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| | **CONCORD GRAPE ESTABLISHMENT AND PRODUCTION COSTS IN WASHINGTON, 1996** | |
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# CONCORD GRAPE ESTABLISHMENT AND PRODUCTION COSTS IN WASHINGTON, 1996

by

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## INTRODUCTION

Washington is the leading state in Concord grape production, and accounts for more than 50 percent of the U.S. production (Washington Grape Report, January 24, 1996). Since the introduction of Concord grapes as an agricultural crop in Washington, acreage devoted to Concord grape vineyards has grown. Concord grapes are grown mainly in south central Washington, where acreage was about 20,525 in 1984, declined slightly throughout the late 1980s, and rebounded to approximately 23,000 in 1994. The decrease in acreage was the result of a downward trend in market prices due to high inventory levels. In 1984, the average cash price for 16 Brix Concord grapes was only $80 per ton, which is the lowest price since the 1960s. A drop in inventories in the following years along with increased interests in export markets to Pacific Rim countries increased the cash price in 1989 and 1990 to $240 per ton. More Concord grape acreage was planted. The 1995 cash price averaged $120 per ton for 16 Brix Concord grapes in Washington.

The removal and planting of Concord grapes involves a significant amount of capital. The purpose of this study was to estimate 1996 economic costs of developing and operating a Concord grape vineyard in Washington.

Concord grapes are a perennial crop which do not reach full production until about the fifth year after planting. As a result, large capital outlays must be made prior to full production. To estimate the economic costs of developing a vineyard, this study specifically sought to:

1. Specify the viticultural practices normally followed in Washington to establish and maintain a 30-acre vineyard of Concord grapes.

2. Estimate the costs of those practices and compare them with the receipts from the grapes to establish profitability levels.

3. Calculate the break-even prices necessary to justify the development of the vineyard.

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Several points need to be clarified about the approach used in this study. There are two basic types of budgets. The first type, referred to as cash budgets, consists of cash costs plus depreciation and cash receipts. The second type of budget is called an economic budget. Economic budgets are used in this study because they reflect the full costs and returns over the useful life of assets.

The economic budgets include both cash and noncash costs. Noncash costs include opportunity costs, i.e., opportunities in other investments which can be thought of as foregone income. Total costs and returns are important in determining profitability and are useful for those contemplating entering or exiting the industry. Costs may also be categorized as fixed and variable. Fixed costs are those incurred despite the level of production. Land tax is an example of a fixed cost. Variable costs are those such as harvest labor, which differ depending on the level of production.

## BUDGET ASSUMPTIONS

The production information used to formulate the budgets is not a guide to recommended viticultural practices, but rather is intended to represent a typical vineyard and the costs associated with its development. The budgets reflect costs based on these assumed growing and operating conditions.

The major assumptions used to calculate the vineyard costs were:

1. A 30-acre Concord grape vineyard is to be developed on a 40-acre, owner-operator farm with five acres of headland and five acres of homestead.

2. The vineyard is planted with No. 1 certified Concord grape nursery stock.

3. The vineyard is managed by the owner-operator whose annual salary is equivalent to 7 percent of the gross revenues of an established vineyard. This salary is referred to as a management fee in the budgets.

4. A solid-set sprinkler irrigation system is used on relatively level ground. The irrigation system and its 20-horsepower motor/pump are purchased new at a cost of $1,000 per acre and depreciated over a 10-year period.

5. The grapes are planted with a 9 x 7 foot spacing with 691 plants per acre.

6. All grape hauling is done on a custom basis. The hauling cost is assumed to be $12 per ton. This cost was derived from Washington Utilities and Transportation Commission Tariff 4-A which has been voided due to deregulation.

7. Establishment costs are amortized over 20 years at 10 percent interest. They consist of total costs in the four years of establishment minus the receipts from the third- and fourth-year partial crops. The amortization factor is 0.12. Multiplication of yearly establishment costs by this factor equals the depreciation and interest on the yearly investment. Amortized establishment costs are shown by year in the itemized cost tables.

8. The 1996 irrigation water charge of $67 per acre is based on charges used in the Roza Irrigation District.

9. The electrical rate for the irrigation system is derived from the Benton County PUD. The 1996 facility charge is $7.45 per horsepower. The energy charge is $0.029 per kilowatt hour (kwh) during March 21 to August 20, and $0.0456 per kwh from August 21 to March 20. An energy credit of $0.00471 per kwh is applied against the energy charge for the period between March 21 and October 20. In calculating the total energy cost for the solid-set irrigation system, it was assumed that 85 percent of the irrigation takes place in the first period (3/21 to 8/20) and 15 percent in the second period (8/21 to 3/20). The respective electricity use in the first and second years is 40 percent and 70 percent of the kwh used in year three and thereafter.

10. The real estate taxes are for Benton and Yakima Counties in 1996. The assessments vary depending on the age of the vineyard. The first year real estate tax is $31.05 per acre for the land and irrigation system. The second and third year real estate taxes rise to $58.57 per acre to include the vines and trellis system. The real estate taxes are $70.39 per acre for the fourth and remaining years reflecting that the vineyard is near or at full production.

11. All land is assumed to be owned by the operator, and both operating and investment capital costs 10 percent. These rates are assumed to represent the average interest rates during the establishment period.

12. All machinery and equipment is assumed to be new and valued at current market prices (Appendix A). Hourly fixed costs (depreciation, interest, insurance, taxes, and housing) and variable costs (repairs, fuel, and lubrication) are calculated by the Farm Enterprise Budget Simulator (FEBS) according to PNW 346, "The Costs of Owning and Operating Farm Machinery in the Pacific Northwest." The 3/4-ton pickup and 4-wheel cycle fixed and variable costs are included in the tractor costs.

13. Personal property taxes from Benton and Yakima Counties in 1996 are estimated to be 1.5 percent of average value ($15.00 per $1,000 of assessed value).

14. Vines are pruned with a mechanical pruner, followed by hand trimming.

15. A bilateral cordon training system with a vertical trellis is used.

16. The 1996 prices for selected inputs (including sales tax) are:

| | |
|---|---|
| Labor | $5.50/hour |
| Gasoline | $1.20/gallon |
| Diesel | $1.029/gallon |
| Nitrogen Fertilizer (Ammonium Nitrate) | $.24/pound |
| Surflan 4AS/gal (Oryzalin) | $70.00/gallon |
| Dormant Oil | $3.00/gallon |
| Prowl | $35.00/gallon |
| Roundup (Glyphosate) | $40.00/gallon |
| Cover Crop Seal (Companion) | $1.70/pound |
| #11 Wire HT | $.50/pound |
| Concrete Anchor 8" x 8" x 8" | $.61/each |
| Trellis Post 4" x 8" | $4.00/each |

17. The vineyard yields three tons of grapes per acre in the third year, six tons in the fourth year, and eight tons at maturity in year five and each year thereafter. The grapes are sold for $180 per ton.

## ANNUAL ESTABLISHMENT COSTS FOR A 30-ACRE CONCORD GRAPE VINEYARD

The first four years in the development of a grape vineyard are devoted to preparing the vineyard for its productive life averaging 20 years. In addition to working the land, planting the vines, installing the trellis system, and other preparatory activities, routine viticultural practices are also performed. The costs of these activities are detailed and discussed in the remainder of this section.

### First-Year Establishment Cost

The activities and corresponding per-acre costs in the first year of the vineyard's development are detailed in Table 1. Table 2 shows the itemized costs of the operations as well as the quantities of the materials used.

Once the soil is prepared to receive the vines and the land is surveyed to mark the rows, the solid-set irrigation system is installed. The solid-set irrigation system is depreciated over a ten-year period. The total fixed cost (depreciation, tax, interest, and insurance) of the system on a per-acre basis is $221.00 which was estimated with the aid of EB 1166, "Estimating Irrigation Pumping and Sprinkler System Costs." Water is applied from April through October.

The vines are planted using a mechanical vine planter pulled by a 100-horsepower tractor. The planter is rented for $6.50 per acre and the tractor with driver are rented at $30 per acre. Two laborers are used on the planter for a total of 2.75 hours per acre. Each acre is planted with 691 #1 certified Concord grape vines.

TABLE 1. SCHEDULE OF FIRST-YEAR ESTABLISHMENT OPERATIONS AND PER ACRE COSTS FOR A 30-ACRE CONCORD GRAPE VINEYARD

| | | | | | | | VARIABLE COST | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OPERATION | TOOLING | MTH | YEAR | MACH HOURS | LABOR HOURS | TOTAL FIXED COST | FUEL, LUBE, & REPAIRS | MACH LABOR | SERVICE | MATER. | INTER. | TOTAL VARIABLE COST | TOTAL COST |
| | | | | | | $ | $ | $ | $ | $ | $ | $ | $ |
| DISK | 50 HP, DISK | FEB | 1996 | .57 | .63 | 6.68 | 2.42 | 3.47 | .00 | .00 | .39 | 6.28 | 12.96 |
| PLOW | CUSTOM PLOWING | MAR | 1996 | .00 | .00 | .00 | .00 | .00 | 15.00 | .00 | .88 | 15.88 | 15.88 |
| SURVEY & MARK | LABOR, STAKES | MAR | 1996 | .00 | .40 | .00 | .00 | 2.20 | .00 | 1.44 | .21 | 3.85 | 3.85 |
| LISTING | CUSTOM LISTING | APR | 1996 | .00 | .00 | .00 | .00 | .00 | 8.00 | .00 | .40 | 8.40 | 8.40 |
| PLANT VINES | 100HP, VINE PLANTER, LABOR | APR | 1996 | .00 | 2.75 | .00 | .00 | 15.12 | 36.50 | 449.15 | 25.04 | 525.81 | 525.81 |
| FILL-IN | 50HP, DISK (3X) | APR | 1996 | 1.72 | 1.89 | 20.05 | 7.27 | 10.40 | .00 | .00 | .88 | 18.55 | 38.60 |
| IRRIGATION | SYSTEM START-UP | APR | 1996 | .00 | .80 | .00 | .00 | 4.40 | .00 | .00 | .22 | 4.62 | 4.62 |
| HOEING | HAND HOEING | JUN | 1996 | .00 | 2.00 | .00 | .00 | 11.00 | .00 | .00 | .37 | 11.37 | 11.37 |
| WEED CONTROL | 50HP, SPRAYER | JUN | 1996 | .46 | .50 | 10.77 | 1.83 | 2.77 | .00 | 28.00 | 1.09 | 33.69 | 44.46 |
| CULTIVATE | 50HP, DISK | JUN | 1996 | .57 | .63 | 6.68 | 2.42 | 3.47 | .00 | .00 | .20 | 6.09 | 12.77 |
| PLANT COVER CROP | 50HP, RENTED SEEDER | JUL | 1996 | .57 | .57 | 5.56 | 1.90 | 3.14 | 6.50 | 21.48 | .83 | 33.84 | 39.41 |
| HOEING | HAND HOEING | JUL | 1996 | .00 | 2.00 | .00 | .00 | 11.00 | .00 | .00 | .28 | 11.27 | 11.27 |
| ROTOVATE | 50HP, ROTOVATOR | JUL | 1996 | .57 | .63 | 7.25 | 2.55 | 3.47 | .00 | .00 | .15 | 6.17 | 13.42 |
| HOEING | HAND HOEING | AUG | 1996 | .00 | 2.00 | .00 | .00 | 11.00 | .00 | .00 | .18 | 11.18 | 11.18 |
| MOW COVER CROP | 50HP, MOWER | SEP | 1996 | .57 | .63 | 6.61 | 2.45 | 3.47 | .00 | .00 | .05 | 5.96 | 12.57 |
| IRRIGATION | SYSTEM SHUT DOWN | OCT | 1996 | .00 | .80 | .00 | .00 | 4.40 | .00 | .00 | .00 | 4.40 | 4.40 |
| WEED CONTROL | 50HP, SPRAYER, PROWL | OCT | 1996 | .46 | .50 | 10.77 | 1.83 | 2.77 | .00 | 35.00 | .00 | 39.60 | 50.37 |
| SPREAD ENDPOSTS | 50HP, TRAILER | OCT | 1996 | .46 | .50 | 7.83 | 2.06 | 2.77 | .00 | 64.00 | .00 | 68.83 | 76.66 |
| SET ANCHORS | 50HP, RENTALS, LABOR | OCT | 1996 | 2.25 | 2.72 | 21.97 | 7.51 | 14.96 | 3.40 | 109.76 | .00 | 135.63 | 157.59 |
| SET ENDPOSTS | 50HP, RENTALS, LABOR | OCT | 1996 | 4.75 | 5.75 | 46.37 | 15.85 | 31.62 | 8.60 | .00 | .00 | 56.08 | 102.45 |
| MANAGEMENT FEE | 7% OF GROSS REVENUE | ANN | 1996 | .00 | .00 | .00 | .00 | .00 | 100.80 | .00 | 5.04 | 105.84 | 105.84 |
| TAXES | REAL ESTATE | ANN | 1996 | .00 | .00 | 31.05 | .00 | .00 | .00 | .00 | .00 | .00 | 31.05 |
| IRRIGATION | IRRIGATE APRIL-OCTOBER | ANN | 1996 | .00 | 1.00 | 221.00 | .00 | 5.50 | .00 | 95.67 | 5.06 | 106.23 | 327.23 |
| PICKUP | MISC USE | SEA | 1996 | 3.60 | 3.96 | 64.94 | 30.90 | 21.78 | .00 | .00 | 2.63 | 55.31 | 120.25 |
| 4-WHEEL CYCLE | MISC. USE | SEA | 1996 | .91 | 1.00 | 6.81 | 3.85 | 5.50 | .00 | .00 | .47 | 9.81 | 16.63 |
| LAND | NET LAND RENT | SEA | 1996 | .00 | .00 | 125.00 | .00 | .00 | .00 | .00 | .00 | .00 | 125.00 |
| MISC | UTILITIES, TELEPHONE, ETC | SEA | 1996 | .00 | .00 | .00 | .00 | .00 | 70.00 | .00 | 3.50 | 73.50 | 73.50 |
| TOTAL PER ACRE | | | | 17.47 | 31.67 | 599.34 | 82.83 | 174.201 | 248.80 | 804.50 | 47.86 | 1358.19 | 1957.54 |

TABLE 2. DETAILED FIRST-YEAR ESTABLISHMENT PER ACRE COSTS FOR A 30-ACRE CONCORD GRAPE VINEYARD

| | UNIT | PRICE OR COST/UNIT | QUANTITY | VALUE OR COST | YOUR FARM |
|---|---|---|---|---|---|
| VARIABLE COSTS | | $ | | $ | |
| CUSTOM PLOWING | ACRE | 15.00 | 1.00 | 15.00 | |
| SURVEY STAKES | EACH | .06 | 24.00 | 1.44 | |
| CUSTOM LISTING | ACRE | 8.00 | 1.00 | 8.00 | |
| PLANTER RENTAL | ACRE | 6.50 | 1.00 | 6.50 | |
| TRACT & DRIV RENT | ACRE | 30.00 | 1.00 | 30.00 | |
| NURSERY STOCK | EACH | .65 | 691.00 | 449.15 | |
| SURFLAN 4AS/GAL | GAL | 70.00 | .40 | 28.00 | |
| SEEDER RENTAL | ACRE | 6.50 | 1.00 | 6.50 | |
| COMPANION SEED | LBS | 1.79 | 12.00 | 21.48 | |
| TRELLIS POST | EACH | 4.00 | 16.00 | 64.00 | |
| POSTDRIVER RENT | ACRE | 8.60 | 1.00 | 8.60 | |
| PROWL | GAL | 35.00 | 1.00 | 35.00 | |
| POST DIGGER | ACRE | 3.40 | 1.00 | 3.40 | |
| CONCRETE ANCHOR | EACH | .61 | 16.00 | 9.76 | |
| #11 HT WIRE | LBS | .50 | 200.00 | 100.00 | |
| MANAGEMENT FEE | ACRE | 100.80 | 1.00 | 100.80 | |
| IRR REPAIRS | ACRE | 10.00 | 1.00 | 10.00 | |
| IRR ELECT (Y1) | ACRE | 18.67 | 1.00 | 18.67 | |
| IRR WATER | ACRE | 67.00 | 1.00 | 67.00 | |
| MISC | ACRE | 70.00 | 1.00 | 70.00 | |
| INTEREST ON OP. CAP. | DOL. | .10 | 478.55 | 47.86 | |
| TRACTOR REPAIR | ACRE | 44.63 | 1.00 | 44.63 | |
| TRACTOR FUEL/LUBE | ACRE | 35.14 | 1.00 | 35.14 | |
| MACHINERY REPAIRS | ACRE | 3.06 | 1.00 | 3.06 | |
| MACHINE FUEL/LUBE | ACRE | .00 | 1.00 | .00 | |
| LABOR (TRAC/MACH) | ACRE | 174.21 | 1.00 | 174.21 | |
| TOTAL VARIABLE COST | | | | 1358.19 | |
| FIXED COSTS | | $ | | $ | |
| TRACTOR DEPRECIATION | ACRE | 91.80 | 1.00 | 91.80 | |
| TRACTOR INTEREST | ACRE | 77.80 | 1.00 | 77.80 | |
| TRACTOR INSURANCE | ACRE | 14.04 | 1.00 | 14.04 | |
| TRACTOR TAXES | ACRE | 11.67 | 1.00 | 11.67 | |
| TRACTOR HOUSING | ACRE | 8.19 | 1.00 | 8.19 | |
| MACHINE DEPRECIATION | ACRE | 9.31 | 1.00 | 9.31 | |
| MACHINE INTEREST | ACRE | 7.24 | 1.00 | 7.24 | |
| MACHINE INSURANCE | ACRE | .43 | 1.00 | .43 | |
| MACHINE TAXES | ACRE | 1.09 | 1.00 | 1.09 | |
| MACHINE HOUSING | ACRE | .72 | 1.00 | .72 | |
| R ESTATE TAX Y1 | ACRE | 31.05 | 1.00 | 31.05 | |
| IRR EQUIPMENT | ACRE | 221.00 | 1.00 | 221.00 | |
| NET LAND RENT | ACRE | 125.00 | 1.00 | 125.00 | |
| TOTAL FIXED COST | | | | 599.34 | |
| TOTAL COST | | | | 1957.54 | |

Weed management activities (chemical application, cultivation, and three hand hoeings) dominate the summer months. A rotovator is used to prepare the soil for the perennial cover crop which is planted in late July and mowed in September. Endposts and anchors are installed for the trellis system in the fall. The remainder of the trellis is installed in the second year.

A number of the annual and seasonal costs require explanation. The net land rent of $125 can be considered an opportunity cost in terms of income foregone by investing in the Concord grape vineyard.[1] The net land rent of $125 per acre represents a minimum return of 5 percent of the land's current market value, assumed to be $2,500 per acre. It is also assumed the land could have been rented for this amount minus the real estate taxes. The interest on operating capital is included to account for the cost of the money expended during the year. In the first year, each acre requires 31.67 hours of operator and hired labor. The total cost per acre in the first year is $1,957.54.

Second-Year Establishment Costs

The second year has the highest annual cost. The schedule of operations and itemized cost summary are shown in Tables 3 and 4, respectively. The total cost per acre for the second year is $3,724.58.

The installation of the trellis system is completed in March. Trellis posts are the major cost item in the second year. Line posts are installed with one post between every other vine. Two wires are strung along the posts, one on top and one at the midsection. The total investment costs of the trellis system amounts to $2,375.23 per acre. Many labor-intensive activities bring the second-year labor requirements to 97.5 hours per acre. Most of the labor is involved with summer training. The vines are pruned in the spring by both mechanical and hand methods. The vines are then trained during the summer. Ten percent of the vines need to be replaced and the new vines are planted by hand.

Beginning the second year, an interest on accumulated investment cost is incorporated into the budget. This accounts for interest actually paid on borrowed money or returns that could have been earned in an alternative investment. The amount is based on the previous year's expenses.

[1]While the owner-operator will not actually experience a land rent cost, the land rent represents the minimum return the owner-operator must have to justify growing this crop on the land. The net rental return represents the income the owner-operator forgoes by producing this crop on the land rather than renting it to a tenant. As a result of investing capital in the land, the farmer receives both current returns from crop production activities and any long-term land value appreciation. However, the farmer would continue to receive land value appreciation even if the land were rented out. Consequently, the appropriate land charge for growing the crop is only the net rent lost. As used in this publication, the land cost is termed an opportunity cost to indicate that it is not an out-of-pocket expense, but rather a return that is foregone. To consider the profitability of crop production relative to other activities, the owner-operator will want to consider these foregone returns, or opportunity costs, along with the usual production expenses.

TABLE 3. SCHEDULE OF SECOND-YEAR ESTABLISHMENT OPERATIONS AND PER ACRE COSTS FOR A 30-ACRE CONCORD GRAPE VINEYARD

| | | | | | | | VARIABLE COST | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OPERATION | TOOLING | MTH | YEAR | MACH HOURS | LABOR HOURS | TOTAL FIXED COST | FUEL, LUBE, & REPAIRS | MACH LABOR | SERVICE | MATER. | INTER. | TOTAL VARIABLE COST | TOTAL COST |
| | | | | | | $ | $ | $ | $ | $ | $ | $ | $ |
| SPREAD LINEPOSTS | 50HP, TRAILER | MAR | 1997 | 1.30 | 1.23 | 22.20 | 5.83 | 6.76 | .00 | 1348.00 | 79.37 | 1439.96 | 1462.16 |
| SET LINEPOSTS | 50HP, RENTALS, LABOR | MAR | 1997 | 11.40 | 13.80 | 111.30 | 38.04 | 75.90 | 8.60 | .00 | 7.15 | 129.69 | 240.99 |
| STRING WIRE | 50HP, TRAILER, LABOR | MAR | 1997 | 1.10 | 14.90 | 18.79 | 4.93 | 81.95 | .00 | 212.26 | 17.45 | 316.60 | 335.38 |
| PRUNING, TIES | 50HP, MECH PRUNER | MAR | 1997 | 1.20 | 5.00 | 25.32 | 12.23 | 27.50 | .00 | 110.35 | 8.75 | 158.84 | 184.16 |
| IRRIGATION | SYSTEM START-UP | APR | 1997 | .00 | .80 | .00 | .00 | 4.40 | .00 | .00 | .22 | 4.62 | 4.62 |
| FERTILIZE | 50HP, FERT SPRDR RENTAL | APR | 1997 | .76 | .92 | 7.42 | 2.54 | 5.06 | 3.55 | 12.00 | 1.16 | 24.30 | 31.72 |
| HOEING | HAND HOEING | APR | 1997 | .00 | 2.00 | .00 | .00 | 11.00 | .00 | .00 | .55 | 11.55 | 11.55 |
| WEED CONTROL | 50HP, SPRAYER | APR | 1997 | .46 | .50 | 10.77 | 1.83 | 2.77 | .00 | 28.00 | 1.63 | 34.23 | 45.00 |
| REPLANT (10%) | HAND PLANTING | APR | 1997 | .00 | 7.80 | .00 | .00 | 42.90 | .00 | 45.50 | 4.42 | 92.82 | 92.82 |
| HOEING | HAND HOEING | MAY | 1997 | .00 | 2.00 | .00 | .00 | 11.00 | .00 | .00 | .46 | 11.46 | 11.46 |
| MOW COVER CROP | 50HP, MOWER | MAY | 1997 | .57 | .63 | 6.61 | 2.45 | 3.47 | .00 | .00 | .25 | 6.16 | 12.62 |
| SUMMER TRAINING | LABOR | JUL | 1997 | .00 | 39.90 | .00 | .00 | 219.45 | .00 | .00 | 5.49 | 224.94 | 224.94 |
| MOW COVER CROP | 50HP, MOWER | JUL | 1997 | .57 | .63 | 6.58 | 2.43 | 3.46 | .00 | .00 | .25 | 6.05 | 12.77 |
| MOW COVER CROP | 50HP, MOWER | SEP | 1997 | .57 | .63 | 6.58 | 2.43 | 3.46 | .00 | .00 | .05 | 5.95 | 12.52 |
| IRRIGATION | SYSTEM SHUT DOWN | OCT | 1997 | .00 | .80 | .00 | .00 | 4.40 | .00 | .00 | .00 | 4.40 | 4.40 |
| TAXES | REAL ESTATE | ANN | 1997 | .00 | .00 | 58.57 | .00 | .00 | .00 | .00 | .00 | .00 | 58.57 |
| MANAGEMENT FEE | 7% OF GROSS REVENUE | ANN | 1997 | .00 | .00 | .00 | .00 | .00 | 100.80 | .00 | 5.04 | 105.84 | 105.84 |
| MISC | UTILITIES, TELEPHONE, ETC | SEA | 1997 | .00 | .00 | .00 | .00 | .00 | 70.00 | .00 | 3.50 | 73.50 | 73.50 |
| LAND | NET LAND RENT | SEA | 1997 | .00 | .00 | 125.00 | .00 | .00 | .00 | .00 | .00 | .00 | 125.00 |
| 4-WHEEL CYCLE | MISC USE | SEA | 1997 | .91 | 1.00 | 6.81 | 3.85 | 5.50 | .00 | .00 | .47 | 9.81 | 16.63 |
| PICKUP | MISC USE | SEA | 1997 | 3.60 | 3.96 | 64.94 | 30.90 | 21.78 | .00 | .00 | 2.63 | 55.31 | 120.25 |
| ESTABLISH COST | INTEREST ON ACCUM INVEST | SEA | 1997 | .00 | .00 | 195.75 | .00 | .00 | .00 | .00 | .00 | .00 | 195.75 |
| IRRIGATION | IRRIGATE APRIL-OCTOBER | SEA | 1997 | .00 | 1.00 | 221.00 | .00 | 5.50 | .00 | 109.67 | 5.76 | 120.93 | 341.93 |
| TOTAL PER ACRE | | | | 22.44 | 97.50 | 887.63 | 107.45 | 536.27 | 182.95 | 1865.79 | 144.49 | 2836.95 | 3724.58 |

TABLE 4. DETAILED SECOND-YEAR ESTABLISHMENT PER ACRE COSTS FOR A 30-ACRE CONCORD GRAPE VINEYARD

| | UNIT | PRICE OR COST/UNIT | QUANTITY | VALUE OR COST | YOUR FARM |
|---|---|---|---|---|---|
| VARIABLE COSTS | | $ | | $ | |
| TWINE | FOOT | .04 | 2758.80 | 110.35 | |
| #11 HT WIRE | LBS | .50 | 424.53 | 212.26 | |
| POSTDRIVER RENT | ACRE | 8.60 | 1.00 | 8.60 | |
| TRELLIS POST | EACH | 4.00 | 337.00 | 1348.00 | |
| NURSERY STOCK | EACH | .65 | 70.00 | 45.50 | |
| FERT SPRDR RENT | ACRE | 3.55 | 1.00 | 3.55 | |
| NITROGEN | LBS | .24 | 50.00 | 12.00 | |
| SURFLAN 4AS/GAL | GAL | 70.00 | .40 | 28.00 | |
| MANAGEMENT FEE | ACRE | 100.80 | 1.00 | 100.80 | |
| MISC | ACRE | 70.00 | 1.00 | 70.00 | |
| IRR REPAIRS | ACRE | 10.00 | 1.00 | 10.00 | |
| IRR ELECT (Y2) | ACRE | 32.67 | 1.00 | 32.67 | |
| IRR WATER | ACRE | 67.00 | 1.00 | 67.00 | |
| INTEREST ON OP. CAP. | DOL. | .10 | 1444.86 | 144.49 | |
| TRACTOR REPAIR | ACRE | 52.46 | 1.00 | 52.46 | |
| TRACTOR FUEL/LUBE | ACRE | 44.04 | 1.00 | 44.04 | |
| MACHINERY REPAIRS | ACRE | 10.95 | 1.00 | 10.95 | |
| MACHINE FUEL/LUBE | ACRE | .00 | 1.00 | .00 | |
| LABOR (TRAC/MACH) | ACRE | 536.27 | 1.00 | 536.27 | |
| TOTAL VARIABLE COST | | | | 2836.95 | |
| FIXED COSTS | | $ | | $ | |
| TRACTOR DEPRECIATION | ACRE | 114.02 | 1.00 | 114.02 | |
| TRACTOR INTEREST | ACRE | 98.21 | 1.00 | 98.21 | |
| TRACTOR INSURANCE | ACRE | 15.26 | 1.00 | 15.26 | |
| TRACTOR TAXES | ACRE | 14.73 | 1.00 | 14.73 | |
| TRACTOR HOUSING | ACRE | 10.23 | 1.00 | 10.23 | |
| MACHINE DEPRECIATION | ACRE | 17.08 | 1.00 | 17.08 | |
| MACHINE INTEREST | ACRE | 13.57 | 1.00 | 13.57 | |
| MACHINE INSURANCE | ACRE | .81 | 1.00 | .81 | |
| MACHINE TAXES | ACRE | 2.03 | 1.00 | 2.03 | |
| MACHINE HOUSING | ACRE | 1.36 | 1.00 | 1.36 | |
| R ESTATE TAX Y2 | ACRE | 58.57 | 1.00 | 58.57 | |
| NET LAND RENT | ACRE | 125.00 | 1.00 | 125.00 | |
| INT INVEST (Y1) | ACRE | 1957.54 | .10 | 195.75 | |
| IRR EQUIPMENT | ACRE | 221.00 | 1.00 | 221.00 | |
| TOTAL FIXED COST | | | | 887.63 | |
| TOTAL COST | | | | 3724.58 | |

## Third-Year Establishment Costs

The operations and detailed costs during the third year of the vineyard's development are shown in Tables 5 and 6, respectively. The total cost per acre is $1,811.55. In the fall of the third year, three tons of grapes are harvested which generated $540 in revenues per acre.

An insect control program is started in the third year which involves the application of four gallons of dormant oil per acre. The pruning and training of the vines are continued. The annual labor budgeted in the third year is 20.68 hours per acre.

## Fourth-Year Establishment Costs

The operations in the fourth year of establishment largely consist of routine viticultural practices since the vineyard is nearly established and the trellis system is in place. The operation costs are shown in Table 7. A detailed list of inputs is presented in Table 8. Almost 20 hours of operator and hired labor are budgeted per acre in the fourth year.

In year four, the vineyard produces six tons of grapes per acre which are mechanically harvested at a custom rate of $30 per ton. Pruning, insect control, weed management, and vine training are continued in the fourth year. The total cost of the vineyard operations is $2,076.58 per acre.

## Summary of Establishment Costs

The per-acre cost of establishing the Concord grape vineyard, the revenue obtained from the grapes, and the net investment are summarized in Table 9. In each establishment year, total costs exceed total revenues yielding a negative return and positive net investment costs.

Determining the total cost of establishing a 30-acre vineyard of Concord grapes is accomplished by multiplying the $7,950.22 per acre net investment cost by 30 acres. This product yields a total net investment cost of $238,506.60. This figure does not include the cost of housing that may be needed for the manager, owner, and/or laborers.

# PRODUCTION COSTS AND BREAK-EVEN PRICES FOR A MATURE 30-ACRE CONCORD GRAPE VINEYARD

It is assumed by the fifth year after planting the vineyard is at full production and produces a yield of eight tons of Concord grapes per acre. This section summarizes the costs of producing the grapes and shows the farm level price necessary to cover the variable and fixed costs of Concord grape production.

TABLE 5. SCHEDULE OF THIRD-YEAR ESTABLISHMENT OPERATIONS AND PER ACRE COSTS FOR A 30-ACRE CONCORD GRAPE VINEYARD

| | | | | | | | VARIABLE COST | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OPERATION | TOOLING | MTH | YEAR | MACH HOURS | LABOR HOURS | TOTAL FIXED COST | FUEL, LUBE, & REPAIRS | MACH LABOR | SERVICE | MATER. | INTER. | TOTAL VARIABLE COST | TOTAL COST |
| | | | | | | $ | $ | $ | $ | $ | $ | $ | $ |
| PRUNING, TIES | 50HP, MECH PRUNER | MAR | 1998 | 1.20 | .50 | 25.32 | 12.23 | 2.75 | .00 | 11.04 | 1.52 | 27.54 | 52.86 |
| INSECT CONTROL | 50HP, SPRAYER | MAR | 1998 | .46 | .51 | 10.81 | 1.84 | 2.78 | .00 | 12.00 | .97 | 17.59 | 28.39 |
| IRRIGATION | SYSTEM START-UP | APR | 1998 | .00 | .80 | .00 | .00 | 4.40 | .00 | .00 | .22 | 4.62 | 4.62 |
| WEED CONTROL | 50HP, SPRAYER | APR | 1998 | .46 | .50 | 10.77 | 1.83 | 2.77 | .00 | 28.00 | 1.63 | 34.23 | 45.00 |
| FERTILIZE | 50HP, FERT SPRDR RENTAL | APR | 1998 | .76 | .92 | 7.42 | 2.54 | 5.06 | 3.55 | 18.00 | 1.46 | 30.60 | 38.02 |
| MOW COVER CROP | 50HP, MOWER | MAY | 1998 | .57 | .63 | 6.61 | 2.45 | 3.47 | .00 | .00 | .25 | 6.16 | 12.77 |
| HOEING | HAND HOEING | JUN | 1998 | .00 | 2.00 | .00 | .00 | 11.00 | .00 | .00 | .37 | 11.37 | 11.37 |
| SUMMER TRAINING | LABOR | JUL | 1998 | .00 | 6.80 | .00 | .00 | 37.40 | .00 | .00 | .94 | 38.34 | 38.34 |
| MOW COVER CROP | 50HP, MOWER | JUL | 1998 | .57 | .63 | 6.58 | 2.43 | 3.46 | .00 | .00 | .15 | 6.05 | 12.62 |
| MOW COVER CROP | 50HP, MOWER | SEP | 1998 | .57 | .63 | 6.58 | 2.43 | 3.46 | .00 | .00 | .05 | 5.95 | 12.52 |
| IRRIGATION | SYSTEM SHUT DOWN | OCT | 1998 | .00 | .80 | .00 | .00 | 4.40 | .00 | .00 | .00 | 4.40 | 4.40 |
| HARVEST | CUSTOM MECH HARVEST | OCT | 1998 | .00 | .00 | .00 | .00 | .00 | 90.00 | .00 | .00 | 90.00 | 90.00 |
| HAULING | CUSTOM HAULING | OCT | 1998 | .00 | .00 | .00 | .00 | .00 | 36.00 | .00 | .00 | 36.00 | 36.00 |
| TAXES | REAL ESTATE | ANN | 1998 | .00 | .00 | 58.57 | .00 | .00 | .00 | .00 | .00 | .00 | 58.57 |
| MANAGEMENT FEE | 7% OF GROSS REVENUE | ANN | 1998 | .00 | .00 | .00 | .00 | .00 | 100.80 | .00 | 5.04 | 105.84 | 105.84 |
| IRRIGATION | IRRIGATE APRIL-OCTOBER | SEA | 1998 | .00 | 1.00 | 221.00 | .00 | 5.50 | .00 | 123.68 | 6.46 | 135.64 | 356.64 |
| PICKUP | MISC USE | SEA | 1998 | 3.60 | 3.96 | 64.94 | 30.90 | 21.78 | .00 | .00 | 2.63 | 55.31 | 120.25 |
| ESTABLISH COST | INTEREST ON ACCUM INVEST | SEA | 1998 | .00 | .00 | 568.21 | .00 | .00 | .00 | .00 | .00 | .00 | 568.21 |
| 4-WHEEL CYCLE | MISC USE | SEA | 1998 | .91 | 1.00 | 6.81 | 3.85 | 5.50 | .00 | .00 | .47 | 9.81 | 16.63 |
| MISC | UTILITIES, TELEPHONE, ETC | SEA | 1998 | .00 | .00 | .00 | .00 | .00 | 70.00 | .00 | 3.50 | 73.50 | 73.50 |
| LAND | NET LAND RENT | SEA | 1998 | .00 | .00 | 125.00 | .00 | .00 | .00 | .00 | .00 | .00 | 125.00 |
| TOTAL PER ACRE | | | | 9.10 | 26.68 | 1118.61 | 60.49 | 113.74 | 300.35 | 192.72 | 25.64 | 692.94 | 1811.55 |

TABLE 8. DETAILED FOURTH-YEAR ESTABLISHMENT PER ACRE COSTS FOR A 30-ACRE CONCORD GRAPE VINEYARD

| | UNIT | PRICE OR COST/UNIT | QUANTITY | VALUE OR COST | YOUR FARM |
|---|---|---|---|---|---|
| VARIABLE COSTS | | $ | | $ | |
| GRAPE TIES | ACRE | 1.60 | 1.00 | 1.60 | |
| DORMANT OIL | GAL | 3.00 | 4.00 | 12.00 | |
| FERT SPRDR RENT | ACRE | 3.55 | 1.00 | 3.55 | |
| NITROGEN | LBS | .24 | 100.00 | 24.00 | |
| SURFLAN 4AS/GAL | GAL | 70.00 | .40 | 28.00 | |
| CUSTOM HAULING | TON | 12.00 | 6.00 | 72.00 | |
| MECH HARV | TON | 30.00 | 6.00 | 180.00 | |
| MANAGEMENT FEE | ACRE | 100.80 | 1.00 | 100.80 | |
| IRR REPAIRS | ACRE | 10.00 | 1.00 | 10.00 | |
| IRR ELECT (Y3+) | ACRE | 46.68 | 1.00 | 46.68 | |
| IRR WATER | ACRE | 67.00 | 1.00 | 67.00 | |
| MISC | ACRE | 70.00 | 1.00 | 70.00 | |
| INTEREST ON OP. CAP. | DOL. | .10 | 259.01 | 25.90 | |
| TRACTOR REPAIR | ACRE | 32.09 | 1.00 | 32.09 | |
| TRACTOR FUEL/LUBE | ACRE | 20.90 | 1.00 | 20.90 | |
| MACHINERY REPAIRS | ACRE | 9.41 | 1.00 | 9.41 | |
| MACHINE FUEL/LUBE | ACRE | .00 | 1.00 | .00 | |
| LABOR (TRAC/MACH) | ACRE | 109.86 | 1.00 | 109.86 | |
| TOTAL VARIABLE COST | | | | 813.80 | |
| FIXED COSTS | | $ | | $ | |
| TRACTOR DEPRECIATION | ACRE | 56.24 | 1.00 | 56.24 | |
| TRACTOR INTEREST | ACRE | 45.14 | 1.00 | 45.14 | |
| TRACTOR INSURANCE | ACRE | 12.08 | 1.00 | 12.08 | |
| TRACTOR TAXES | ACRE | 6.77 | 1.00 | 6.77 | |
| TRACTOR HOUSING | ACRE | 4.92 | 1.00 | 4.92 | |
| MACHINE DEPRECIATION | ACRE | 13.36 | 1.00 | 13.36 | |
| MACHINE INTEREST | ACRE | 9.55 | 1.00 | 9.55 | |
| MACHINE INSURANCE | ACRE | .57 | 1.00 | .57 | |
| MACHINE TAXES | ACRE | 1.43 | 1.00 | 1.43 | |
| MACHINE HOUSING | ACRE | .96 | 1.00 | .96 | |
| R ESTATE TAX Y4 | ACRE | 70.39 | 1.00 | 70.39 | |
| INT INVEST (Y1) | ACRE | 1957.54 | .10 | 195.75 | |
| INT INVEST (Y2) | ACRE | 3724.58 | .10 | 372.46 | |
| INT INVEST (Y3) | ACRE | 1271.55 | .10 | 127.15 | |
| IRR EQUIPMENT | ACRE | 221.00 | 1.00 | 221.00 | |
| NET LAND RENT | ACRE | 125.00 | 1.00 | 125.00 | |
| TOTAL FIXED COST | | | | 1262.78 | |
| TOTAL COST | | | | 2076.58 | |

Table 9.Summary of 1996 Net Investment Costs in Establishing a 30-Acre Concord Grape Vineyard ($/acre).

| | Establishment Years | | | | Total |
|---|---|---|---|---|---|
| Cost Category | First | Second | Third | Fourth | Establishment Cost |
| Receipts: | | | | | |
| Yields (tons) | 0 | 0 | 3 | 6 | 9 |
| Price ($/ton) | 180 | 180 | 180 | 180 | 180 |
| Revenue | 0 | 0 | 540 | 1080 | 1620 |
| Variable Costs: | | | | | |
| Preharvest | 1358.19 | 2836.95 | 322.48 | 317.34 | 4834.96 |
| Harvest | 0 | 0 | 126.00 | 252.00 | 378.00 |
| Postharvest | 0 | 0 | 244.46 | 244.46 | 488.92 |
| Total Variable Costs | 1358.19 | 2836.95 | 692.94 | 813.80 | 5701.88 |
| Fixed Costs: | | | | | |
| Trac/Pickup/4WHL | 203.50 | 252.45 | 120.32 | 125.15 | 701.42 |
| Machinery | 18.79 | 34.85 | 25.51 | 25.87 | 105.02 |
| Irrigation | 221.00 | 221.00 | 221.00 | 221.00 | 884.00 |
| Net Land Rent | 125.00 | 125.00 | 125.00 | 125.00 | 500.00 |
| Real Estate Tax | 31.05 | 58.57 | 58.57 | 70.39 | 218.58 |
| Interest on Accumulated Investment | ---- | 195.75 | 568.21 | 695.36 | 1459.32 |
| Total Fixed Costs | 599.34 | 887.62 | 1118.61 | 1262.77 | 3868.34 |
| Total Costs | 1957.53 | 3724.57 | 1811.55 | 2076.75 | 9570.22 |
| Net Investment Costs | 1957.53 | 3724.57 | 1271.55 | 996.57 | 7950.22 |

Mature Vineyard Costs

The per-acre total cost associated with maintaining a 30-acre Concord grape vineyard is $2,467.56 (Tables 10 and 11). Operator and hired labor requirements amount to 18.53 hours per acre for the established vineyard. The amortized establishment cost, which includes interest and all other establishment costs, is the single largest cost at $934.16 per acre.

Break-Even Prices

The break-even selling prices for Concord grapes necessary to cover different costs at various yields are presented in Table 12. The break-even selling price to cover variable costs represents the price that must be received to cover the costs that occur only if the established crop is produced and harvested. If the actual cash price is less than this break-even price, the vineyard is an uneconomical investment in the short run. Short-run, break-even prices range from $82.88 at 15 tons per acre to $246.43 per ton for a vineyard only yielding three tons per acre. For example, the variable costs of a vineyard yielding eight tons per acre will be covered with a selling price of $118.66 per ton.

The break-even selling price for total costs represents the price that must be received in order for the vineyard to cover costs and stay in business over the long run. In a mature vineyard, approximately 60 percent of the total costs per acre are fixed costs, i.e., costs incurred regardless of the level of production. This means that the break-even prices to cover total costs are much higher than the break-even prices to cover variable costs. If the price received is less than this break-even price, an alternative investment should be pursued which produces a larger return to management, labor, and capital. If the actual price is greater than this break-even price, the operator covers all costs and earns a profit. Break-even prices range from $184.09 per ton for a yield of 15 tons per acre to $752.51 per ton for a vineyard yielding just three tons per acre. A yield of eight tons per acre requires a selling price of $308.44 per ton to cover total costs. This is $128.44 per ton more than the price assumed in preparing this budget study. From a break-even perspective, at the prevailing price of $180 per ton, an established vineyard must yield over 15 tons per acre to break even in the long run.

TABLE 10. SCHEDULE OF OPERATIONS AND PER ACRE COSTS FOR AN ESTABLISHED 30-ACRE CONCORD GRAPE VINEYARD

| | | | | | | | VARIABLE COST | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OPERATION | TOOLING | MTH | YEAR | MACH HOURS | LABOR HOURS | TOTALFIXED COST | FUEL, LUBE, & REPAIRS | MACH LABOR | SERVICE | MATER. | INTER. | TOTAL VARIABLE COST | TOTAL COST |
| | | | | | | $ | $ | $ | $ | $ | $ | $ | $ |
| PRUNING, TIES | 50HP, MECH PRUNER | FEB | 2000 | 1.20 | 1.50 | 25.32 | 12.23 | 8.25 | .00 | 1.60 | 1.47 | 23.55 | 48.87 |
| TRELLIS REPAIR | 50HP, TRAILER, MATERIALS | FEB | 2000 | .92 | 3.11 | 15.71 | 4.13 | 17.11 | .00 | 75.25 | 6.43 | 102.91 | 118.62 |
| CHOP PRUNINGS | 5HP, MOWER | MAR | 2000 | .45 | .50 | 5.19 | 1.92 | 2.72 | .00 | .00 | .27 | 4.91 | 10.11 |
| FERTILIZE | 50HP, FERT SPRDER RENTAL | MAR | 2000 | .76 | .92 | 7.42 | 2.54 | 5.06 | 3.55 | 24.00 | 2.05 | 37.20 | 44.62 |
| INSECT CONTROL | 50HP, SPRAYER | MAR | 2000 | .46 | .51 | 10.81 | 1.84 | 2.78 | .00 | 12.00 | .97 | 17.59 | 28.39 |
| IRRIGATION | SYSTEM START-UP | APR | 2000 | .00 | .80 | .00 | .00 | 4.40 | .00 | .00 | .22 | 4.62 | 4.62 |
| MOW COVER CROP | 50HP, MOWER | MAY | 2000 | .57 | .63 | 6.61 | 2.45 | 3.47 | .00 | .00 | .25 | 6.16 | 12.77 |
| SPOT WEED CONTROL | 50HP, SPRAYER | JUN | 2000 | .50 | .55 | 11.75 | 2.00 | 3.03 | .00 | 3.20 | .27 | 8.49 | 20.24 |
| HOEING | HAND HOEING | JUN | 2000 | .00 | 2.00 | .00 | .00 | 11.00 | .00 | .00 | .37 | 11.37 | 11.37 |
| MOW COVER CROP | 50HP, MOWER | JUL | 2000 | .57 | .63 | 6.58 | 2.43 | 3.46 | .00 | .00 | .15 | 6.05 | 12.62 |
| MOW COVER CROP | 50HP, MOWER | SEP | 2000 | .57 | .63 | 6.58 | 2.43 | 3.46 | .00 | .00 | .05 | 5.95 | 12.52 |
| IRRIGATION | SYSTEM SHUT DOWN | OCT | 2000 | .00 | .80 | .00 | .00 | 4.40 | .00 | .00 | .00 | 4.40 | 4.40 |
| HARVEST | CUSTOM MECH HARVEST | OCT | 2000 | .00 | .00 | .00 | .00 | .00 | 240.00 | .00 | .00 | 240.00 | 240.00 |
| HAULING | CUSTOM HAULING | OCT | 2000 | .00 | .00 | .00 | .00 | .00 | 96.00 | .00 | .00 | 96.00 | 96.00 |
| MANAGEMENT FEE | 7% OF GROSS REVENUE | ANN | 2000 | .00 | .00 | .00 | .00 | .00 | 100.80 | .00 | 5.04 | 105.84 | 105.84 |
| TAXES | REAL ESTATE | ANN | 2000 | .00 | .00 | 70.39 | .00 | .00 | .00 | .00 | .00 | .00 | 70.39 |
| MISC | UTILITIES, TELEPHONE, ETC | SEA | 2000 | .00 | .00 | .00 | .00 | .00 | 70.00 | .00 | 3.50 | 73.50 | 73.50 |
| LAND | NET LAND RENT | SEA | 2000 | .00 | .00 | 125.00 | .00 | .00 | .00 | .00 | .00 | .00 | 125.00 |
| 4-WHEEL CYCLE | MISC USE | SEA | 2000 | .91 | 1.00 | 6.81 | 3.85 | 5.50 | .00 | .00 | .47 | 9.81 | 16.63 |
| PICKUP | MISC USE | SEA | 2000 | 3.60 | 3.96 | 64.94 | 30.90 | 21.78 | .00 | .00 | 2.63 | 55.31 | 120.25 |
| IRRIGATION | IRRIGATE APRIL-OCTOBER | SEA | 2000 | .00 | 1.00 | 221.00 | .00 | 5.50 | .00 | 123.68 | 6.46 | 135.64 | 356.64 |
| ESTABLISH COSTS | AMORTIZED ESTABLISHMENT COSTS | SEA | 2000 | .00 | .00 | 934.15 | .00 | .00 | .00 | .00 | .00 | .00 | 934.15 |
| TOTAL PER ACRE | | | | 10.51 | 18.53 | 1518.25 | 66.70 | 101.92 | 510.35 | 239.73 | 30.60 | 949.30 | 2467.56 |

TABLE 11. DETAILED PER ACRE COSTS FOR AN ESTABLISHED 30-ACRE CONCORD GRAPE VINEYARD

| | UNIT | PRICE OR COST/UNIT | QUANTITY | VALUE OR COST | YOUR FARM |
|---|---|---|---|---|---|
| VARIABLE COSTS | | $ | | $ | |
| TRELLIS MATERIAL | ACRE | 3.25 | 1.00 | 3.25 | |
| TRELLIS POST | EACH | 4.00 | 18.00 | 72.00 | |
| GRAPE TIES | ACRE | 1.60 | 1.00 | 1.60 | |
| DORMANT OIL | GAL | 3.00 | 4.00 | 12.00 | |
| FERT SPRDR RENT | ACRE | 3.55 | 1.00 | 3.55 | |
| NITROGEN | LBS | .24 | 100.00 | 24.00 | |
| ROUNDUP | GAL | 40.00 | .08 | 3.20 | |
| MECH HARV | TON | 30.00 | 8.00 | 240.00 | |
| CUSTOM HAULING | TON | 12.00 | 8.00 | 96.00 | |
| MANAGEMENT FEE | ACRE | 100.80 | 1.00 | 100.80 | |
| MISC | ACRE | 70.00 | 1.00 | 70.00 | |
| IRR REPAIRS | ACRE | 10.00 | 1.00 | 10.00 | |
| IRR ELECT (Y3+) | ACRE | 46.68 | 1.00 | 46.68 | |
| IRR WATER | ACRE | 67.00 | 1.00 | 67.00 | |
| INTEREST ON OP. CAP. | DOL. | .10 | 305.98 | 30.60 | |
| TRACTOR REPAIR | ACRE | 33.75 | 1.00 | 33.75 | |
| TRACTOR FUEL/LUBE | ACRE | 22.78 | 1.00 | 22.78 | |
| MACHINERY REPAIRS | ACRE | 10.18 | 1.00 | 10.18 | |
| MACHINE FUEL/LUBE | ACRE | .00 | 1.00 | .00 | |
| LABOR (TRAC/MACH) | ACRE | 101.92 | 1.00 | 101.92 | |
| TOTAL VARIABLE COST | | | | 949.30 | |
| FIXED COSTS | | $ | | $ | |
| TRACTOR DEPRECIATION | ACRE | 60.93 | 1.00 | 60.93 | |
| TRACTOR INTEREST | ACRE | 49.45 | 1.00 | 49.45 | |
| TRACTOR INSURANCE | ACRE | 12.34 | 1.00 | 12.34 | |
| TRACTOR TAXES | ACRE | 7.42 | 1.00 | 7.42 | |
| TRACTOR HOUSING | ACRE | 5.35 | 1.00 | 5.35 | |
| MACHINE DEPRECIATION | ACRE | 16.29 | 1.00 | 16.29 | |
| MACHINE INTEREST | ACRE | 12.17 | 1.00 | 12.17 | |
| MACHINE INSURANCE | ACRE | .73 | 1.00 | .73 | |
| MACHINE TAXES | ACRE | 1.82 | 1.00 | 1.82 | |
| MACHINE HOUSING | ACRE | 1.22 | 1.00 | 1.22 | |
| R ESTATE TAX Y5+ | ACRE | 70.39 | 1.00 | 70.39 | |
| NET LAND RENT | ACRE | 125.00 | 1.00 | 125.00 | |
| IRR EQUIPMENT | ACRE | 221.00 | 1.00 | 221.00 | |
| INT INVEST (Y1) | ACRE | 1957.54 | .12 | 230.01 | |
| INT INVEST (Y2) | ACRE | 3724.58 | .12 | 437.64 | |
| INT INVEST (Y3) | ACRE | 1271.55 | .12 | 149.41 | |
| INT INVEST (Y4) | ACRE | 966.58 | .12 | 117.10 | |
| TOTAL FIXED COST | | | | 1518.25 | |
| TOTAL COST | | | | 2467.56 | |

TABLE 12. BREAK-EVEN SELLING PRICES OF CONCORD GRAPES AT VARIOUS YIELDS (TONS/ACRE)

| YIELD | BREAK-EVEN ($/TON) NECESSARY TO COVER: | | |
|---|---|---|---|
| | VARIABLE COSTS | FIXED COSTS | TOTAL COSTS |
| 3 | 246.43 | 506.08 | 752.51 |
| 4 | 195.32 | 379.56 | 574.88 |
| 5 | 164.66 | 303.65 | 468.31 |
| 6 | 144.21 | 253.04 | 397.25 |
| 7 | 129.61 | 216.89 | 346.50 |
| 8 | 118.66 | 189.78 | 308.44 |
| 9 | 110.14 | 168.69 | 278.83 |
| 10 | 103.33 | 151.82 | 255.15 |
| 11 | 97.75 | 138.02 | 235.77 |
| 12 | 93.11 | 126.52 | 219.63 |
| 13 | 89.17 | 116.78 | 205.95 |
| 14 | 85.81 | 108.45 | 194.26 |
| 15 | 82.88 | 101.21 | 184.09 |

## CONCLUSION

The establishment of a perennial crop such as a Concord grape vineyard has many costs before a crop is produced. These costs must be recovered in the vineyard's productive years. Based on the assumptions of the vineyard used for this study, the establishment of a 30-acre Concord grape vineyard in Washington would be unprofitable given current prices and historical yields.

It is recognized that costs vary widely from farm to farm. Viticulturists can be very efficient in their production techniques which, in turn, may lower costs. Readers utilizing this manual must realize that this study used new machinery costs and included all economic costs. These costs may make a profitable enterprise appear unprofitable. Thus, this study should not be generalized to vineyard practices outside the assumptions used in the study. However, it does provide a benchmark for analyzing the economics of Concord grape production in the state of Washington.

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APPENDIX A. EQUIPMENT COMPLEMENT FOR A 30-ACRE CONCORD GRAPE VINEYARD, 1996

| MACHINERY | PURCHASE PRICE | YEARS TO TRADE | ANNUAL HOURS | DEPRECIATION | INTEREST | INSURANCE | TAXES | HOUSING | TOTAL FIXED COST | REPAIR | FUEL AND LUBE | TOTAL VARIABLE COST | TOTAL COST |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $ | | | | | $ | $ | $ | $ | $ | $ | $ | $ |
| | | | | | | | | | COST PER HOUR | | | | |
| 50 HP TRACTOR | 22,000.00 | 10 | 350 | 4.43 | 4.07 | .24 | .61 | .41 | 9.76 | 1.56 | 1.78 | 3.34 | 13.10 |
| 3/4 TON PICKUP | 19,227.00 | 10 | 200 | 7.91 | 5.66 | 2.94 | .85 | .68 | 18.04 | 5.82 | 2.76 | 8.58 | 26.62 |
| 100 GAL SPRAYER | 2,000.00 | 10 | 25 | 6.58 | 4.71 | .28 | .71 | .47 | 12.75 | .32 | .00 | .32 | 13.07 |
| TRAILER | 2,400.00 | 15 | 50 | 2.89 | 2.63 | .16 | .39 | .26 | 6.34 | .81 | .00 | .81 | 7.15 |
| 4-WHEEL CYCLE | 4,698.00 | 10 | 100 | 3.87 | 2.76 | .17 | .41 | .28 | 7.49 | 2.85 | 1.38 | 4.23 | 11.71 |
| MOWER | 1,000.00 | 10 | 200 | .41 | .29 | .02 | .04 | .03 | .80 | .60 | .00 | .60 | 1.40 |
| ROTOVATOR | 2,900.00 | 15 | 200 | .87 | .79 | .05 | .12 | .08 | 1.91 | .78 | .00 | .78 | 2.70 |
| DISK | 1,400.00 | 15 | 200 | .42 | .38 | .02 | .06 | .04 | .92 | .56 | .00 | .56 | 1.48 |
| MECH PRUNER | 13,000.00 | 10 | 200 | 5.35 | 3.83 | .23 | .57 | .38 | 10.36 | 6.52 | .00 | 6.52 | 16.88 |

Use pesticides with care. Apply them only to plants, animals, or sites listed on the label. When mixing and applying pesticides, follow all label precautions to protect yourself and others around you. It is violation of law to disregard label directions. If pesticides are spilled on skin or clothing, remove clothing and wash skin thoroughly. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.

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