyanins and yield for Pinot noir clones, 1985-1987 Knudsen-Erath Vineyard.

Anthocyanin content is also higher in clones which are more advanced in maturity, as expressed by degrees Brix. One exception again is UCD 13 (Martini) which has poor color even at moderate Brix. The clones with high anthocyanin content (40 mg/l00g or more) all averaged 21.5 degrees Brix or higher and include Colmar 538, UCD 17, UCD 29, UCD 1, UCD 2A, UCD 12, and UCD4. (Fig.5). Anthocyanin content also tends to be lower in clones which have larger berries, However, the traditional concept that Pinot noir clones with larger berries will have poor color does not hold true for UCD 1 and UCD 29, Both of these clones have loose clusters with large berries and high levels of anthocyanins. By contrast, UCD 13 and UCD 236 have smaller berries with considerably less color. (Fig. 6).

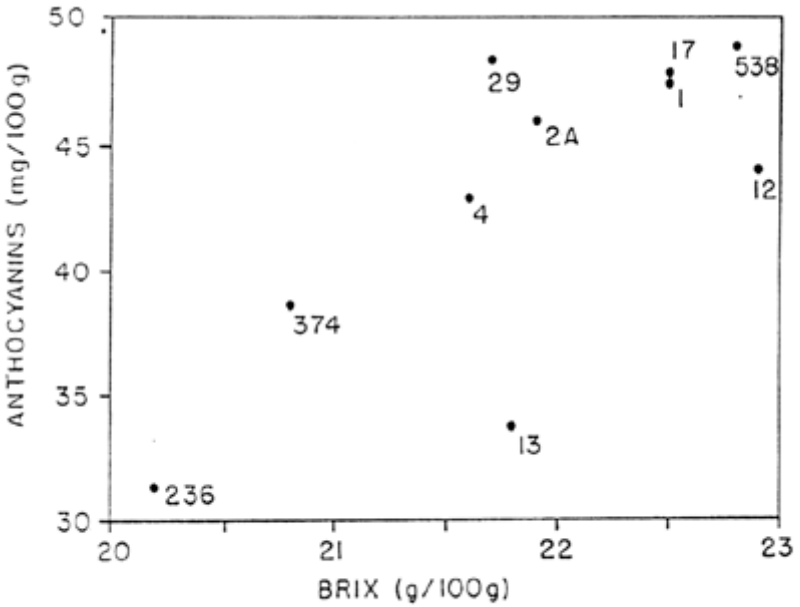

Fig. 5 Anthocyanins and Brix for Pinot noir clones, 1985-1987 Knudsen-Erath Vineyard.

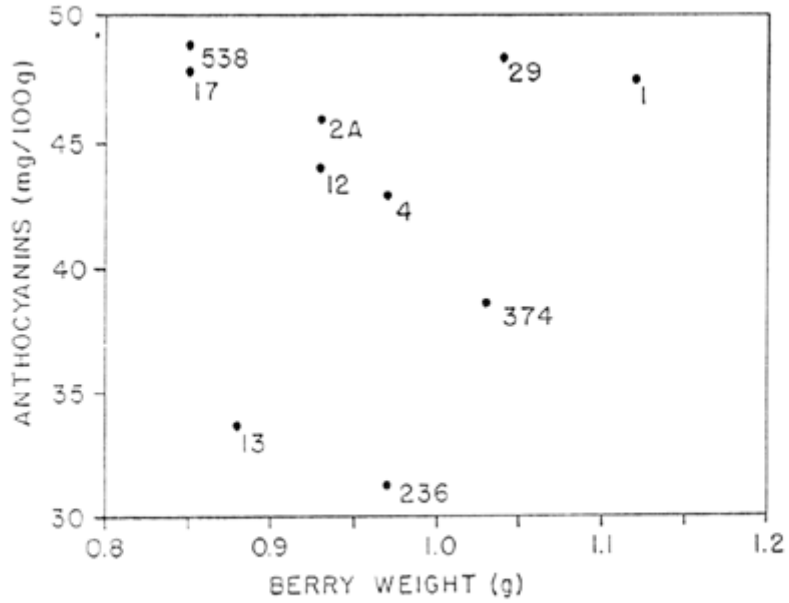

Fig. 6 Anthocyanins and berry weight for Pinot noir clones, 1985-1987 Knudsen-Erath Vineyard.

Wine Production and Sensory Evaluation

Red wines were produced from the clones in 1985 from one site (Knudsen Erath Vineyard) and the data presented here is the preliminary evaluation of these wines. In 1986 and 1987 we produced wines from all the clones from both of our two grower-cooperator sites which we are still in the process of evaluating. The wines were produced using traditional processing techniques in our experimental winery in the Department of Food Science. After fermentation on the skins for one week with frequent punching down of the cap, the wines were pressed and allowed to complete malolactic fermentation.

The new wines were then clarified by natural settling and were polish filtered and bottled. The wines were evaluated at nine and 18 months by an industry panel of winemakers. The scale used to evaluate different attributes was an intensity scale of 1 to 5 (1 = low intensity, and 5 = high intensity).

Clonal differences were found in overall intensity, varietal aroma and flavor intensity, and in fruity, berry, and spicy character. The data presented here is a summary of the more detailed sensory data published in the Symposium proceedings.

Fruity, berry and spicy character were among the attributes used to try to develop preliminary aroma profiles for the different clones. The clones which rated highest in fruity character were UCD 1, UCD 4, UCD 29, and Colmar 538. The clones which rated highest in berry character were also UCD 1 and UCD 29. The clones which rated the highest in spicy character were UCD 1, UCD 4, UCD 12, UCD 29, and Colmar 538. (Fig. 7)

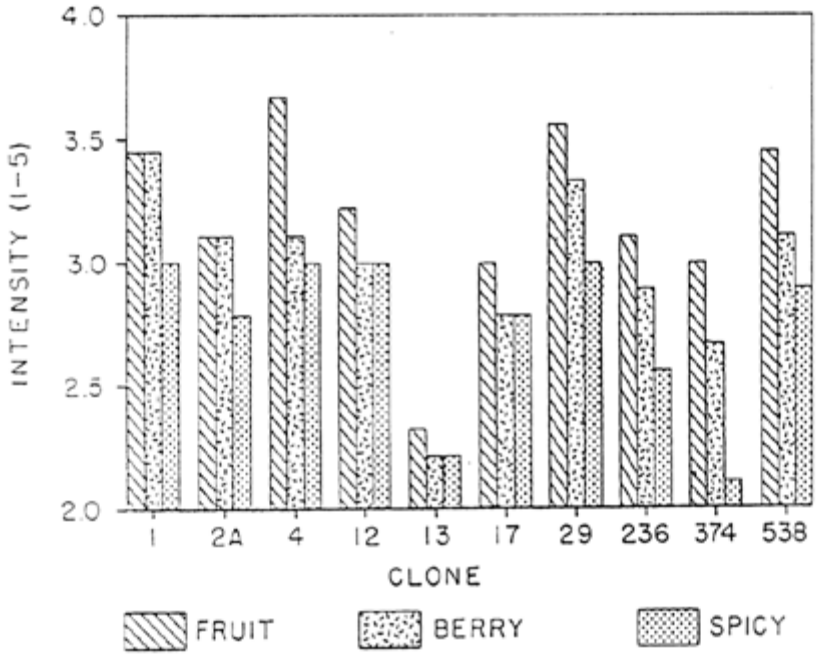

Fig. 7 Intensity of fruit, berry and spicy character for Pinot noir clones, 1985 Knudsen-Erath Vineyard.

In general, clones with low to moderate yields were rated higher in overall varietal intensity with the exception of UCD 17 and especially UCD 13. The clones rated the lowest in overall varietal aroma and flavor were UCD 13, UCD 17, Esp 236 and Esp 374. Although Esp 236 and 374 were rated average to low in overall intensity as red wines, they both are high yielding with low to moderate soluble solids and moderate acidity and may have good potential for the production of white wines, blush wines, and traditional sparkling wines (Fig. 8).

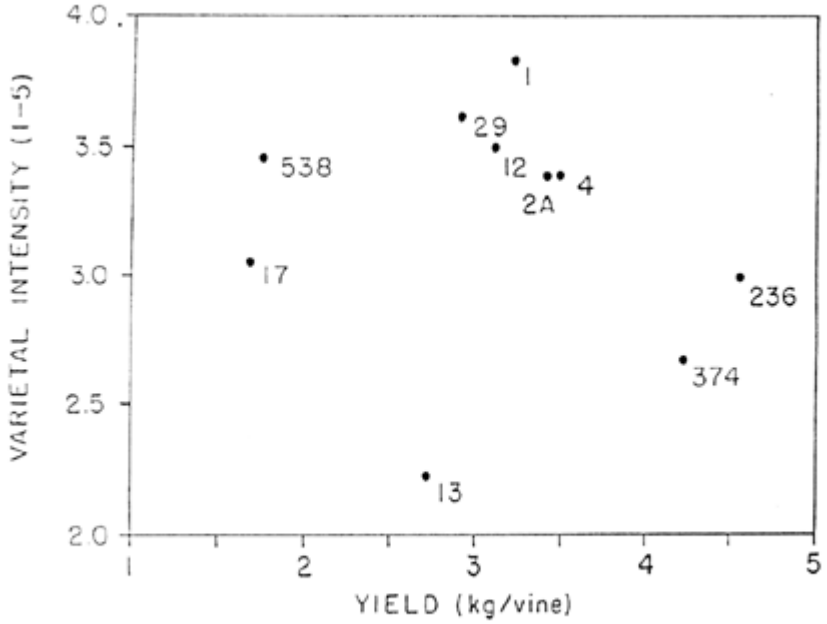

Fig. 8 Varietal intensity and yield for Pinot noir clones, 1985 Knudsen-Erath Vineyard.

Our commercial industry standards in Oregon, UCD 2A (Wadenswil) and UCD 4 (Pommard) rated well and similarly in overall varietal aroma and flavor intensity. Other clones which also rated high overall and have strong potential for the production of premium quality Pinot noir include: UCD 1 (Pinot franc), UCD 12 (Spain), UCD 29 (Jackson), and Colmar 538 (Fig. 9).

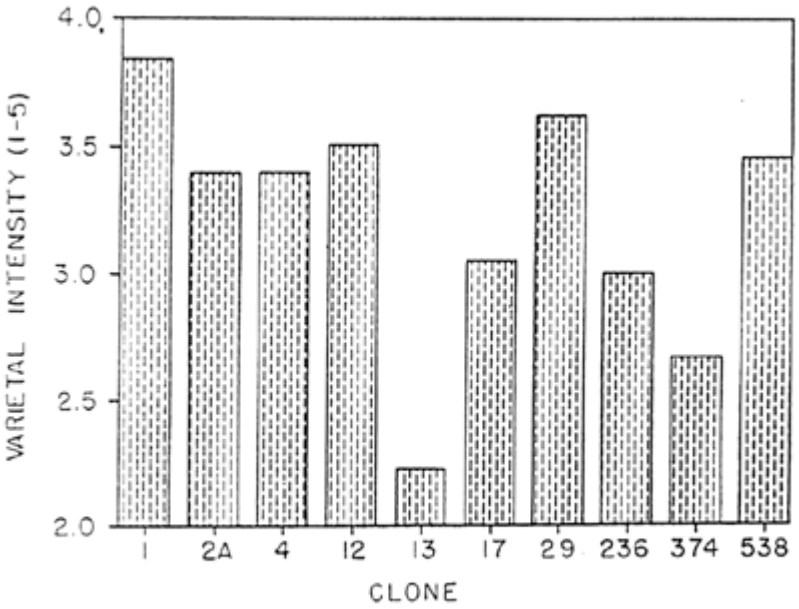

Fig. 9 Varietal intensity for Pinot noir clones 1985 Knudsen-Erath Vineyard.

In summary, our preliminary observations of these Pinot noir clones have shown differences in yield, cluster morphology, fruit composition, as well as wine character. However, to conclude with a word of

caution, we have observed that yearly differences and site to site differences are often greater than clonal differences, We are, however, seeing consistent patterns emerge among the clones regardless of site or season.

Our initial screening has allowed us to select a group of the more promising Pinot noir clones to further increase the diversity of our clonal material in Oregon, and we hope that as they become commercially available that they will further enhance the high level of quality which Oregon is already achieving with our current but limited number of Pinot noir clones.