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A Field Evaluation of Select Wine Grape Varieties for the Aurora and Medford Areas of Oregon-- A Progress Report

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FOREWORD

Growing varietal wine grapes is a new industry for Oregon. The soils and climate of several areas within the state provide favorable sites for grape production.

Growers and state agencies cooperated in developing a plant quarantine policy which safeguards this new industry against the introduction of phylloxera and certain viruses. As a result, all plantings in Oregon have originated from certified planting stock.

Oregon State University scientists are conducting research on various aspects of grape production and utilization. This report summarizes 5 years of data on the performance of wine grape varieties at Aurora and Medford.

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ABSTRACT

Selected varieties of *Vitis vinifera* grapes were established in experimental plots at the North Willamette Experiment Station near Aurora and the Southern Oregon Experiment Station near Medford in 1969 and 1970, respectively. Phenological development and fruit production were measured. Summation of degree days from April 1 until harvest ranged from 2,130 to 2,590 at Medford and from 1,956 to 2,079 at Aurora. Grapes were generally higher in soluble solids and lower in acids at Medford than at Aurora. Disease and bird damage was noted at both sites. Winter injury occurred on Grenache and Sauvignon blanc at both sites. Sylvaner was also damaged at Aurora but most varieties survived low temperatures of 5°F at the Aurora site without injury. Aligote, Chenin blanc, Semillon, Flora, Pinot blanc, White Riesling, and Pinot noir withstood temperatures of -8°F at Medford.

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Appreciation is expressed to Dr. Hoya Yang for providing some of the soluble solids and acid data and to Dr. Ralph Garren for his suggestions about this report. For clarification, trade names have been used in this report. This is not to imply endorsement of products named or criticism of those not included.

CONTENTS

APPENDIX TABLES

A Field Evaluation of Select Wine Grape Varieties for the Aurora and Medford Areas of Oregon - A Progress Report

Lloyd W. Martin and Porter B. Lombard

This report summarizes efforts at the North Willamette Experiment Station and the Southern Oregon Experiment Station to evaluate the field performance of several _Vitis vinifera_ varieties and to present data collected during the first four years of production.

ESTABLISHMENT PROCEDURES

Aurora

In 1969, hardwood cuttings of 14 certified virus-free _Vitis vinifera_ grape varieties were obtained from foundation stock at the University of California and rooted. They were planted in the field in 1970.

Spacing was 8 feet in the row and 12 feet between rows. Each plot contained 5 plants. Eight varieties were replicated four times; the other 6 were planted in single plots in the border rows. Four varieties were added to the planting in 1972, two in the replicated area and two in the border rows. Table 7 provides a complete list of the varieties in the experimental planting in 1974.

Medford

Plants derived from hardwood cuttings of 8 certified virus-free varieties were planted in the field in 1969 and 21 varieties were planted during 1970 and 1971. Source of the plants was from the foundation planting at the University of California.

Spacing was 7 feet in the row and 12 feet between rows. Each plot contained 2 to 4 plants. Twelve varieties included 5 replicated plots; the remainder had a minimum of two. An additional 8 varieties (which have not yet fruited) were planted in 1973.

SITE

Aurora

The planting site is on the valley floor, 90 feet above sea level, and has a south exposure with an estimated slope of 4 percent. The soil is classed as a Willamette sandy shot loam.

Medford

The planting is on Central Point sandy loam soil on the valley floor at 1,480 feet above sea level. The site has no slope.

INSECT AND DISEASE CONTROL

Aurora

No sprays were applied for control of insects or diseases until 1974. A severe mildew problem occurred during the 1973 season, reducing yield and fruit set. Varieties with the greatest mildew problem were Muscat blanc, Red Veltliner, Pinot noir, and Pinot blanc. Varieties with the least mildew problem were Gamay, White Riesling and Semillon. Mildew tolerance of the other varieties was intermediate but was severe enough on all varieties to demonstrate the need for a routine mildew control program. Four sprays of wettable sulfur controlled mildew on all varieties during the 1974 season. No insect problem developed.

Medford

The only pesticides applied were two wettable sulfur sprays applied during May and June in 1973 and 1974. Some mildew developed on Chardonnay, Muscat blanc, Pinot noir, Helena, Chenin blanc, Gewurztraminer, and Zinfandel. Insects noted in the planting were leaf hopper and lygus bug, but no effort was made to control them.

WEED CONTROL

Aurora

Mechanical weed control methods were used the first two growing seasons. Then chemical herbicides were applied. Princep was used in the fall and Karmex in the spring as preemergence applications according to manufacturer's directions. Paraquat was applied in the spring to eliminate weeds and grass. Control of weeds and grasses has been satisfactory and no phytotoxic effects have been observed.

Medford

Spring application of Treflan was incorporated in the soil for weed control during the first 3 seasons, and Princep 80 W (at 2 pounds/Acre) was applied with Paraquat (1 quart/50 gallons) in April 1973 and 1974.

PRUNING AND TRAINING

Aurora

Plants were pruned back to two buds at the time of planting in 1970. None of the plants was pruned or trained during the first summer in the field.

In March, 1971, the plants were again pruned back to a single 2-bud stump just above the ground level. In July, 1971, the most vigorous developing shoot from each plant was selected and trained to a stake. This main shoot was headed at 3-1/2 feet and lateral growth allowed to develop. Other shoots developing near the ground line were cut off and new growth was cut off during the remainder of the growing season. In March, 1972, plants were pruned, depending on vigor and winter injury, to a maximum of 2, 6-bud canes which were left self-supporting or trained laterally on a single wire 3-1/2 feet above ground line.

In March, 1973, and in March, 1974, all varieties, except Sylvaner and Grenache, which were winter damaged, were pruned to two canes with a total of 30 buds. During the 1973 growing season, a second wire was placed at the top of the training stakes, 58 inches above the soil and 16 inches above the lower wire. When seasonal growth was 3 to 4 feet long, a string was attached to the end posts of each plot at the 58-inch level and stretched on both sides of the row, adjacent to the top wire, thereby forcing the new shoots upright between the topmost wire and the strings. Plant growth was kept in a relatively narrow hedge which allowed maximum exposure to light. Wind and mechanical injury to new shoot growth was reduced from injury in previous years.

After the first two growing seasons, the only summer pruning was removal of suckers that originated near the soil line or on the base of the main trunk.

Medford

The cordon method of training on a 3-wire trellis was used at first on all varieties. A single wire was placed 36 inches high and 2 wires were placed 24 inches higher on a crossarm 18 inches long. The cordons were pruned to 5 spurs of 1-3 buds on each arm.

Many varieties were later changed to a cane system of training to increase their fruiting potential. The cane method required two wires at the 36-inch height to support the four canes which were pruned to 10-12 buds each. Pruning was usually done in March.

Several vines severely damaged by the freeze in 1972 were cut back to the ground to permit development of another trunk.

Summer pruning removed suckers rom the base of the trunks. Shoots were tipped back frequently to control growth and allow more light into the fruiting region.

IRRIGATION

Aurora

During 1970 and 1971, the vineyard was irrigated on a 10 to 14-day interval in July and August to encourage rapid plant development. In 1972, one 2-inch irrigation was made in mid-July.

Medford

The young vines were irrigated frequently for the first two years, but no irrigation was applied after August 1. After the vines were bearing, only one trickle irrigation was applied in June.

HARVEST SAMPLING

Aurora

Berry samples were taken at weekly intervals beginning about the first of August and continuing until harvest time. One mature berry was selected at random from each of the plants, composited by variety, the juice extracted, and analyzed for soluble solids. (See Tables 3, 5 and 7.)

Fruit was harvested by hand and weighed. Time of harvest was determined by soluble solids and/or lack of suitable weather for further fruit maturity. In 1973 the rapidly developing mildew problem was an influencing factor in selecting the optimum harvest date. The soluble solids and total acid readings shown in Table 1 were taken from the total harvest crush; thus, the soluble solids are generally lower than the final field readings recorded in the tables mentioned above.

Medford

Samples of 20 berries each were taken at appropriate times for maturity testing from the top, middle and bottom of the grape bunches at random along the row and combined to provide a single sample for each plot. The sample was placed in cheese cloth and squeezed for juice to analyze for soluble solids, titratable acid and pH. The periodic analysis is summarized for 10 varieties in Tables 4, 6 and 8.

The grapes were harvested when a maturity test indicated soluble solids of 20-23 percent, titratable acid of 0.7-0.9 percent, and a pH of 3.3-3.6. Harvest at the proper time was difficult particularly at the end of the season when rain and cool weather slowed maturity development. The grapes from each vine were weighed and the equivalent tons per acre calculated. Only mature bunches were used in the yields. The harvest dates, heat units, yields, and juice content at harvest are indicated in Table 2.

WINTER INJURY

Aurora

An early fall freeze following the very vigorous plant growth in 1971 resulted in the first cold injury to occur. Plants had been fertilized and irrigated throughout the growing season and were succulent when the temperature dropped to 25°F on October 28. Grenache, Sylvaner and Sauvignon blanc had the greatest injury and were pruned to the ground. Injury to the other varieties was restricted to the smaller lateral shoots still succulent.

On December 8, 1972, the temperature dropped to 5°F. The newly formed trunks of Grenache and Sylvaner were severely injured and again were cut back to the ground line. Sauvignon blanc showed some discoloration in the outer bark of both the main trunk and the canes; however, normal growth and fruiting occurred in 1973. The other varieties showed no apparent injury.

The low temperature in winter, 1974, was 8°F on January 10. Injury was not evident on any of the varieties except Grenache; however, no irrigation was used the previous summer and all plants except Grenache were well conditioned for the low January temperature. The severe pruning of the previous year, plus the natural vigor of Grenache, apparently left it in a condition very susceptible to winter injury.

Medford

Four consecutive nights of sub-zero temperatures (minimum of -8°F) in December, 1972, damaged buds, canes, cordons, and some trunks. These low temperatures damaged the Grenache vines the most severely, killing all buds and most canes so that no fruiting occurred the following season. Sauvignon blanc, Gamay and Gewurztraminer buds and canes were injured enough to reduce cropping. Those varieties with little or no bud or cane injury were: Aligote, Chenin blanc, Semillon, Flora, Pinot blanc, White Riesling, and Pinot noir.

EVALUATION OF VARIETIES

The following summation is a composite of notes and observations from both sites, and in some instances an interpretation of tabular data previously referred to. Exceptions are noted when a variety was not tested at both sites.

Aligote: early season bud break and bloom; mid season maturity; moderate yields with cordon training; moderate soluble solids and low acid content. Tested only at the Medford site.

Chardonnay: mid season bud break and bloom; mid season maturity; moderate yields with cane pruning; some sun-burning with high trellising; moderate soluble solids and slightly high acid content. High trellising increased soluble solid content slightly. Tested only at the Medford site.

Chenin blanc: mid season bud break and bloom; late season maturity; heavy yields with cordon training, moderate soluble solids and acid content, but heavy yields in 1974 reduced soluble solids. Tested only at the Medford site.

Flora: mid season bud break and bloom; mid season maturity; moderate yields with cordon training; high soluble solids and low acids. Clusters often mature unevenly.

Gewurztraminer: mid season bud break and early season bloom; early to mid season maturity; low to moderate yields with cane pruning; low to moderate soluble solids and low acid content. Cordon training reduced yields but advanced maturity. Development of shot berries is common.

Helena: late season bud break and bloom; mid season maturity; moderate yields with cordon training; high soluble solids and high acid content. Cane pruning did not improve berry maturity at Medford but high trellising did lower the acid content and increase soluble solids; however, raisining and sun-burning of the berries was severe with high trellis training.

Muscat blanc: late season bud break and bloom; mid season maturity; moderate yields under cane pruning; moderate soluble solids and acid content. Freeze damage reduced yields considerably on this variety at Medford. It appeared very susceptible to mildew in the Aurora test.

Pinot blanc: early season bud break and bloom; mid season maturity; moderate to high yields; moderate soluble solids and low acid content. Cane pruning reduced yields at Medford and delayed maturity. This variety appears to be well adapted to both test sites.

Sauvignon blanc: mid season bud break and bloom; mid season maturity; moderate to high yields on cordon training; high soluble solids and moderate acid. Chemical thinning of berries with GA_3 improved maturity in observation plots at Medford. This variety appears very susceptible to freeze injury.

Semillon: late season bud break and bloom; mid season maturity; moderate to high yields on cordon training; low soluble solids and acid content.

Sylvaner: late season bud break and bloom; mid season maturity; moderate yields on cordon training; high soluble solids and low acid content. This variety appears somewhat susceptible to low temperatures.

White Riesling: late season bud break and mid season bloom; late season maturity; high yields on cordon training; moderate soluble solids and acid content. This variety appears to be well-suited to this region; however, heavy cropping should be controlled by cluster thinning.

Cabernet Sauvignon: late season bud break and bloom; mid season maturity; moderate yields on cane pruning; moderate soluble solids and acid content. This variety is susceptible to low temperatures and was tested only at the Medford site.

Gamay: late season bud break and mid season bloom; late season maturity; moderate to high yields on cordon training; low soluble solids and moderate to high acidity. Excessive fruit set tends to delay maturity. This variety appears well-suited to both sites although maturity and freeze injury may be a problem.

Grenache: late season bud break and bloom; late season maturity; high yields on cordon training; moderate soluble solids and acidity. Lower yields on cane pruning system advanced berry maturity. Grenache is very susceptible to low temperatures.

Pinot noir: early season bud break and bloom; early season maturity; moderate yields with cane pruning; high soluble solids and moderate acidity.

Zinfandel: late season bud break and mid season bloom; late season maturity; high yields on either cordon or cane training; moderate to low soluble solids and very high acidity. Heavy cropping produces "red berry" condition and tends to delay maturity.

Table 1. Production, harvest maturity, and accumulated degree days for wine grapes at North Willamette Experiment Station, 1972-1974

Variety	Date of Harvest	Degree Days[x]	Yield (Tons/A)	Soluble Solids (%)	Total acid (g/100 L as tartaric)
White Wine Grapes					
Flora	10/5/72	1989	0.66	21.0	0.904
	10/10/73	1985	2.95	17.8	-----
	10/23/74	2079	6.13	20.5	0.889
Gewurztraminer[y]	9/26/72	1956	0.89	20.6	0.776
	10/2/73	1982	1.20	21.0	0.720
	10/9/74	2027	2.63	23.8	0.724
Helena	10/5/72	1989	1.04	21.5	1.357
	10/10/73	1985	2.22	21.7	-----
	10/23/74	2079	5.85	21.6	1.039
Muscat blanc	10/23/74	2079	3.86	21.6	0.844
Pinot blanc[y]	9/26/72	1956	0.43	19.5	1.010
	10/10/73	1985	2.44	18.8	0.956
	10/23/74	2079	6.94	19.3	0.844
Red Veltliner	10/5/72	1989	0.61	20.5	0.877
	10/10/73	1985	0.54	21.2	-----
	10/23/74	2079	7.86	19.4	0.919

Table 1 (continued). Production, harvest maturity and accumulated degree days for wine grapes at North Willamette Experiment Station, 1972-1974

Variety	Date of Harvest	Degree Days[x]	Yield (Tons/A)	Soluble Solids (%)	Total acid (g/100 L as tartaric)
Sauvignon blanc[y]	10/2/73	1982	1.19	21.2	1.200
	10/9/74	2027	3.72	22.0	1.200
Semillon	10/5/72	1989	0.70	19.6	0.922
	10/10/73	1985	2.09	19.8	-----
	10/23/74	2079	6.13	19.6	0.788
Sylvaner[y]	10/9/74	2027	0.79	23.2	0.848
White Riesling[y]	10/5/72	1989	0.93	20.7	1.222
	10/10/73	1985	2.92	19.3	1.290
	10/15/74	2049	4.86[z]	20.3	0.956
<u>Red Wine Grapes</u>					
Gamay[y]	10/5/72	1989	2.50	17.2	1.365
	10/10/73	1985	3.05	17.3	1.410
	10/22/74	2079	3.93[z]	14.4	1.241
Pinot noir[y]	9/26/72	1956	1.29	20.2	0.900
	10/2/73	1982	1.75	21.2	1.050
	10/15/74	2049	7.09	20.1	0.926

Table 1 (continued). Production, harvest maturity and accumulated degree days for wine grapes at North Willamette Experiment Station, 1972-1974

Variety	Date of Harvest	Degree Days[x]	Yield (Tons/A)	Soluble Solids (%)	Total acid (g/100 L as tartaric)
Zinfandel	10/5/72	1989	1.59	20.6	1.327
	10/10/73	1985	2.04	20.3	-----
	10/23/74	2079	11.12[z]	14.7	1.253

[x]Degree days are the accumulated daily mean temperatures above 50°F from April 1 to harvest date.

[y]Denotes varieties with 4 replications; others were in single plots

[z]Does not include the following estimated losses resulting from bird (starling) damage:

White Riesling, 10 percent;
Gamay, 35 percent;
Zinfandel, 25 percent.

Table 2. Production, harvest maturity, and accumulated degree days for wine grapes at Southern Oregon Experiment Station, 1971-1974

Variety	No. of Vines	Date of Harvest	Degree Days[x]	Yield (Tons/ Acre)	Soluble Solids (%)	Titratable Acids (%)
White Wine Grapes						
Aligote	7	9/27/73	2400	2.1	19.0	0.74
	7	10/18/74	2556	5.5	20.0	0.72
Chardonnay	6	10/3/74	2466	5.1	19.5	1.16
Chenin blanc	6	10/9/73	2440	4.2	21.0	0.91
	6	10/20/74	2572	15.3	17.0	0.91
Flora	8	9/12/72	2190	0.6	23.4	0.75
	8	9/14/73	2200	5.0	22.2	0.93
	18	10/18/74	2556	8.0	20.0	0.74
Gewurztraminer	5	9/24/71	2140	0.7	22.0	0.76
	16	9/7/72	2130	0[y]	19.5	0.98
	20	9/14/73	2200	1.0[z]	23.5	0.58
	20	10/16/74	2540	6.5	18.0	0.84
Helena	2	9/24/71	2140	1.1	23.8	1.35
	20	9/7/72	2130	0.4	22.4	1.22
	20	9/17/73	2250	6.0	22.9	1.73
	20	10/7/74	2480	6.7	23.0	0.96

Table 2 (continued). Production, harvest maturity, and accumulated degree days for wine grapes at Southern Oregon Experiment Station, 1971-1974

Variety	No. of Vines	Date of Harvest	Degree Days[x]	Yield (Tons/ Acre)	Soluble Solids (%)	Titratable Acids (%)
Muscat blanc	4	9/25/72	2400	0.7	24.6	0.77
	6	9/17/73	2250	0.2[z]	23.2	0.98
	6	9/27/74	2402	5.2	20.0	0.98
Pinot blanc	12	9/18/72	2300	1.2	22.2	0.73
	19	10/10/73	2450	6.4	20.5	0.61
	19	10/12/74	2506	6.4	20.0	0.99
Red Veltliner	7	9/18/73	2280	0.2	22.5	0.75
	7	10/12/74	2506	7.4	15.0	0.94
Sauvignon blanc	5	9/24/71	2140	1.2	22.0	1.23
	5	9/25/72	2400	1.3	22.6	1.07
	9	9/17/73	2250	2.7[z]	22.6	0.85
	22	10/4/74	2470	5.8	22.5	0.90
Semillon	20	9/25/72	2400	0.3[y]	24.5	0.59
	20	9/14/73	2200	2.5	20.9	0.86
	20	10/3/74	2466	8.1	20.5	0.95
Sylvaner	7	9/18/72	2300	0.4	24.0	0.91
	7	9/17/73	2250	4.4	21.4	0.88
	17	10/7/74	2480	6.1	23.0	0.75

Table 2 (continued). Production, harvest maturity, and accumulated degree days for wine grapes at Southern Oregon Experiment Station, 1971-1974

Variety	No. of Vines	Date of Harvest	Degree Days[x]	Yield (Tons/ Acre)	Soluble Solids (%)	Titratable Acids (%)
White Riesling	5	10/18/71	2285	1.2	21.2	1.04
	5	10/19/72	2600	4.8	20.9	0.98
	20	10/15/73	2480	6.7	22.2	0.94
	20	10/8/74	2490	9.4	20.5	0.97
Red Wine Grapes						
Cabernet Sauvignon	2	10/18/71	2285	0.7	22.1	0.86
	2	9/25/72	2400	1.3	22.6	1.07
	10	10/5/73	2435	2.0[z]	22.3	0.74
	10	10/9/74	2495	6.2	20.0	0.97
Gamay	4	10/18/71	2285	4.2	19.5	1.29
	11	10/16/72	2590	3.1[y]	21.5	0.88
	19	10/12/73	2450	3.4[z]	20.5	0.90
	20	10/20/74	2572	8.5	16.0	1.10
Grenache	4	10/18/71	2285	1.1[y]	21.3	1.34
	4	10/13/72	2580	9.0	20.2	0.99
	20			0[z]	0	0
	20	10/20/74	2572	7.0	18.0	0.90
Pinot noir	2	9/24/71	2140	1.7	23.1	0.86
	2	9/7/72	2130	1.5	22.6	0.88
	8	9/26/73	2380	5.4	22.5	0.69
	18	9/27/74	2402	4.8	20.0	1.0

Table 2 (continued). Production, harvest maturity, and accumulated degree days for wine grapes at Southern Oregon Experiment Station, 1971-1974

Variety	No. of Vines	Date of Harvest	Degree Days[x]	Yield (Tons/ Acre)	Soluble Solids (%)	Titratable Acids (%)
Zinfandel	5	10/18/71	2285	4.7	21.4	1.12
	5	10/13/72	2570	9.7	21.8	1.27
	16	10/16/73	2480	5.6[z]	20.1	1.35
	16	10/17/74	2550	7.4	21.5	0.96

[x]Degree days are the accumulated daily mean temperatures above 50°F from April 1 to harvest date.

[y]Does not include extensive loss from bird damage.

[z]Yield was reduced because of winter injury to plants.

Table 3. Maturity indices of wine grape varieties at North Willamette Experiment Station, 1972

Variety	Total Soluble Solids (%) at various dates					
	8/31	9/6	9/13	9/20	9/27	10/4
White Wine Grapes						
Flora	10.6	17.6	22.1	23.7	23.3	23.2
Gewurztraminer	17.0	20.0	20.8	22.2	--	--
Helena	15.0	18.1	19.6	22.2	22.4	22.3
Muscat blanc	14.0	17.0	19.6	19.4	21.6	21.6
Pinot blanc	15.8	19.4	18.8	21.7	--	--
Red Veltliner	18.0	20.0	21.4	21.9	21.9	22.4
Semillon	15.0	17.2	18.7	21.0	20.5	21.3
White Riesling	13.3	16.1	18.7	20.2	20.3	21.5
Red Wine Grapes						
Gamay	15.6	16.5	16.8	18.6	18.5	19.1
Pinot noir	17.6	19.4	20.5	21.8	--	--
Zinfandel	15.0	15.4	17.4	19.4	20.4	21.0
Degree Days[z]	1722	1824	1880	1947	1956	1989

[z]Degree days are the accumulated daily mean temperatures above 50°F after April 1.

Table 4. Maturity indices of wine grape varieties at Southern Oregon Experiment Station, 1972

Varieties	Total soluble solids (%) at various dates.										
	8/24	8/31	9/7	9/12	9/18	10/2	10/4	10/9	10/12	10/16	10/19
White Wine Grapes											
Gewurztraminer	15.0	19.1	19.4								
Pinot blanc	14.6	18.9	21.2	22.4	22.2						
Sauvignon blanc	15.0	17.6	19.0	21.1	22.0						
Semillon	15.0	18.6	21.3	21.5	22.5						
White Riesling	10.6	14.6	15.0	17.5	20.0	20.2	-	20.0	19.7	21.5	20.0
Red Wine Grapes											
Cabernet Sauvignon	11.7	15.4	17.0	19.0	20.1	21.0	-	22.1	23.5		
Gamay	11.2	13.6	17.1	17.9	18.7	19.6	19.8	19.8	19.8	21.5	22.5
Grenache	8.5	12.6	15.6	17.0	18.3	20.8	21.7	22.0	24.6		
Pinot noir	18.0	18.8	20.0	22.6							
Zinfandel	9.6	14.5	16.4	18.0	19.0	21.1	20.6	21.6	22.8		
Degree Days[z]	1890	2010	2130	2190	2300	2510	2520	2550	2570	2590	2600

[z]Degree days are the accumulated daily mean temperatures above 50°F after April 1.

Table 5. Maturity indices of wine grape varieties at North Willamette Experiment Station, 1973

Variety	Total Soluble Solids (%) at various dates					
	8/31	9/7	9/14	9/21	9/28	10/5
White Wine Grapes						
Flora	7.9	11.4	17.1	17.4	18.5	17.8
Gewurztraminer	18.0	19.4	20.6	21.1	21.9	--
Helena	12.5	16.2	17.4	19.9	20.5	21.7
Muscat blanc	13.0	15.7	19.7	22.2	24.4	23.0
Pinot blanc	12.9	16.3	18.4	18.6	19.3	19.6
Red Veltliner	12.6	14.0	18.6	18.5	20.4	21.2
Sauvignon blanc	15.4	17.4	20.1	21.0	21.3	--
Semillon	13.0	14.6	17.8	17.0	18.8	19.8
White Riesling	10.0	13.7	16.0	18.2	18.4	19.6
Red Wine Grapes						
Gamay	14.5	14.7	15.4	16.0	17.2	18.4
Pinot noir	16.4	17.9	19.5	20.1	21.7	--
Zinfandel	14.8	15.4	17.0	17.3	18.4	20.3
Degree days[z]	1586	1702	1818	1903	1969	1984

[z]Degree days are the accumulated daily mean temperatures above 50°F after April 1.

Table 6. Phenological development and maturity indices of wine grape varieties at Southern Oregon Experiment Station, 1973

Varieties	Bud Break[y]	Bloom[z]	Total soluble solids (%) at various dates 9/7	9/14	9/21	9/28	10/5	10/12
White Wine Grapes								
Gewurztraminer	4/17	6/6	21.5	23.5				
Pinot blanc	4/18	6/5	17.0	17.7	18.2	19.2	21.0	20.5
Sauvignon blanc	4/19	6/7		24.2	25.0			
Semillon	4/17	6/9	20.0	20.5	20.7			
White Riesling	4/21	6/7			16.5	19.5	19.5	20.2
Red Wine Grapes								
Cabernet Sauvignon	4/22	6/7			21.8	22.5		
Gamay	4/25	6/6			18.5	20.0	20.0	20.5
Grenache	Freeze damage	-------	-------	-------	-------	-------	-------	-------
Pinot noir	4/17	6/1	19.8	20.0	22.0	22.5		
Zinfandel	4/23	6/7		19.8	20.0	19.2	19.5	20.0
Degree days[x]			2150	2200	2335	2405	2435	2450

[x]Degree days are the accumulated daily mean temperatures above 50°F after April 1.

[y]Bud break dates indicate when 10 percent of the main growing points exceeded 1/2 inch.

[z]Bloom dates indicate when 50 percent of the clusters had more than 5 percent of the caps off.

Table 7. Maturity indices of wine grape varieties at North Willamette Experiment Station, 1974

Variety	Total Soluble Solids (%) at various dates					
	9/12	9/19	9/26	10/3	10/10	10/17
Chardonnay[z]	11.0	18.4	21.2	21.6	23.3	--
Flora	--	12.0	15.0	17.2	18.0	21.6
Gewurztraminer	17.0	20.2	22.0	22.4	24.4	--
Helena	10.0	15.8	17.4	18.2	16.9	20.5
Muscat blanc	15.0	18.6	19.0	19.2	20.5	23.0
Pinot blanc	15.0	17.6	20.0	21.2	21.2	22.0
Red Veltliner	13.0	16.4	19.6	18.6	21.4	21.2
Riesling #277335[z]	--	12.0	19.0	20.8	23.1	23.3
Riesling italica[z]	--	14.2	21.0	22.4	22.8	22.0
Sauvignon blanc	18.2	19.4	21.0	22.4	23.6	--
Semillon	11.6	13.4	14.8	17.0	18.2	18.4
Sylvaner	15.8	19.4	22.4	24.0	24.2	--
White Riesling	11.0	14.2	18.2	20.2	22.3	22.4
Gamay	12.8	14.4	16.2	16.6	18.0	18.0
Gamay Beaujolais[z]	16.4	20.2	22.6	23.0	24.2	--
Grenache	--	14.8	19.6	20.0	21.2	23.5
Pinot noir	16.6	19.0	20.4	22.4	23.0	--
Zinfandel	11.8	12.8	14.2	16.2	16.0	17.3
Degree days (base 50°F)	1689	1812	1959	2005	2027	2062

[z]Planted in 1972; all others planted in 1970.

Table 8. Phenological development and maturity indices of wine grape varieties at Southern Oregon Experiment Station, 1974

Varieties	Bud Break[y]	Bloom[z]	Total Soluble Solids (%) at various dates						
			9/5	9/13	9/20	9/27	10/4	10/11	10/18
White Wine Grapes									
Gewurztraminer	4/20	6/14	13.5	15.0	15.0	16.8	17.0	18.0	18.0
Pinot blanc	4/16	6/14	13.3	13.5	17.0	19.0	19.5	20.0	
Sauvignon blanc	4/20	6/14	15.0	17.0	18.0	18.5	22.5		
Semillon	4/30	6/18	13.2	15.5	17.5	20.0	20.5		
White Riesling	4/30	6/14	11.0	12.0	17.5	18.5	19.5	20.5	
Red Wine Grapes									
Cabernet Sauvignon	4/30	6/15	14.5	15.5	16.5	18.0	19.0	20.0	
Gamay	4/30	6/14	11.0	13.5	13.0	16.0	17.0	16.0	
Grenache	4/30	6/22	12.5	14.0	15.5	18.0	19.0	19.0	18.0
Pinot noir	4/16	6/11	14.5	16.5	20.0	20.0			
Zinfandel	4/30	6/17	9.5	13.5	16.5	18.5	19.5	20.0	
Degree Days[x]			2006	2135	2263	2402	2470	2501	2556

[x]Degree days are the accumulated daily mean temperatures above 50°F after April 1.

[y]Bud break dates indicate when 10 percent of the main growing plants exceed 1/2 inch.

[z]Bloom dates indicate when 50 percent of the clusters had more than 5 percent of the caps off.