



# 2009 Cost Estimates of Establishing and Producing Sweet Cherries in Washington

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## Preface

Production costs and returns are highly variable for any particular orchard operation due to case-specific:

- capital, labor, and natural resources
- crop yields
- type and size of machinery implements
- input prices
- cultural practices
- commodity prices
- operation size
- management skills

Cost estimation also varies with the intended use of the enterprise budget. The information in this publication can be used as a general guide for establishing and producing sweet cherries in the state of Washington. To avoid drawing unwarranted conclusions for any particular orchard or group of orchards, the reader must closely examine the outlined assumptions and make adjustments to the costs and/or returns as appropriate for their situation.

## Production of Sweet Cherries in Washington

Sweet cherry orchards in Washington State are almost entirely located in the arid central region east of the Cascade Mountains. The central Washington counties—Benton, Chelan, Douglas, Franklin, Grant, Klickitat, Okanogan and Yakima—account for 98 percent of the state's total bearing acreage of sweet cherries. Of these, the largest producer is Yakima County, with 28 percent, followed by Grant County (17%) and Chelan County (14%) (NASS, 2009a). From 2005 to 2009, the total bear-

ing acreage of sweet cherries in Washington increased from 31,000 to 35,000 acres (NASS, n.d.).

Sweet cherries ranked eighth in terms of the gross value of major agricultural commodities in Washington, with gross sales of about \$327.12 million as of 2007. The crop also accounted for 46.1 percent of the total sweet cherries produced in the United States during the same period (NASS, 2009b).

Table 1 shows Northwest cherry shipments (including Yakima, Wenatchee, Hood River, Milton-Freewater, and The Dalles production districts) by variety. Bing, Rainier, and Sweetheart are the top three cherry varieties grown in Washington. During 2008 and 2009, Sweetheart ranked second in production, only after Bing (Yakima Valley Growers-Shippers Association, 2009). Sweetheart is becoming popular because it is a late season variety and helps expand the marketing season. Both Bing and Rainier varieties are harvested between June and early July, whereas Sweetheart can be harvested from August to early September. This timing allows growers to extend the marketing season for cherries. Sweetheart is also self-fertile, meaning it does not need a different variety for pollination, which makes it more convenient (Donald Elfving, Washington State University Department of Horticulture and Landscape Architecture, personal communication, April 2010).

## Study Objectives

The study provides estimates for: (1) the costs of the equipment, materials, supplies, and labor required to establish and maintain a modern sweet cherry orchard in Washington State; and (2) the

price and yield levels that will make establishment and production of such an orchard profitable.

The data and assumptions used in this study were gathered from a group of experienced cherry growers in Washington and are considered to represent modern, well-managed orchards. Specific elements gathered from these sources and reflected here include production practices, input requirements, and views about the latest developments in production methods.

Due to the assumptions and sources of information used, the data in this publication should be considered representative of what knowledgeable growers in the area anticipate over the life of an orchard, not accounting for production risk. Many factors alter not only establishment and production costs, but also pack-out and returns. Crop loss should be periodically anticipated. We recommend that growers use the blanks provided on the right-hand column of Table 3 to estimate their own costs and returns.

The primary value of this report is its identification of the types of inputs, costs, and yields considered to be typical of well-managed sweet cherry orchards. This publication does not necessarily represent the average grower and is not intended to be a guide to production practices. It does, however, indicate current trends in the industry, and as such, can be helpful in estimating the physical and financial requirements of comparable plantings.

## Budget Assumptions

1. Specifications for the sweet cherry block example described in this study are listed in Table 2.
2. The budget and production cost items in Tables 3-8 are based on an 11-acre block within a 150-acre orchard. One acre of this block is not used for the direct production of cherries, but rather dedicated to roads, a pond, loading area, etc. Therefore, the total productive area for this block is 10 acres.
3. The irrigation system consists of overhead cooling and under tree drip sprinklers, with two separate sub-main lines. Water is provided through a public irrigation district.
4. Labor is hand and ladder, without use of mechanized devices.

## Summary of Results

The study assumes that a sweet cherry orchard is fully established in five years. Given the assumptions listed above, the total production cost for a 6-year-old sweet cherry block is estimated at \$11,824 per acre, as shown in Table 3. Production costs are classified into *variable costs*, which comprise pruning, materials, labor, harvest, machinery maintenance, and repairs; and *fixed costs*, which are incurred whether or not sweet cherries are grown and include depreciation on capital, interest, taxes, management, and administration.

Annual yield and prices received are two key factors affecting the net returns of growers. Table 4 presents alternative price and yield scenarios for a fully established orchard. If the yield is 2 tons per acre, net returns are negative at any price below \$3,990 per ton. Other combinations of price and yield levels offer positive net returns.

Most of the budget values given in Table 3 are based on comprehensive underlying information. Details of the data used to create the budgets for both establishment and full maturity years of production are presented in Tables 5 to 8. Annual capital requirements for a 10-acre sweet cherry block are listed in Table 5. The detailed machinery and building requirements for the full 150-acre orchard are given in Table 6. Interest costs and depreciation are listed in Tables 7 and 8, respectively. All interest and amortization costs assume an 8.5 percent interest rate. The amortized establishment costs assume a total useful life of 25 years (5 years of establishment and 20 years of full production).

Interest costs represent the cost of using the orchard's assets for sweet cherry production as opposed to alternative activities. Depreciation costs include the annual replacement cost of machinery and buildings. The use of replacement prices may overstate costs growers currently experience. However, it provides an indication of the earnings needed to replace depreciable assets. Recent increases in prices paid for machinery and equipment mean that the depreciation claimed on older purchases substantially understates the amount of capital required to replace that asset. When looking at the long-term viability of the enterprise, it is important to consider its ability to replace depreciable assets on a replacement cost basis.

A downloadable spreadsheet version of the sweet cherry budget (Table 3) and associated data underlying the per acre cost calculations (Tables 5–8 and two others with establishment and full production costs) are available at the WSU Farm Management website (<http://www.farm-mgmt.wsu.edu/treefruits.htm>). Washington growers can modify select values and thus use the Excel workbook to help collect and analyze their own cost data to make informed financial decisions about establishing and producing a sweet cherry planting.

## References

NASS. 2009a. Table 32: Fruits and Nuts, 2007 and 2002. 2007 Census of Agriculture: Washington State County Data. U.S. Department of Agriculture National Agricultural Statistics Service. <http://www.agcensus.usda.gov/Publications/2007/>

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**Table 1. Total Northwest Sweet Cherry Shipments<sup>1</sup> by Variety, 2005–2009**

Variety	2005	2006	2007	2008	2009
Bing	6,526	6,784	6,085	3,022	6,409
Rainier	1,266	1,407	1,562	934	1,636
Lapin	1,667	1,523	1,147	722	1,238
Lambert	163	173	230	107	23
Chelan	148	494	388	368	1,062
Sweetheart	469	1,078	1,397	1,023	2,384
Vans	115	66	91	91	25
Skeena	N/A	386	374	299	880
Other Dark Sweet	771	1,864	2,451	2,325	3,888
<b>Annual Total</b>	<b>11,125</b>	<b>13,776</b>	<b>13,726</b>	<b>8,891</b>	<b>17,545</b>

Source: Yakima Valley Growers-Shippers Association, 2009

<sup>1</sup>Values represent 1,000 20# box equivalents, except for Rainier which are 1,000 15# box equivalents.

**Table 2. Sweet Cherry Block Specifications**

Architecture	Two-dimensional system (planar canopy), randomly trained w/ 18'' radius from tree center
In-row spacing	10'
Between-row spacing	16'
Rootstock	Sweetheart on a Mazzard rootstock
Block size	10 acres, on 11 acres of land
Life of planting	25 years
Tree density	272 trees per acre
Trellis system	3 leader trees, 5-wire vertical system, 11' high trellis with a 12' tree. Bottom wire is 18'' from ground with 24'' between each wire.

**Table 3. Cost and Returns per Acre of Establishing and Producing Sweet Cherries on a 10-acre Orchard Block**

	Establishment Years					Full Production <sup>1</sup>	Your Costs
	Year 1	Year 2	Year 3	Year 4	Year 5		
Estimated Production (tons/acre)			1.0	4.0	6.0	8.0	
Estimated Price (\$/ton) <sup>2</sup>			2,400.00	2,400.00	2,400.00	2,400.00	
<b>Total Returns</b>			2,400.00	9,600.00	14,400.00	19,200.00	
<b>Variable Costs (\$/acre):</b>							
<u>Establishment</u>							
Soil Preparation	2,051.25						
Trees (including labor & painting)	2,284.80						
<u>Orchard Activities</u>							
Pruning & Training <sup>3</sup>	163.20	272.00	553.79	707.20	911.20	911.20	
Chemicals <sup>4</sup>	185.00	185.00	690.00	690.00	690.00	925.00	
Fertilizer	66.00	77.00	88.00	99.00	110.00	60.50	
Beehives			45.00	45.00	45.00	45.00	
General Farm Labor	262.50	262.50	262.50	262.50	262.50	367.50	
Irrigation/Electric Charge	150.00	150.00	150.00	150.00	150.00	150.00	
<u>Harvest Activities</u>							
Picking Labor			480.00	1,920.00	2,880.00	4,240.00	
Other Labor (checkers, tractor drivers)			50.00	200.00	360.00	400.00	
<u>Maintenance and Repairs</u>							
Machinery Repair, Fuel & Lube	325.00	325.00	325.00	325.00	325.00	700.00	
Wind Machine & Alarm System Repair			40.00	40.00	40.00	40.00	
Pond Maintenance			50.00	50.00	50.00	50.00	
<u>Other Variable Costs</u>							
Overhead (5% of VC)	274.39	63.58	136.71	224.44	291.19	394.46	
Interest (7% of VC) <sup>5</sup>	403.35	93.46	200.97	329.92	428.04	434.89	
<b>Total Variable Costs</b>	<b>6,165.49</b>	<b>1,428.53</b>	<b>3,071.98</b>	<b>5,043.05</b>	<b>6,542.93</b>	<b>8,718.55</b>	
<b>Fixed Costs (\$/acre):</b>							
<u>Depreciation</u>							
Irrigation System	77.40	77.40	77.40	77.40	77.40	77.40	
Mainline & Pump	20.00	20.00	20.00	20.00	20.00	20.00	
Pond				36.00	36.00	36.00	
Trellis	58.92	58.92	58.92	58.92	58.92	58.92	
Wind Machine				93.60	93.60	93.60	
Machinery & Building Annual Replacement Cost	399.00	399.00	399.00	399.00	399.00	399.00	
<u>Interest</u>							
Irrigation System	100.51	100.51	100.51	100.51	100.51	100.51	
Land	552.50	552.50	552.50	552.50	552.50	552.50	
Machinery & Buildings	137.82	137.82	137.82	137.82	137.82	137.82	
Mainline & Pump	21.25	21.25	21.25	21.25	21.25	21.25	
Pond				38.25	38.25	38.25	
Trellis	62.60	62.60	62.60	62.60	62.60	62.60	
Wind Machine				121.55	121.55	121.55	
Establishment Costs (7%)		561.27	830.23	1,065.07	970.58		
<u>Other Fixed Costs</u>							
Land & Property Taxes	150.00	150.00	150.00	150.00	150.00	150.00	
Insurance Cost (all farm)	50.00	50.00	50.00	50.00	50.00	50.00	
Management Cost	300.00	300.00	300.00	300.00	300.00	300.00	
Amortized Establishment Costs <sup>6</sup>						963.82	
<b>Total Fixed Costs</b>	<b>1,852.60</b>	<b>2,413.87</b>	<b>2,682.84</b>	<b>3,207.08</b>	<b>3,112.58</b>	<b>3,105.82</b>	
<b>TOTAL COSTS</b>	<b>8,018.09</b>	<b>3,842.40</b>	<b>5,754.82</b>	<b>8,250.13</b>	<b>9,655.51</b>	<b>11,824.38</b>	
<b>ESTIMATED NET RETURNS</b>	<b>(8,018.09)</b>	<b>(3,842.40)</b>	<b>(3,354.82)</b>	<b>1,349.87</b>	<b>4,744.49</b>	<b>7,375.62</b>	
<b>Accumulated Establishment Costs</b>	<b>8,018.09</b>	<b>11,860.49</b>	<b>15,215.31</b>	<b>13,865.44</b>	<b>9,120.95</b>		

<sup>1</sup>The full production year is representative of all the remaining years the orchard is in full production (Year 6 to Year 25).

<sup>2</sup>Prices represent FOB discounted prices (FOB minus packinghouse charges).

<sup>3</sup>Training costs are replaced by green fruit thinning costs in Year 3.

<sup>4</sup>Including labor.

<sup>5</sup>Interest expense charged on full year during establishment years and for 3/4 of a year during full production.

<sup>6</sup>Represents the costs incurred during the establishment years (minus revenues during those years) that must be recaptured during the full production years.

**Table 4. Estimated Net Returns per Acre at Various Prices and Yields during Full Production<sup>1</sup>**

Yield (tons/acre)	Price (\$/ton) <sup>2</sup>				
	800	1,600	2,400	3,200	4,000
2	-6,378.54	-4,778.54	-3,178.54	-1,578.54	21.46
4	-6,060.49	-2,860.49	339.51	3,539.51	6,739.51
6	-5,742.43	-942.43	3,857.57	8,657.57	13,457.57
8	-5,424.38	975.62	7,375.62	13,775.62	20,175.62
10	-5,106.32	2,893.68	10,893.68	18,893.68	26,893.68
12	-4,788.27	4,811.73	14,411.73	24,011.73	33,611.73

<sup>1</sup>Includes amortized establishment costs.

<sup>2</sup>Price represents FOB discounted price (FOB minus packinghouse charges).

**Table 5. Summary of Annual Capital Requirements for a 10-acre Sweet Cherry Block**

	Establishment Years					Full Production <sup>1</sup>
	Year 1	Year 2	Year 3	Year 4	Year 5	
<b>Annual Requirements</b>						
Land (11 acres)	71,500.00					
Trellis System	14,730.00					
Irrigation System	21,500.00					
Mainline & Pump	5,000.00					
Pond			9,000.00			
Wind Machine			26,000.00			
Operating Expenses	66,654.87	19,285.30	35,719.77	55,430.54	70,429.27	368,742.09
<b>Total Requirements</b>	<b>179,384.87</b>	<b>19,285.30</b>	<b>70,719.77</b>	<b>55,430.54</b>	<b>70,429.27</b>	<b>368,742.09</b>
<b>Receipts</b>			<b>24,000.00</b>	<b>96,000.00</b>	<b>144,000.00</b>	<b>192,000.00</b>
<b>Net Requirements</b>	<b>179,384.87</b>	<b>19,285.30</b>	<b>46,719.77</b>	<b>(40,569.46)</b>	<b>(73,570.73)</b>	<b>176,742.09</b>

<sup>1</sup>The full production year is representative of all the remaining years the orchard is in full production (Year 6 to Year 25).

**Table 6. Machinery and Building Requirements for a 150-acre Orchard**

	Purchase Price (\$)	Number of Units	Total Cost (\$)
Mobile home	120,000	1	120,000
Machine shop	50,000	1	50,000
Tractor (70HP, 4WD)	37,000	3	111,000
Tractor (40HP, 4WD)	30,000	1	30,000
4 wheeler	5,000	2	10,000
Speed sprayer	20,000	3	60,000
Weed spray boom & tank	3,000	1	3,000
Mower (rotary)	6,000	1	6,000
Mower (flail)	8,500	1	8,500
Fork lift	20,000	1	20,000
Bin trailer	5,500	3	16,500
Ladder (10')	120	60	7,200
<b>Total Cost</b>			<b>442,200</b>



**Table 7. Interest Costs per Acre for a 10-acre Sweet Cherry Block**

	Total Purchase Price (\$)	Salvage Value (\$)	Number of Acres	Total Interest Cost (\$)	Interest Cost Per Acre (\$)
Irrigation System	21,500	2,150	10	1,005	100.51
Land <sup>1</sup>	71,500	71,500	11	6,078	552.50
Machinery & Buildings	442,200	44,220	150	20,673	137.82
Machine & Pump	5,000	0	10	213	21.25
Pond	9,000	0	10	383	38.25
Trellis	14,730	0	10	626	62.60
Wind Machine &	26,000	2,600	10	1,216	121.55

<sup>1</sup>Refer to Budget Assumption #2.

Note: Interest Rate = 8.5%; Salvage Value = 10%

**Table 8. Depreciation Costs per Acre for a 10-acre Sweet Cherry Block**

	Total Purchase Price (\$)	Number of Acres	Total Value Per Acre (\$)	Years of Use	Depreciation Cost Per Acre (\$)
Irrigation System	21,500	10	2,150.00	25	77.40
Mainline & Pump	5,000	10	500.00	25	20.00
Pond	9,000	10	900.00	25	36.00
Trellis	14,730	10	1,473.00	25	58.92
Wind Machine	26,000	10	2,600.00	25	93.60
Machinery & Building Annual Replacement Cost <sup>1</sup>					399.00

<sup>1</sup>An estimate of average annual replacement costs, rather than depreciation costs, is used for all machinery, equipment, and buildings. The use of replacement prices may overstate costs currently being experienced by fruit growers. However, it provides an indication of the earnings needed to replace depreciable assets. Recent increases in prices paid for machinery and equipment mean that the depreciation claimed on older purchases substantially understates the amount of capital required to replace that asset. When looking at the long-term viability of the enterprise, it is important to consider its ability to replace its depreciable assets on a replacement cost basis.

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