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# *The Oregon Wine Industry*

**Historical Perspectives and the  
Current Production and Cost Situation**



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## THE OREGON WINE INDUSTRY: HISTORICAL PERSPECTIVES AND THE CURRENT PRODUCTION AND COST SITUATION

The Oregon wine industry grew rapidly over the last decade, expanding from a few acres to approximately 1,500 acres in 1981 and 2,300 acres in 1982. In 1980, there were 36 licensed wineries in Oregon. Although California accounts for 85 percent of all wine produced in the United States, the wine production in the Pacific Northwest (PNW) is not inconsequential. The PNW states have distinguished themselves as producers of unique and high quality wines.

Many observers believe the growth of the Oregon wine industry will continue. It is estimated that Oregon-produced wine will have a retail value of \$20 million by 1985 compared to \$7 million in 1980. A larger wine industry offers more opportunities for employment, the use of marginal land, and tourism.

Total per capita wine consumption in the United States increased at an average annual rate of 3.4 percent between 1956 and 1976. Between 1968 and 1972 the average annual rate of increase in per capita consumption was almost 11 percent, whereas from 1956 to 1960 the average annual increase was only 0.6 percent. Contributing to this rising wine consumption are the liberalization of drinking laws, lower legal drinking ages, and shifts in the age distribution of the population. The changing age distribution is an important factor for the future since about one third of the population is entering the prime wine consumption period.

Oregon has great potential for participating in the increasing wine market. Specifically, the PNW states have several areas with climates similar to northern European wine growing regions. These PNW areas can produce quality wine from the Vitis vinifera grape currently in demand in the United States.

### United States Production and Utilization

In 1980 the total production of all grapes in the United States was about 5.6 million tons (Table 1). California accounted for 92 percent of the total U.S. grape production, New York's grape production was 3 percent of the national total, and Washington's was 2.6 percent. California's total production figures include raisin varieties (53 percent), wine varieties (40 percent), and table grape varieties (seven percent). In California, wine varieties were used almost 100 percent for crushed products. Raisin varieties were used for making wine, brandy, raisins, and for fresh consumption.

In New York, Concord grapes represent approximately 70 percent of the total grape production. Concord grapes account for about 90 percent of Washington's production. The average grower price varies from \$167 per ton in Pennsylvania to \$531 per ton in Oregon. The prices represent averages of all grapes. Prices for premium wine grapes, table grapes, and raisin grapes vary considerably due to yield differences. This explains the relatively high grape price for Oregon where primarily high quality, lower yielding V. vinifera varieties are planted. The value of total grape production in the United States amounted to over \$1.3 billion in 1980.

Table 1.--United States grapes: production, quantity crushed, average grower prices and farm value, by states, 1980<sup>a/</sup>

State	Total production (tons)	Quantity crushed (tons) <sup>b/</sup>	Avg. Grower price (dollar/ton)	Value of T. production (1000 \$) <sup>c/</sup>
California	5,105,000	2,891,000	238.00	1,215,585
New York	175,000	171,000	217.00	37,975
Washington	145,100	144,700	178.00	25,828
Pennsylvania	56,000	54,000	167.00	9,352
Michigan	49,500	47,800	250.00	12,375
Arizona	12,400	--	170.00	2,108
Ohio	12,000	11,700	173.00	2,076
Arkansas	6,600	6,560	170.00	1,122
North Carolina	5,800	4,400	276.00	1,518
Georgia & South Carolina	4,500	2,550	388.00	1,746
Missouri	4,200	4,100	254.00	1,067
Oregon	1,415	1,415	531.00	751
Other states	<u>471,100</u>	<u>446,810</u>	<u>229.00</u>	<u>107,567</u>
U.S. Total	6,048,615	3,786,035	237.00	1,322,955

<sup>a/</sup> California Crop and Livestock Reporting Service and Crop Reporting Board, U.S. Department of Agriculture, Washington, D.C., and Oregon State University Extension Service, county agent estimates, Corvallis, Oregon.

<sup>b/</sup> Crushed for all purposes.

<sup>c/</sup> Value of production losses not included.

Table 2 summarizes the use of grapes in the United States for 1979. It shows about 54 percent of the grapes used for wine, 28 percent dried into raisins, 6 percent crushed for juice, and about 1 percent canned. Only 10.5 percent of the 1979 U.S. grape crop was consumed fresh as table grapes.

### Oregon's Wine History

Oregon's history of wine grape growing is almost as old as the state. Grape growing began with the first settlers coming over the Oregon Trail in the middle of the last century. Some settlers brought vine cuttings and began growing grapes in the Willamette Valley south of Portland. Ashland farmers grew V. vinifera table grapes and shipped Flame Tokay to markets. This was before the Tokay industry developed at Lodi, California.

The 1860 Census of Agriculture lists Oregon wine production at 2,603 gallons (Table 3). The special national census of wine growing (1880) shows Jackson County producing 15,000 gallons of wine. The 1899 Census lists 537,139 grape vines of bearing age as yielding 2,694 tons of grapes. The number of grape vines decreased from 381,302 in 1909 to 361,484 in 1919, while the value of production increased from \$98,776 to \$170,558 during the same period.

Grapes were grown from the V. vinifera and V. labrusca (the most common variety is Concord) varieties. The V. vinifera grapes were limited to Jackson and Josephine Counties and the Columbia Basin. V. labrusca grapes were grown in the Umpqua Rogue River Valley, the Willamette Valley, the Columbia Basin, and as far northeast as Umatilla County. Around the turn of the century Professor Bioletti suggested that several Oregon locations seemed climatically suited for V. vinifera varieties. The wine industry prospered and won honors around 1900. Wine producer Ernst Reuter, a German settler near Forest Grove, won a silver medal at the 1904 St. Louis Exhibition.

The Oregon wine industry decreased production from 1900 to 1920. Anticipating Prohibition, most wine producers expected disaster. Dozens of old farmer wineries in Oregon continued operating when Prohibition began in 1920, but production shifted to private basements and bathrooms. In fact, grape production increased from 1,421 tons in 1919 to 2,668 tons in 1929 (Table 3).

The first license after the repeal of Prohibition was granted to Louis Herbolt in 1933. Herbolt's efforts in the post-Prohibition era increased the number of wineries to 28 in 1938. Total production in 1938 exceeded one million gallons. The number of Oregon bonded wineries and total production of wine declined progressively after 1938, however, because of strong competition from California. The California Marketing Act of 1937 enabled the passage of marketing orders for wine and wine grapes. These orders were designed to stabilize prices for wine and wine grapes. Through promotional and other activities of the California Wine Advisory Board, California worked to become the nation's number one wine supplier. Oregon grape production continued to decline until the late 1950's.

In 1965 Dr. Konstantin Frank introduced his New York State Johannisberg Riesling and Chardonnay wines. This changed the national pattern of wine grape

Table 2. -- Utilization of United States grapes by type of product, 1979<sup>a/</sup>

Utilized production	Fresh use	Canned	Dried	Crushed for wine	Crushed for juice
Tons 4,998,700	542,100	60,000	1,380,900	2,713,000	310,600
Percentage 100	10.5	1.2	27.68	54.39	6.23

<sup>a/</sup> Agricultural Statistics 1980, U.S. Department of Agriculture, Washington, D.C.

Table 3.--Oregon grape and wine industry: production, number of vines, value of production  
1860-1981 <sup>a/</sup>

Year	Acres	Number of Vines	Number Bearing	Number Nonbearing	Production (tons)	Value of production (\$)	Gallons produced
1860	--	--	--	--	--	--	2,603
1870	--	--	--	--	--	--	1,751
1880	--	--	--	--	--	--	15,000 <sup>b/</sup>
1890	--	--	--	--	--	--	--
1899	--	--	537,139	--	2,694	--	--
1909	--	468,598	381,302	--	1,603	98,776	--
1919	--	397,054	361,484	35,570	1,421	170,558	--
1924	--	648,514	--	--	--	--	--
1929	--	599,579	517,892	81,687	2,668	111,663	--
1934	--	599,943	528,700	71,243	1,904	49,517	--
1939	--	438,497	398,157	40,340	1,606	57,788	--
1944	--	350,657	--	--	1,384	127,921	--
1949	--	286,619	223,041	63,578	899	57,993	--
1954	--	173,589	164,961	8,628	303	24,515	--
1959	--	112,742	102,022	10,720	616	49,359	--
1964	--	89,052	78,590	10,462	519	80,000	--
1969	89	39,885	32,574	7,311	289	66,000	--
1974	432	225,252	56,406	168,846	1,190	457,000	--
1978	1,305	918,662	464,511	454,511	1,413	522,000	--
1981 <sup>c/</sup>	1,238	--	--	--	--	--	--
1982 <sup>c/</sup>	1,812	--	--	--	--	--	--

<sup>a/</sup> U.S. Census of Agriculture, U.S. Department of Agriculture, Washington, D.C., and Oregon State University Extension Service, Corvallis, Oregon.

<sup>b/</sup> Only Jackson County was listed.

<sup>c/</sup> Includes at least 80 percent of Oregon acreage.

growing because it meant California was no longer the only state that could grow the true V. vinifera grapes of Europe.

In the 1960's consumer tastes changed toward table wines. The demand for dessert wines declined, better grapes were required, and new vineyards were needed. California's surplus raisin and table grapes and the East's Concord grapes no longer appealed to consumers. The rapid expansion of the market for table wines in the 1960's created a pressing demand for more wine grapes. Better products of the new premium quality varieties and education on the value of wine in the diet led to a renewed interest in wines.

Oregon's wine industry awakened during the 1960's as former California growers came to explore and experiment with wine grape growing and winemaking potential in the Northwest. These people showed several wine grape varieties were better suited to Oregon's climate than to other locations in the United States, including California.

Oregon wines have the potential for being competitive with other growing regions on a quality basis. The temperate Oregon climate can lead to better grapes with a high flavor intensity. A high quality wine product, however, is also dependent on both timely grape cultural practices and precise winemaking procedures.

In 1968 Oregon State University planted grape vines of different varieties at the Research Centers in Medford, Aurora, and Corvallis. Several commercial growers and OSU researchers tested 27 V. vinifera and several rootstock varieties. In 1976, the Northwest Regional Commission authorized a Tri-State Grape Research Project with test plots in Oregon, Washington, and Idaho.

From 1969 to 1978 the acreage of grape vines increased from 89 acres to 1,305 acres (Table 3). Wine grape production increased from 289 tons to 1,413 tons, resulting in a 1978 production value of \$522,000.

#### 1981 and 1982 Oregon Wine Grape Surveys

In late 1981 and 1982, Oregon State University surveyed the Oregon wine grape industry. Grape growers were asked for information on bearing and non-bearing acres, varieties grown, yield, farm price of the grapes, and their location (by county). The 1982 survey asked for additional information about acreages being established and those planned for the near future. This section covers information from those surveys. While not all grape growers returned the questionnaires, at least 80 percent of Oregon wine grape acreage was included.

This report contains comparisons between the 1981 and 1982 data. The two-year comparisons indicate the changes in the industry. The data are not directly comparable because some vineyards reporting in 1982 were new or different from those reporting in 1981.

## Number of Operations

A total of 117 vineyard operations reported in 1981 (Table 4). Eighty operations reported bearing acres and 91 reported nonbearing acres. Most of those with bearing acres reported some nonbearing acres, but many with nonbearing acres appear to be just entering the business. Oregon vineyards are also relatively small. Of the 80 with bearing acres, only three are 30 acres or more. Fifty-seven, or about 70 percent of those 80, are 10 acres or less. Of the 91 operations reporting nonbearing acres, almost all (87) are 15 acres or less. In most cases, however, these grape growers also have some bearing vineyards.

Of the 144 vineyards reporting in 1982, only eight had 30 acres or more planted in wine grapes (Table 5). One hundred twenty-six of those 144 reported 20 acres or less. It is apparent from the two surveys that the vineyard average size is gradually increasing. In 1981 the average vineyard was 10.6 acres. In 1982 the average was 12.6 acres.

## Acres Reported

In 1981, survey respondents reported 718 acres of bearing vineyards (Table 6), with Pinot Noir the primary variety grown (241 acres). The three main varieties (Pinot Noir, White Riesling, and Chardonnay) combined for 570 acres or almost 80 percent of the total. The same three varieties dominated the 519 nonbearing acres with over 70 percent of the total.

The 1982 survey showed a 31 percent (224 acre) increase in bearing acreage over 1981 and a 68 percent (351 acre) increase in nonbearing acreage. Of the 224-acre increase in bearing acres, 140 acres (63 percent) were in Pinot Noir, White Riesling, and Chardonnay. Of the 351-acre increase in nonbearing acres, 314 acres or 89 percent were in those three varieties.

In 1982, slightly more than 1,800 acres of planted vineyards were tabulated. Assuming 80 percent of Oregon's acreage was included in the survey, actual acres of commercial wine grapes numbered between 2100 and 2200.

## New Plantings of Wine Grapes

The 1982 survey asked respondents for information on acreages planted or planned (Table 7). Respondents indicated they planted 386 acres in 1982 and planned to establish another 719 acres in 1983. They also reported 1,380 acres planned for a five-year period (1984 to 1988). Even in the new plantings, the top three varieties of Pinot Noir, White Riesling, and Chardonnay dominated. However, Gewurztraminer appears to be increasing in favor.

The data for the 1984 to 1988 period are probably not as reliable as the near-term expectations of growers. Also, many more operators could potentially enter the industry in future years. One additional caution: the 386 acres planted in 1982 were included in the nonbearing figures in Table 6.



Table 4. -- Size of Oregon vineyard operations, bearing and nonbearing acreage, 1981

Size of acres	Bearing		Nonbearing		Total vineyards	Total acres
	Total vineyards	Total acres	Total vineyards	Total acres		
0 - 5.0	43	93.1	59	154.3	52	122.8
5.1 - 10.0	14	117.4	17	125.9	23	179.0
10.1 - 15.0	8	97.6	11	143.0	14	175.3
15.1 - 20.0	5	84.3	1	19.0	10	177.8
20.1 - 25.0	5	110.6	2	41.7	6	132.1
25.1 - 30.0	2	57.1	--	--	7	197.2
30.1 & over	3	158.0	1	35.5	5	254.8
∞ Total	80	718.1	91	519.4	117	1,239.0 <sup>a/</sup>

<sup>a/</sup> Some totals may not be the same due to rounding.

Table 5.--Numbers and total size of Oregon vineyard operations, 1981 and 1982

<u>Size of acres</u>	<u>Total vineyards</u>		<u>Total acres</u>	
	<u>1981</u>	<u>1982</u>	<u>1981</u>	<u>1982</u>
0 - 5.0	52	58	122.8	158.2
5.1 - 10.0	23	26	179.0	199.2
10.1 - 15.0	14	20	175.3	253.3
15.1 - 20.0	10	22	177.8	399.5
20.1 - 25.0	6	5	132.1	117.6
25.1 - 30.0	7	5	197.2	144.3
30.1 & over	5	8	254.8	540.2
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Total	117	144	1239.0	1812.3

Table 6.--Oregon wine grape acreage by variety, bearing and nonbearing, 1981 and 1982

Variety	Bearing acres			Nonbearing acres			Total <sup>b/</sup>		
	1981	1982	% change	1981	1982	% change	1981	1982	% change
Pinot Noir	241.1	299.5	24	162.7	285.6	76	403.8	585.1	45
White Riesling	176.7	221.3	25	89.4	158.2	77	266.1	379.5	43
Chardonnay	151.9	199.8	32	120.5	242.8	101	272.4	442.6	62
Cabernet Sauvignon	40.0	48.3	21	23.4	22.1	-6	63.4	70.3	11
Gewurztraminer	42.5	68.1	60	51.8	54.1	4	94.3	122.2	30
Gamay Beaujolais	13.8	29.1	111	4.6	5.8	26	18.4	34.9	90
Merlot	7.3	8.7	19	3.0	5.3	77	10.3	14.0	36
Sauvignon Blanc	8.3	11.0	33	3.6	17.2	378	11.9	28.2	137
Muller Thurgau	2.2	3.5	59	14.3	28.0	96	16.5	31.4	90
Zinfandel	1.2	1.5	25	---	3.9	--	1.2	5.4	350
Pinot Gris	1.7	4.4	159	27.0	26.2	-3	28.7	30.5	6
Miscellaneous Red	1.1	11.4	---	6.5	0.3	--	7.6	11.6	--
Miscellaneous White	17.7	27.6	---	6.7	15.0	--	24.4	42.6	--
Other <sup>a/</sup>	12.6	8.2	---	5.9	5.7	--	18.5	13.9	--
Total Acres	718.1	942.2		519.4	870.2		1,237.5	1812.3	

<sup>a/</sup> Varieties not specified.

<sup>b/</sup> The totals may not add due to rounding error.

Table 7.--New plantings of wine grapes by variety, actual 1982, planned 1983 and 1984-88 future planting expectations

Variety	1982 Planted acreage	1983 Planned acreage	1984-88 Future plantings
	-----Acres-----		
Pinot Noir	151.7	201.5	225.0
White Riesling	31.3	179.6	307.1
Chardonnay	147.9	185.4	256.4
Cabernet Sauv.	9.6	25.0	68.0
Gewurztraminer	24.8	82.6	178.1
Gamay Beaujolais	3.5	1.5	3.6
Merlot	---	5.0	50.0
Sauvignon Blanc	2.2	13.1	58.5
Muller Thurgau	4.5	8.8	52.0
Zinfandel	3.2	---	---
Pinot Gris	3.7	8.2	31.5
Miscellaneous Red	---	1.1	1.0
Miscellaneous White	2.0	6.1	138.3 <sup>a/</sup>
Other <sup>b/</sup>	1.3	1.5	10.5
Total	385.7	719.4	1,380.0

<sup>a/</sup> One farm indicated 50 acres each of two varieties.

<sup>b/</sup> Varieties not specified.

## Where Grapes Are Grown

The greatest concentration of Oregon's wine grape acreage is in the Willamette Valley. This valley is also the state's most agriculturally diversified region. Because the valley floor often experiences frost in the spring, most vineyards lay along the hillsides. Douglas County and Jackson-Josephine counties are also major Oregon production areas.

Washington and Yamhill counties, located in the northern end of the Willamette Valley and west of the Willamette River, account for much of Oregon's wine grape production (Table 8). Yamhill County growers reported more grape acres in both years than any other county. Washington County was second in 1981 but dropped to third in 1982. In 1981, these two counties had almost two-thirds bearing acres and about half of the nonbearing acres. Polk County, however, is gaining; over 250 nonbearing acres were reported in 1982.

Washington and Yamhill counties also have a large share of the number of vineyards reporting. In 1982, 144 vineyards reporting bearing and/or nonbearing acreages, an increase of 27 over 1981's total.

## Production Potential

Potential areas for wine grape production in Oregon were identified in part through a soil analysis conducted by information obtained from the State Water Resource Boards and the Oregon State University Extension Service. To find the potential acreage for wine grape production, researchers used the following parameters: (1) the soil series should be deep or moderately well drained, (2) rainfall should not exceed 40 inches, (3) slopes should be between three and 20 percent upgrade, and (4) elevation should not be higher than 1,000 feet. Using these parameters researchers estimated potential grape acreage for the Willamette Valley alone to be 178,000 acres. For the Umpqua region they estimated 37,800 acres.

One would expect that grapevines could not be planted on all of this estimated area. More information is needed on exposition of the slopes and the micro-climate. All of these factors are important for successful wine grape growing. Yet, even if only a small percentage of the potential acres were actually feasible for grape planting, research indicates no physical limitation to future wine grape production in Oregon. The potential wine grape growing areas in Oregon are shown in Figure 1.

## Yields Per Acre

Yields per acre of wine grapes vary considerably according to variety, soil, and climate conditions. Comparisons of yields per acre were difficult for several reasons: (1) There were hardly any data about acreage and production available before 1975. In that year the first survey of the Oregon Wine Growers Council was conducted. (2) The U.S. Census listed only number of vines of bearing and nonbearing age. Spacing practices, however varied over time and within regions. (3) California figures must be compared with caution because varieties other than V. vinifera varieties were included in those figures.

Table 8.-- Oregon wine grape acreage by county, bearing and nonbearing, 1981 and 1982

County	Bearing		Nonbearing		Total	
	1981	1982	1981	1982	1981	1982
Benton	(1) 11.0	(5) 21.2	(5) 19.6	(5) 23.8	30.6	45.0
Clackamas	(5) 6.5	(6) 9.2	(6) 9.9	(9) 15.8	16.4	25.0
Douglas	(6) 91.3	(12) 109.3	(10) 41.5	(8) 66.1	132.8	175.4
Jackson	(6) 50.9	(5) 49.0	(4) 9.2	(9) 41.3	60.1	90.3
Josephine	(4) 15.4	(6) 28.8	(11) 40.2	(10) 41.5	55.6	70.3
Lane	(3) 18.3	(5) 35.8	(8) 54.5	(12) 73.5	72.8	109.3
Linn	(2) 23.8	(2) 31.2	(2) 21.0	(2) 14.4	44.8	45.5
Marion	(3) 29.0	(3) 44.4	(4) 18.1	(4) 40.1	47.1	84.4
Morrow	---	---	(2) 8.5	(2) 11.5	8.5	11.5
Polk	(4) 14.6	(4) 33.3	(5) 45.6	(9) 252.4	60.2	285.7
Wasco	---	(2) 15.5	---	(2) 4.0	---	19.5
Washington	(15) 157.5	(15) 184.3	(16) 88.6	(12) 79.7	246.1	264.0
Yamhill	(25) 297.0	(26) 374.8	(23) 161.2	(23) 191.6	458.2	566.4
Other Counties	(3) 2.8	(3) 5.5	(1) 1.5	(1) 14.5	4.3	20.0
Total	(77) 718.1	(94) 942.2	(91) 519.4	(108) 870.2	1,237.5	1,812.3

Note: The number in parenthesis is the number of vineyards reporting.

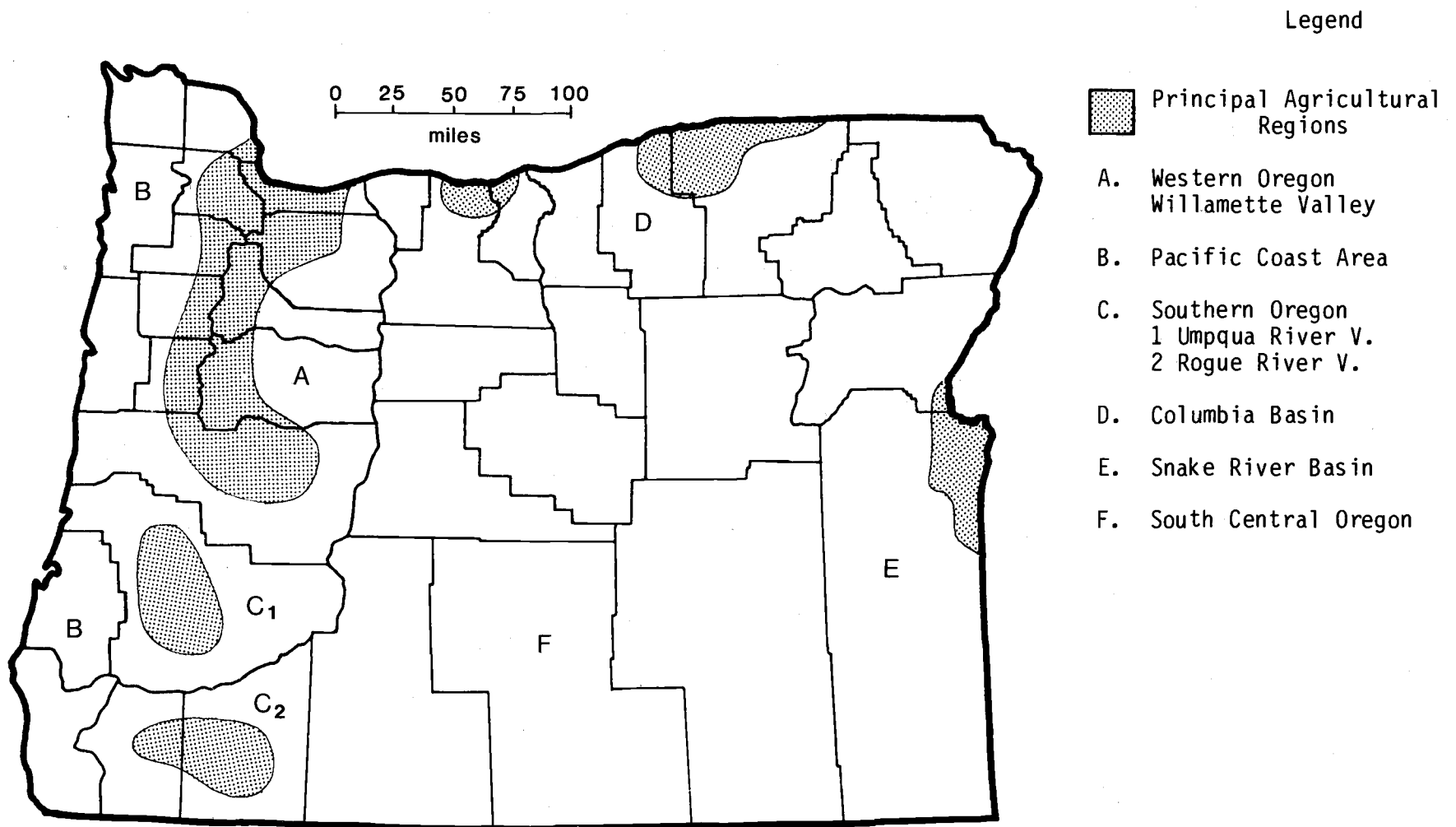


Figure 1.--Potential wine grape growing areas in Oregon<sup>a/</sup>

<sup>a/</sup> Dr. Ralph Garren, Department of Horticulture, Oregon State University, Corvallis, Oregon

Some of those varieties are heavy quantity producers but exhibit inferior quality in wine compared to V. vinifera varieties.

Yield per acre in California varied between 4.52 and 6.96 tons over the last 10 years. The average yield per acre in Oregon varied between 1.8 and 3.2 tons over the last five years (Table 9).

While the acreages by variety were quite complete on both the 1981 and 1982 survey forms, the yield and price data were not complete (Table 10). In reviewing this data, it should be noted that no quality standards were used. Sugar content typically affects price, and bunch rot and/or materials other than grapes affect both price and yield.

It is interesting to note that average yields reported in 1982 were about twice as high as those reported in 1981. Given the high yields obtained by some growers in 1982, it appears that Oregon vineyards have the potential of attaining very profitable production levels. The low yields in Table 9 represent acreages that are just becoming productive.

## Wine Grape Production

### Costs and Returns

Most farm decisions are concerned with comparing costs and returns of different alternatives. To understand the basic cost relationships of wine-making, you need to know: (1) the costs of producing a ton of grapes; (2) the activities associated with these costs; and (3) the capital requirements for establishing a vineyard.

### Peculiarities of Grape Production Costs

Perennial crops differ from annual cultures because they require higher initial investments and provide returns over a longer time period. Also, in most cases the farm organization is fixed. After the planting of the vines and construction of the trellis system, the wine grape grower is restricted in the choice of production operations. Once the vineyard is established, improved machinery technology cannot always be applied and the grower has the choice of either a premature reconstruction of the vineyard or a continuation of production at relatively higher costs.

The production life of a vineyard is determined by economics and is influenced by improvements in vine cultivation including development of new breeds or selections with improved quality and quantity, and by changes in consumer behavior. Consumer behavior ultimately determines the demand for a certain wine type and thus, the varieties of wine grapes grown.

Cost studies for wine grape production usually are divided into: (1) costs of establishing a vineyard; (2) production costs for each of the first three



Table 9.--Estimated average Oregon wine grape yields, 1976-80, by variety<sup>a/</sup>

Variety	Low yield (tons/acre)	High yield (tons/acre)
Pinot Noir	1.5	6.0
White Riesling	2.0	5.0
Chardonnay	1.0	5.0
Gewurztraminer	1.5	3.0
Cabernet Sauvignon	2.0	5.0
Gamay Beaujolais	2.0	4.0

<sup>a/</sup> Lombard, Porter. Interviews with Oregon wine grape producers. Oregon State University, Corvallis, Oregon.

Table 10.-- Oregon average yield and grower prices for wine grapes by variety, 1981 and 1982

Variety	Average yield		Prices reported in dollars/ton					
	(tons/ac.)		Weighted average		High		Low	
	1981	1982	1981	1982	1981	1982	1981	1982
Pinot Noir	1.4	3.1	573	670	800	871	361	475
White Riesling	2.3	3.9	592	620	900	750	280	400
Chardonnay	1.6	3.5	726	860	930	1019	600	525
Gewurztraminer	1.9	3.2	668	703	800	750	540	600
Cabernet Sauvignon	2.3	3.9	612	623	700	675	500	450

years; and (3) production costs of the mature vineyard. Establishment costs occur over the first three years because not all installations are made at once. The costs of establishing a vineyard should be charged over the useful life of the vineyard because the vineyard, as a durable asset, contributes to production over several years. A problem is that the useful life of a vineyard cannot be precisely determined in advance. It has to be assumed. As the vineyard ages, quality and quantity of its production usually declines, resulting in decreased revenues. Decreasing revenues can also be caused by low demand for a certain type or variety, change in consumer tastes, or overproduction. On the cost side, relative and absolute costs increase when an older vineyard's production can't be improved using modern techniques.

The major components of establishment costs are: investment in land, plants, trellis system, land preparation, depreciation, irrigation system (if necessary), and cultural costs in the first years, during which no cash flows in. Production costs of the mature vineyard can be divided into fixed and variable costs. Fixed costs do not vary with output. In grape production fixed costs are interest or rental rate paid for the land, interest on machinery investment, depreciation, insurance, taxes, and housing for the machinery. Variable costs in grape production (those that vary directly with the rate of output) are labor costs for pruning, summer training, and harvesting, and material costs for fertilizer, spraying material, herbicides, tying materials, fuel, and machine lubricants.

#### Establishment and Cultural Costs for a 20-Acre Vineyard

Table 11 summarizes the establishment and cultural costs of a representative 20-acre vineyard in Oregon. Because costs and production practices do not vary much among different varieties, no particular variety was chosen for the cost calculation. (A study by Fuqua, supports the idea that costs would be the same for any *V. vinifera* variety planted in Oregon.) Researchers assumed for the study that the entire 20 acres would be planted at the same time and at the same site. To make a consistent estimate of the cost for the trellis system, they also assumed a square shaped vineyard. The number of end posts, line posts, and anchors would vary considerably. The trellis system was established gradually over the first three years. Stakes, end posts, and anchors were purchased during the first year (Table 11); line posts, in the second year. The trellis system was completed during the third year with the installation of the wires. The costs of the trellis system amounted to \$1,358 per acre. The trellis system consisted of line posts every fourth plant, three main and two movable catch wires, end posts, and anchors on either side. The plants were purchased for \$.60 each. The researchers assumed that 10 percent of the plants had to be replaced during the second year. Prior to planting the soil was plowed on a custom work basis. The cost assigned for the services of an acre of land was calculated on the basis of purchase price times interest rate. The land cost also reflected opportunity costs of using capital for land investment rather than the next best alternative. Table 11 assumes a purchase price of \$2,000 per acre.

This cost study does not reflect Oregon's average production cost per acre. Rather it reflects costs using a selected production method. The production

Table 11.--Establishment and cultural costs per acre for a 20 acre vineyard<sup>a/</sup>

	Amount per acre	Cost per unit (\$)	First year (\$)	Second year (\$)	Third year (\$)	Fourth year (\$)
<u>Establishment costs</u> (including labor)						
Land preparation (custom)		50	50			
Plants	650	0.60	390			
Replants	65	0.60		39		
Trellis:						
Stakes	650	0.60	390			
Line posts	160	2.50		400		
End posts	4.5	6.50	30			
Anchors	4.5	0.60	3			
Anchor wire		0.25	1			
Wire #11	11,657 ft	0.019			221	
#13	7,772	0.014			113	
Miscellaneous			50	50	50	50
<u>Total established costs:</u>			914	489	384	50
Cultural costs:						
Spraying mat.				6	9	33
Herbicides				22	22	40
Fertilizer			20			19
Labor pruning mat. appl. summer tr. 20 hours harvesting \$60/ton		4.00	80	80	80	360 120
Variable machinery costs <sup>b/</sup> (fuel and maintenance)						
			130	130	130	145
Interest on operating capital			103	21	17	50
<u>Total variable costs:</u>			333	259	258	767
Fixed costs:						
Machinery fixed cost			300	300	300	300
Management charge			120	120	120	120
Taxes (land)			6	6	6	6
Interest (\$2,000/acre @ 12%)			240	240	240	240
<u>Total fixed costs:</u>			666	666	666	666
<u>Total cost:</u>			1,913	1,414	1,308	1,483
Receipts for first harvest						-1,100
Accumulated investment cost at the end of second year (i=14%)				3,595		
Accumulated investment cost at the end of third year (i=14%)					5,406	
Accumulated investment cost at the end of fourth year (i=14%)						6,546

<sup>a/</sup> Costs reflect 1981 prices. For machinery cost details, see Appendix Table 1.

<sup>b/</sup> Transportation costs for harvest are included in the fourth year only.

practices were developed from information obtained from interviews with 10 commercial grape growers in Oregon. The growers' production practices, machinery, and equipment varied somewhat. Some grape growers produced other crops and already had machinery. Other grape growers started with used machines.

The second cost category (Table 11) is cultural costs incurred during the first four years. It was assumed that weed control was done twice with herbicides and five times with sulfur. The chemicals Botran and Captan were both applied twice against fungi. Fertilizer was applied during the first, fourth, and the subsequent following years. An adequate amount of nitrogen, phosphorus, and potassium was used.

Labor had to be hired during the first three years for planting, establishment of the trellis, and summer training. For the mature vineyard hired labor was needed for pruning, summer training, and harvesting. Laborers harvested the grapes by hand at a cost of \$60 per ton. Transportation costs were included as part of the costs of machinery. Machinery was assumed to be new and purchased in 1981. Variable machinery costs amounted to \$130 in each of the first three years and \$145 in the fourth year. Total variable costs amounted to \$333, \$259, \$258, and \$767 respectively for the four establishment years.

Fixed costs during the first four years are summarized at the bottom of Table 11. Fixed machinery costs (depreciation, interest, insurance, and housing charges) amounted to \$300 per acre. A fixed management charge of \$120 per acre, which amounted to about 5 percent of the expected gross receipts, was assessed. Property taxes were \$6 per acre. An interest cost of \$240 reflected the initial investment of \$2,000 per acre for the use of the land. Total fixed costs amounted to \$548 per acre.

Total establishment and cultural costs were \$1,913 for the first year. Total costs for the second year, \$1,483. In the fourth year the first grapes would be harvested. By assumption, the yield was two tons per acre and was sold at \$550 per ton.

The total costs accruing during the first four years were compounded at 14 percent interest to the end of the fourth year. This included opportunity costs of the establishment investment for the four years. The compounded establishment costs amounted to \$6,546 per acre and were amortized over the expected life of the vineyard.

#### Production Costs for the Mature Vineyard

Table 12 summarizes the production costs for the mature vineyard. These costs were calculated at varying land investment prices to indicate how sensitive total costs are to land investment cost. The life of the investment was assumed to be 25 years. The operations and cost items listed in Table 11 are similar to the last column on Table 11, the costs of the fourth year. Total variable costs amounted to \$691 in all three cases. All fixed cost items were the same in the three cases except for the amortization of accumulated establishment costs and the land investment cost. Total costs included only total preharvest costs. These costs did not vary with different yield levels.

Table 12.--Production cost per acre of a mature vineyard with varying land prices

	Price of land \$1000 per acre		Price of land \$2000 per acre		Price of land \$4000 per acre	
<u>Variable costs:</u>	% of total cost		% of total cost		% of total cost	
Fertilizer, Spraying mat'., Herbicides, Misc.	141	7	141	6	141	5
Labor (pruning, mat'l. appl. and summer training)	360	17	360	15	360	13
Variable Machinery cost	145	7	145	6	145	5
Interest on operating capital	<u>45</u>	<u>2</u>	<u>45</u>	<u>2</u>	<u>45</u>	<u>2</u>
Total variable costs	691	33	691	29	691	25
<u>Fixed costs:</u>						
Fixed Machinery	300	13	300	13	300	11
Taxes	6	--	6	--	6	--
Management charge	120	6	120	5	120	5
Interest on land (12% interest)	120	6	240	11	480	17
Amortized establishment Cost (14% interest)	<u>891<sup>a/</sup></u>	<u>42</u>	<u>979<sup>b/</sup></u>	<u>42</u>	<u>1156<sup>c/</sup></u>	<u>42</u>
Total fixed costs	1437	67	1645	71	2062	75
Total preharvest cost	2128	100	2336	100	2753	100

<sup>a/</sup> Accumulated investment cost \$5955 at the end of the fourth year, amortized over 21 years.

<sup>b/</sup> Accumulated investment cost \$6546 at the end of the fourth year.

<sup>c/</sup> Accumulated investment cost \$7727 at the end of the fourth year.

The total preharvest costs ranged from \$2,128 when the land cost was \$1,000 per acre, to \$2,753 when the land cost was \$4,000 per acre.

Percentage figures for each category of total preharvest costs are also included in Table 12. Fixed costs ranged from 67 to 75 percent. Amortized investment cost alone accounted for about 42 percent of the costs. Among variable costs, labor was the biggest item and ranged from 13 to 17 percent of total costs. Materials, machinery variable costs, and interest on operating capital were each relatively small as a percent of total preharvest costs.

### Breakeven Prices

Table 13 summarizes breakeven prices (where total receipts cover total costs) for different yield and price levels. Harvest costs of \$60 per ton were included in calculating total costs. In general, the higher the yield, the lower the grape grower breakeven price. Table 14 summarizes the prices at which variable costs would be covered. These values represent the minimum prices required for the farmer to stay in business, at least in the short run. Eventually, however, the farmer would need to cover both short and long-term debt; thus the total breakeven price would need to be obtained.

### Internal Rate of Return

The internal rate of return (IRR) is the discount rate at which the net present value of all cash flows equals zero. The IRR on a 20-acre vineyard was calculated for varying yield and price levels on a pre-tax basis. Yearly budgets were used in the calculation. The IRR method implicitly assumes that net cash flows from an investment are reinvested to earn the same rate as the IRR. Thus, the acceptability of an investment depends upon the comparison of the IRR with the investor's required rate of return.

Table 15 identifies positive internal rates of return for a 20-acre vineyard. Prices received per ton ranged from \$350 to \$750 in \$50 increments. Yields varied from three to six tons per acre in one-ton increments. There were three different land prices: Case 1, \$1,000 per acre, Case 2, \$2,000 per acre, and Case 3, \$4,000 per acre.

Analysis of the data pointed out the importance of vineyard productivity. At a grape price of \$350 per ton, the high-yielding vineyard made a positive internal rate of return in Case 1. The low-yielding vineyard began to make a positive rate of return at \$700 per ton in Case 1. For Case 2 a slightly positive IRR for a 3-ton yield was obtained at a price of \$750 per ton. In Case 2 the first positive IRR at four tons was obtained at a price of \$550 per ton. In Case 3 yield per acre had to be four tons and \$600, to achieve the first positive IRR. With a high yield, the wine grape grower might still earn an appropriate rate of return at modest price levels.

### Winery and Wine Production Costs

Wine grapes are raw material, not an end product. Therefore, wine grape production must be analyzed in relation to the winery. To analyze the cost of

Table 13.--Wine grape production breakeven prices for selected yields per acre and land prices

Yield per acre (tons)	Case 1 <sup>a/</sup>		Case 2 <sup>b/</sup>		Case 3 <sup>c/</sup>	
	Total cost (\$)	Breakeven price (per ton)	Total cost (\$)	Breakeven price (per ton)	Total cost (\$)	Breakeven price (per ton)
2	2,248	1,124	2,456	1,228	7,847	3,924
3	2,308	769	2,516	839	7,907	2,636
4	2,368	592	2,576	644	7,967	1,992
5	2,428	486	2,636	527	8,027	1,605
6	2,488	415	2,696	449	8,087	1,348

<sup>a/</sup> Case 1 = land price at \$1,000 per acre.

<sup>b/</sup> Case 2 = land price at \$2,000 per acre.

<sup>c/</sup> Case 3 = land price at \$4,000 per acre.



Table 14.--Wine grape short run (variable cost) breakeven prices for selected yields per acre

Yield per acre	Variable cost (\$)	Short run breakeven price (per ton)
2	811	406
3	871	290
4	931	233
5	991	198
6	1,051	175

Table 15. --Internal rate of return on a 20 acre vineyard with varying land prices <sup>a/</sup>

Yield per acre (tons)	Dollars per ton									Land price per acre
	350	400	450	500	550	600	650	700	750	
										Case 1
3	--	--	--	--	--	--	--	2.52	6.30	\$1,000
4	negative IRRs		--	--	5.11	9.59	13.59	17.32	20.92	
5	--	--	6.30	11.63	16.41	20.92	25.28	29.58	33.83	
6	2.53	9.59	15.48	20.92	26.15	31.28	36.36	41.43	46.48	
										Case 2
3	--	--	--	--	--	--	--	--	3.16	\$2,000
4	negative IRRs		--	--	1.90	6.52	10.45	14.04	17.42	
5	--	--	3.16	8.54	13.16	17.42	21.49	25.46	29.37	
6	--	6.52	12.28	17.42	22.29	27.03	31.69	36.32	40.93	
										Case 3
3	--	--	--	--	--	--	--	--	--	\$4,000
4	negative IRRs		--	--	--	0.87	5.02	8.55	11.73	
5	--	--	--	3.06	7.70	11.72	15.43	18.96	22.37	
6	--	0.87	6.84	11.73	16.15	20.33	24.39	28.37	32.32	

<sup>a/</sup> Calculated on a before tax basis

wine production, determine (1) the capital requirements; and (2) the costs to produce wine out of grapes for various sizes of wineries.

The winemaking process is described in simple steps by Hugh Johnson (see additional readings list):

"All that is needed to turn grape juice into wine is the simple, entirely natural process of fermentation. Fermentation is the chemical change of sugar into alcohol and carbon dioxide gas brought about by yeasts ... Under normal conditions the yeasts will go on working until all the sugar in the grapes is converted into alcohol, or until the alcohol level in the wine reaches about 15% of the volume..."

However, those "normal" conditions are not always present. Modern wine-making requires high technology and knowledge to produce a consistent high quality product.

Wine production is a capital-intensive business. A small winery producing 10,000 gallons annually requires a capital investment of about \$266,500 in 1981 dollars (Table 16). Before planning a winery, the potential winery operator must set detailed goals and establish a business plan which includes the varieties and types, the approximate volume of wine at a defined level of quality, and the markets to be served, whether local, regional, out-of-state, or international. The business plan should also include the price levels consistent with expected quality and volume of wine.

The first decision when starting the winery is the location of the firm. Wine production costs can increase rapidly if the grapes for the crush have to be hauled over a long distance. Distance of the winery to the market also influences the final cost of the wine. Accessibility of the winery to tourists is important if the operator plans to sell part of the wine through a tasting room.

Construction costs of wineries vary considerably according to the design of plant, visitor-sales facilities, and land prices. Because each winery has unique requirements, wineries must be custom designed and constructed. Construction costs for buildings can therefore vary between \$15 and \$70 per square foot. About one-half square foot of building is required per gallon of annual production.

Equipment must meet the same standards as other food processing industries to produce a sanitary, quality product. In general the price of equipment is not directly related to wine quality, but it has an important effect on the efficiency of the operation. Small wineries that cannot afford expensive equipment do not necessarily produce lower quality wines.

A major part of the winery equipment is cooperage. The choice between wood barrels and stainless steel tanks depends upon the composition of the red and white wines being produced. Wood barrels are used only if the wine is aged in wood to flavor it. This is the current practice in Oregon with most red and some white wines. Storage and processing equipment size is usually based on the following conversions: (1) For one ton of crushed grapes about 160 gallons of

Table 16.--Estimated investment costs for a 10,000, 25,000, and 50,000 gallon winery<sup>a/</sup>

	Annual production 10,000 gallons		Annual production 25,000 gallons		Annual production 50,000 gallons	
	Units	Dollars	Units	Dollars	Units	Dollars
<u>Land</u> (\$2,000 per acre)	2 acres	4,000	3 acres	6,000	4 acres	8,000
<u>Building</u>						
Square feet	6,000		8,000		12,000	
Price per square foot (\$)	30		25		20	
Total building cost		180,000		200,000		240,000
<u>Cooperage</u>						
Stainless steel tanks						
5,000 gallons for \$10,000			4 units	40,000	9 units	90,000
2,500 gallons for \$6,000	3 units	18,000	2 units	12,000	3 units	18,000
1,250 gallons for \$4,000	2 units	8,000	2 units	8,000	2 units	8,000
French oak barrels						
60 gallons for \$300 each	50 units	15,000	200 units	60,000	400 units	120,000
Total cooperage		41,000		120,000		236,000
<u>Processing equipment</u>						
Unloading facilities		5,000		20,000		20,000
(including crusher/stemmer)						
Press	1 x 10h1	9,000	1 x 15h1	12,000	2 x 15h1	24,000
Refrigeration		1,000		5,000		5,000
Filter (plate and frame)		8,000		8,000		8,000
Filter (pressure leaf)		5,000		5,000		5,000
Pumps		1,000		2,000		3,000
Hose, fittings		2,000		5,000		7,000
Forklift				10,000		10,000
Laboratory		5,000		5,000		5,000
<u>Bottling line</u>						
Filler		500		3,500		25,000
Corker		200		4,700		
Labeler		2,000		17,000		17,000
Rinser		500		3,500		4,000
Foil spinner		3,300		3,300		10,000
Miscellaneous		2,000		5,000		10,000
Total processing equipment		41,500		111,000		158,000
<u>Total investment</u>		266,500		437,000		642,000
<u>Investment per gallon of capacity</u>		26.65		17.48		12.84

<sup>a/</sup> Costs reflect 1981 prices. Cooperage is designed for producing one-third red wine and two-thirds white wine. Equipment choices, prices, labor organization. Bill Nelson, Winery Systems & Enology Consultant (Eugene)

storing cooperage is needed; (2) for fermenting space, red wine requires about 220 gallons per ton; and (3) a greater size than the actual volume the wine requires is necessary for filtering, racking, etc. A winery is considered filled to capacity when the gallons of wine in storage equal two-thirds to three-fourths of its total gallons of cooperage. In selecting the cooperage the proper size of the tanks has to be considered. This depends on the amount and number of different wines to be produced.

The processing equipment of a winery consists of: press, crusher stemmer, pumps, filters, bottling line, laboratory, hoses, and fittings. The equipment that is chosen for a particular winery depends on the organization, labor situation, and money available. Winemakers have a large choice of equipment with various degrees of automation.

Estimated Investment and Production Costs of a  
10,000, 25,000, and 50,000 Gallon Winery

Table 17 illustrates the difference in estimated investment and production costs for three different size wineries in Oregon. Size is expressed in terms of annual production: 10,000, 25,000, and 50,000 gallons. Building, equipment, and labor organization is appropriate for each particular size. As in the grape production cost study, the wine production study does not represent average costs for producing wine in Oregon. Instead, the costs are representative of those associated with the three different winery sizes.

The major investment cost items were building, cooperage, and processing equipment (Table 16). The total investment costs amounted to \$266,500 for the small, \$437,000 for the medium, and \$642,000 for the large winery. Investment per gallon of capacity declined from \$26.65 for a 10,000 gallon facility to \$12.84 for a 50,000 gallon facility.

Operating costs consisted of labor, bottling supplies, and chemicals (Table 17). It was assumed that the small winery employed a half-time winemaker. The medium and large winery hired a full-time winemaker. For crush and bottling operations additional workers were hired. Labor hours were charged \$7.20, including social security and other benefits. Because no strict distinction between the winemaker's, operator's, and hired labor's work could be drawn, an extra management charge was included. The management charge reflected the operator's and winemaker's managing and supervising work. Total labor costs amounted to \$21,612 for the small, \$37,586 for the medium, and \$50,848 for the large winery.

Costs for bottling supplies declined when larger volumes of supplies were purchased. Operating costs included a charge for storing the red wine. It was assumed that 15 minutes per week had to be spent tending each barrel. That cost amounted to \$.52 per gallon of wine produced. Total operating costs amounted to \$50,612 for the small, \$96,086 for the medium, and \$159,384 for the large winery. Per gallon operating costs ranged from \$3.19 for the 50,000 gallon capacity plant to \$5.06 for the 10,000 gallon capacity plant.

Table 17.-- Operating costs for three selected winery sizes<sup>a/</sup>

	Annual production 10,000 gallons		Annual production 25,000 gallons		Annual production 50,000 gallons	
	<u>Units</u>	<u>Dollars</u>	<u>Units</u>	<u>Dollars</u>	<u>Units</u>	<u>Dollars</u>
<u>Labor cost</u>						
Crush	720 h	5,184	1,080 h	7,776	1,440 h	10,368
Filtering, racking prebottling	240 h	1,728	300 h	2,160	440 h	2,880
Bottling (incl. set up)	--	7,500	--	13,250	--	16,000
Management charge	--	7,200	--	14,400	--	21,600
Total labor cost	--	21,612	--	37,586	--	50,848
<u>Bottling supplies</u>						
Corks per case	\$1.50	--	\$1.20	--	\$1.10	--
Bottles	\$3.00	--	\$2.40	--	\$2.15	--
Labels	\$ .50	--	\$ .30	--	\$ .25	--
Capsules	\$ .36	--	\$ .36	--	\$ .36	--
Cost per case	\$5.36	--	\$4.26	--	\$3.86	--
Total bottling supply		23,300	--	44,500	--	80,500
<u>Chemicals, filer, etc.</u>	--	500	--	1,000	--	2,000
<u>Cost for storing red wine</u>	--	5,200	--	13,000	--	26,000
<u>Total operating cost</u>	--	50,612	--	96,086	--	159,384
<u>Operating cost per gallon of capacity</u>	--	5.06	--	3.84	--	3.19

<sup>a/</sup> Equipment choices, prices, labor organization. Bill Nelson, Winery Systems & Enology Consultant, (Eugene)

Table 18.-- Interest cost, taxes, and depreciation charges for three selected winery sizes a/

	Annual production 10,000 Gallons (Dollars)	Annual production 25,000 Gallons (Dollars)	Annual production 50,000 Gallons (Dollars)
<u>Interest Cost</u>			
Long-term loan for building, <u>b/</u> land, steel tanks	13,221	16,510	22,205
Intermediate loan for equipment, wood barrels	12,179	36,862	59,928
Total interest cost	25,400	53,819	82,314
<u>Property Tax</u>			
Land, building	3,900	5,021	6,853
Machinery	552	1,921	2,751
Total tax	4,452	6,942	9,604
<u>Depreciation</u>			
Building (30 years)	6,000	6,667	8,000
Steel tanks (15 years, 10% resale)	1,560	3,600	6,960
Equipment (10 years, 10% resale)	2,943	9,342	13,320
Oak barrels (5 years, \$20 resale)	2,800	11,200	22,400
Total depreciation	13,303	30,809	50,680
<u>Total cost</u>	43,155	84,187	142,598
<u>Cost per gallon of capacity</u>	4.32	3.37	2.85

a/ Equipment choices, prices, labor organization. Bill Nelson, Winery Systems & Enology Consultant, (Eugene)

b/ Based on 13% weighted average cost of capital times average investment. Weighted average cost of capital includes cost for equity capital at 14% and interest on debt capital at 12%.

Table 18 lists the interest cost, property tax, and depreciation charges. It was assumed that half of the long-term investment was equity. The other half was borrowed for 25 years at an interest rate of 12 percent. Capital for the purchase of equipment and wood barrels was borrowed for eight years at 14 percent interest. The cost of capital included the combined cost of debt and equity. This was done by weighting half of the average long-term investment with the interest rate (12 percent). The other half of the investment was weighted with the opportunity cost of equity capital which was assumed to be 14 percent. Total capital costs amounted to \$25,400, \$53,819, and \$82,314 for the three different wineries, respectively. Property tax was calculated at a rate of two percent of the assessed value of buildings, land, and machinery. For the calculation of the depreciation, certain life times and resale values were assumed. The straight line method of depreciation was applied. Total interest, taxes and depreciation charges per gallon of capacity declined from \$4.32 for the 10,000 gallon facility to \$2.85 for the 50,000 facility.

Table 19 summarizes the winery costs on a per gallon basis. This table also includes a percentage breakdown of the costs. Per unit costs generally decline with increasing firm size. There are also differences in the composition of the cost.

In this situation it was assumed that the grapes were purchased for \$550 per ton. This is equivalent to \$3.66 per gallon of wine. Per gallon production costs totaled \$12.69 for the small, \$10.81 for the medium, and \$9.44 for the large winery.

Grapes were the biggest cost item for the winery sizes examined while taxes were the least cost item percentage-wise. Depreciation totaled only 10.5 to 11.0 percent of costs depending on the capacity of the winery.

You might expect grape price variation to have an important impact on the wine production percentage cost analysis. For example, for the small 10,000 gallon winery, grapes priced at \$450 per ton came to 24.9 percent of total costs. However, grapes priced at \$850 per ton amounted to only 38.6 percent of total winery costs.

In contrast grapes priced at \$450 per ton for a 50,000 gallon winery came to 35.8 percent of total costs. At \$850 per ton, the grapes in that size plant account for 51.5 percent of total costs. This underlies the importance of grape prices to wineries -- especially those with larger capacity.



Table 19.--Cost summary: fixed costs, variable costs, and percentages of final per gallon cost for three selected winery sizes

	Annual production 10,000 gallons (Dollars)	Annual production 25,000 gallons (Dollars)	Annual production 50,000 gallons (Dollars)
<u>Fixed cost (per gallon)</u>			
Interest	2.54	2.13	1.65
Depreciation	1.33	1.23	1.01
Property tax	.44	.27	.19
Management charge	.72	.57	.43
Total fixed cost	5.03	4.20	3.28
<u>Variable cost (per gallon)</u>			
Grapes (\$550 per ton)	3.66	3.66	3.66
Labor	1.10	.61	.33
Cost for red wine	.52	.52	.52
Bottling supply, filter, etc.	2.38	1.82	1.65
Total variable cost	<u>7.66</u>	<u>6.61</u>	<u>6.16</u>
Total fixed and variable costs	12.69	10.81	9.44
<u>Percentages of final per gallon cost</u>			
Interest	20.00	20.00	17.50
Depreciation	10.50	11.00	10.50
Tax	3.50	2.00	2.00
Bottling supply	18.50	17.00	17.40
Labor	18.50	16.00	13.60
Grapes	<u>29.00</u>	<u>34.00</u>	<u>38.80</u>
	100.00	100.00	100.00

For More Information

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APPENDIX 1. -- Fixed and variable machinery costs <sup>a/</sup>

Equipment	Purchase price (Dollars)	Life (years)	RFV <sup>b/</sup> (percent)	Depreciation (Dollars)	Interest, insurance housing		Annual repair cost
					(percent)	(\$)	
Tractor (40 hp)	11,400	10	29.5	803	15.2	1122	130
Pickup (0.75 ton)	9,000	10	17.7	765	20.4	1080	545
Disc	960	15	9.6	87	14.6	77	
Rototiller	2,700	10	17.7	222	14.6	232	} 236
Fertilizer spreader	500	10	17.7	41	14.6	43	
Trailer	400	15	9.6	33	14.6	32	
Sprayer	3,000	10	17.7	298	14.6	258	
Variable cost per hour (fuel, lubrication)							
Tractor	4.62						
Pickup	8.39						

<sup>a/</sup> Lamy, J. Business Economics, Inc. Personal communication to the authors, September 22, 1979.

<sup>b/</sup> Remaining on-farm value.

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