Farm Business Management Report

# Estimated Costs and Returns for Establishing And Producing Asparagus in Washington in 2009

J. Shannon Neibergs and Tim Waters Washington State University Extension



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#### Abstract

This bulletin provides a budget analysis of producing a 40-acre asparagus field under center pivot irrigation in the Columbia Basin area of Washington. An enterprise budget is provided for each establishment year and a typical full production year. The length of asparagus bed life is assumed to be 15 years. The budgets created in this study include both cash and non-cash expenses and represent typical production practices in the area. The user is strongly recommended to fully understand the costs and returns presented in the bulleting before implementing any on-farm management changes. The bulletin has an associated spreadsheet model available through the WSU Farm Management website (<u>http://www.farm-mgmt.wsu.edu/Software.html</u>). The use of trade names and cultural practices in this report does not constitute an endorsement or recommendation by Washington State University, nor is any criticism implied by omission of other similar products or cultural practices.

#### Note

Enterprise costs and returns vary from one farm to the next and over time due to differences in:

- Capital, labor, land and management resources
- Type and size of machinery complement
- Production practices
- Size of the farm and alternative enterprises
- Production yields and sale prices
- Input prices

Costs can also be calculated differently depending on the intended use of the cost estimate. The information in this publication serves as a general guide for an asparagus production system in the Columbia Basin area of Washington. To avoid drawing unwarranted conclusions from this report, closely examine the assumptions and data used and make appropriate adjustments to your situation.

<sup>1</sup>J. Shannon Neibergs, Associate Professor Extension Economist, School of Economic Sciences, SE Extension District, Washington State University Extension, Pullman, WA.

Tim Waters, Area Extension Educator Franklin & Benton Co., Commercial Vegetables, Washington State University Extension, Pasco, WA.

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# Estimated Costs and Returns for Establishing And Producing Asparagus in Washington in 2009

### Introduction

Sample costs to establish and produce asparagus in the Columbia Basin area of Washington are presented in this enterprise budget study. This study is intended as a guide, and can be used as a template to prepare budgets and make production decisions to estimate potential returns and to analyze investment and financial analysis decisions. Production practices used in the budget are based on typical practices for asparagus in this area. It is recommended that the user modify the budget assumptions to reflect their specific situation by using the space provided in the budgets for Your Farm costs or by adjusting assumptions in the associated excel spreadsheet available at <a href="http://farm.mngt.wsu.edu/publication\_lists.htm">http://farm.mngt.wsu.edu/publication\_lists.htm</a>

These budgets were developed in collaboration with a group of asparagus producers. As a group the typical production practices, schedule of operations, application rates and production yields were discussed and determined. Their contribution to this study was critical and greatly appreciated. Input costs were determined through supplier contacts and discussed with the producer group to represent typical production costs in 2008 and for 2009.

## Background

Washington has a long history of being a major asparagus producer. Historically Washington produced both fresh market and processing market asparagus. Figure one shows Washington's harvested acreage from 1986 to projected 2008.



Figure 1. Washington Asparagus Harvested Acreage 1986 to projected 2008.

Washington asparagus harvested acreage declined from a peak of 32,000 acres in 1988 and 1989 to a projected low of 8,000 acres in 2008. Washington asparagus production has declined due to international competition stemming from the Andean Free Trade agreement first enacted in 1991 and the North American Free Trade agreement which was signed in 1992 and became effective in 1994. Both free trade agreements allowed duty free access of Peruvian and Mexican asparagus into U.S. markets. Shortly after enacting the free trade agreements, Washington lost its asparagus processing industry. The asparagus processing plants Del Monte in Toppenish, and the Chiquita plant in Walla Walla stopped operations in 2003. The Seneca plant in Dayton operated through 2005. The plant canned asparagus for the Green Giant label and was reportedly at the time the World's largest asparagus processing plant. Presently the majority of the harvested acres are for fresh market sales with a small share going to asparagus processing such as pickled asparagus.

Washington has the highest average asparagus yields of the three leading U.S. asparagus producing states as shown in Figure 2. Using NASS USDA data on yield from 2005 to 2008 the average per acre yield in Washington is 42 cwt per acre, and is 28 and 21 cwt per acre in California and Michigan respectively. The USDA yield data is lower than used in a California budget study which used 40 cwt / acre, (Aegerter, Klonsky and DeMoura, 2007) and the yield data for a full production year used in this budget, see Table 1.



Figure 2. Comparative Asparagus Yield in cwt per acre.

This study was done to assess the economic costs and profitability of establishing and producing asparagus based on 2008-2009 prices and current managing and growing practices. It is an update of the 2001 asparagus budget (Ball, Folwell and Holmes). As a perennial crop, asparagus does not reach its full production until the sixth year of production, five years after the crowns

are transplanted. To estimate the economic costs of establishment and production for this study it is necessary to:

- 1. Specify the cultural practices normally followed in Washington to establish and maintain a 40-acre field of asparagus.
- 2. Estimate the production costs of typical production practices and estimate yield and price to calculate revenue which together are used to estimate asparagus profitability.
- 3. Calculate a sensitivity analysis on yield and price to identify profitability break-even points necessary to economically justify establishing a new asparagus bed.

The economic budgets created in this study include both cash and noncash items. An example of a noncash item is an opportunity cost. For instance, when farmers produce a crop on the land they own, they forego the income that would be attained if the land were rented, minus any cost incurred as the lessor (i.e., real estate taxes). Therefore, the return foregone from the land is an opportunity cost. Since the budget includes full costs (including opportunity costs) and returns over the useful life of the asset, it is referred to as an economic budget.

Costs in the budget are classified as variable and fixed. A fixed cost, which can be either cash or noncash, does not vary, even with an increase or decrease in production. Machinery interest and land tax are fixed cash costs, and remain constant regardless if the crop is produced. The opportunity cost for management is a noncash fixed cost. It remains fixed because it can be either used or not used during the year. Conversely, a variable cost is one that does change with the amount of product produced. Harvesting labor and fertilizer are examples of costs that vary directly with the level of production.

## **Budget Assumptions**

The major assumptions made to calculate the establishment costs of asparagus include:

- 1. The asparagus enterprise is a well-managed 40-acre crop grown on a 180-acre diversified farm.
- 2. The crop is established with transplanted crowns in the first year. The asparagus is planted on 45 inch beds and 7.0 inch in-row spacing giving a plant population of 22,000 crowns per acre.
- 3. The land opportunity cost is based on renting the irrigated land in a potato rotation over the fifteen life of the asparagus stand. Over the 15 years the land could be rented for potatoes for four years at \$750 and the remaining eleven years at \$500 per acre per year. The average land rent cost over this rental scenario is \$566.67. While the owner-operator will not have a land rent cost, it is representative of the rental income the owner foregoes by producing a crop rather than renting the land and is regarded as an opportunity cost.

- 4. An annual management fee to the asparagus grower is 5.00 percent of the fully producing asparagus field in year 6.
- 5. A center pivot irrigation system is used to irrigate the 40 acre field. The center pivot system has 4 towers with a 180 foot span and a 54 foot overhang and a Select2 computerized control panel. The irrigation system is composed of a buried main line and pump to service the circle. The equipment is priced new and depreciated over a 30-year period for 40 acres asparagus field. The cost for the towers and panel is \$53,674. The total costs for with the pump and mainline for the 40 acre center pivot system is \$85,000.
- 6. Machinery and equipment costs are based on 2008 purchase prices. Assuming new equipment shows the enterprise's ability to generate the earnings required to replace depreciable assets. Machinery and equipment operating, depreciation, housing, interest and insurance costs are calculated based on the *Costs of Owning and Operating Farm Machinery in the Pacific Northwest*, Smathers, 2007.
- 7. The interest on operating capital is 7.75%. Investment capital interest is charged at 7.0%.
- 8. For the East Columbia Basin Irrigation District, the 2008 irrigation water charge is \$60.00 per acre and the energy cost is irrigation electricity cost is \$50.00.
- 9. The asparagus bed yields with year 1 representing the establishment year are:

Table 1. Asparagus Budget Yields							
	Yield in Lbs per Acre						
Year 1	0						
Year 2	1,000						
Year 3	3,000						
Year 4	4,500						
Year 5	6,000						
Years 6 -15	7,000						

- 10. The price of asparagus used in the budget is \$0.67 per pound. This is the average price paid in 2008 reported by fresh asparagus packers to the Washington Asparagus Commission.
- 11. Harvesting costs are based on yield. The harvesting cost to cut asparagus is \$0.22 per pound of yield. Related to harvesting cost are swamping or loading costs which are taking the cut asparagus to the edge of the field. Swamping costs are \$0.01 per pound of yield. Supervision of the harvest workers is paid at \$0.02 per pound of yield. Labor taxes of 17% are paid on the total labor cost.

12. Real estate property tax rates are from the Franklin County Assessor (http://www.co.franklin.wa.us/assessor/tax\_calculator.html). The tax rate in 2008 is 1.463% of the average assessed value (\$14.63 per \$1,000 of value). For tax purposes, real estate tax (land), irrigation system, and the asparagus crown values are assessed for property taxes. The estimated property values and the budget's annual property taxes are given in Table 2.

	Age of Asparagus Bed					
Item per Acre	1 - 3 years	4 – 15 years				
Land	\$7,000.00	\$7,000.00				
Asparagus Crown Value	1,000.00	2,200.00				
Irrigation System	1,200.00	1,200.00				
Total Value	9,200.00	10,400.00				
Per Acre Property Tax	134.60	152.15				

**Table 2. Estimated Property Assessed Values and Taxes** 

13. Prices for materials and services were assembled through grower meetings, fertilizer company field men and contacting industry supply firms.

Table 3.	Custom	Services	Costs
I unic of	Custom		CODED

Item	Unit	Cost per Unit (\$)
Custom Listing	Acre	50.00
Custom Planting	Acre	300.00
Aerial Spraying	Acre	7.50
<b>Custom Fertilizer Application</b>	Acre	7.50

Item	Unit	Cost per Unit (\$)
Asparagus Crowns	Thousand	80.00
Nitrogen	Lb	0.57
Phosphate	Lb	0.75
Potassium	Lb	0.84
Roundup	Gallon	36.00
Lorox	Lb	13.33
Disyston	Gallon	147.36
Sevin XLR Plus	Gallon	35.00
Treflan FP	Gallon	20.00
Karmex	Lb	6.05
Sencor	Lb	13.00
Irrigation Water	Acre	60.00
Irrigation Electricity	Acre	50.00
Diesel	Gallon	3.25
Gasoline	Gallon	2.25

#### Table 4. Input Costs

14. Interest only payments are included on net accumulated production establishment costs for years 2 to 4. The production accumulated establishment costs are accumulated variable costs plus machinery-equipment depreciation, machinery-equipment housing and insurance, land taxes and labor taxes for years 1 through 4 net of any receipts are amortized over the remaining bed production years 5 - 15 at 7.0% interest. Year 5 is the first year of economic profit and is used as the first year for amortizing the production expenses. Opportunity costs on land, machinery and management are not amortized, because including non-cash opportunity costs creates interest on interest payments and results in negative net economic returns throughout the life of the asparagus bed. The annual amortized asparagus establishment cost for years 5 to 15 under this production cost assumption is \$405.81. If the full economic cost of all land, machinery interest and management opportunity costs are included with interest charged against these opportunity costs during the establishment period, the annual amortized establishment cost for years 5 to 15 would be \$1,035.03 and the asparagus field could not generate a profit. Table 5 provides the detail used in calculating the amortization cost.

					Economic	Economic
	Production		Net Production	Amortization	Basis	Amortization
	Expense	Revenue	Revenue	Interest (7%)	Net Revenue	Interest (7%)
Year 1	3,228.87	0.00	-3,228.87	0.00	-4,124.03	0.00
Year 2	1,002.39	670.00	-332.39	-226.02	-1,451.52	-288.68
Year 3	1,671.65	2,010.00	338.35	-249.29	-812.88	-390.29
Year 4	2,134.21	3,015.00	880.79	-225.60	-246.75	-447.19
Total Net Establishment Cost			-3,043.04		-7,761.33	
	Years 5 to 1	5 annual ar	nortized cost	\$405.81		\$1,035.03

#### Table 5. Amortized Net Establishment Cost Detail

### Asparagus Budget Itemized Costs, Schedule of Operations, and Materials and Services

The detailed budget information is presented in the Appendix for the establishment years 1 to 5, and for a typical full production year representing years 6 - 15 of the bed life. There are two tables for each establishment and production year. The schedule of operations table details the production year by operation by month and identifies the associated labor and or machine hours. The itemized cost budget table details input usage, annual revenues, variable costs and fixed costs. Table 6 provides a summary of the revenue and costs detailed in each budget year appendix table.

						Full
	Year 1	Year 2	Year 3	Year 4	Year 5	Production
			\$ / acr	e		
Revenue						
Yield (lbs)	0.00	1,000.00	3,000.00	4,500.00	6,000.00	7,000.00
Price (\$/lb)	0.67	0.67	0.67	0.67	0.67	0.67
Total Revuene	0.00	670.00	2,010.00	3,015.00	4,020.00	4,690.00
Variable Cost						
Non-Harvest	2,947.28	454.32	510.72	600.95	523.06	526.29
Harvest	0.00	250.00	750.00	1,042.26	1,500.00	1,750.00
Total Variable Cost	2,947.28	704.32	1,260.72	1,643.21	2,023.06	2,276.29
Total Fixed Costs	1,176.75	1,417.20	1,562.16	1,618.53	1,862.49	1,904.99
Total Costs	4,124.03	2,121.52	2,822.88	3,261.75	3,885.55	4,181.27
Net Return	-4,124.03	-1,451.52	-812.88	-246.75	134.45	508.73

Table 6. Summary of Asparagus Budget Revenues, Costs and Returns

### First Year Establishment Costs

In Appendix Table 1A, itemized costs for establishing asparagus are broken down by type of input item and corresponding per acre costs in the first year. Appendix Table 1B lists the schedule of operations along with the fixed and variable costs associated with each operation and the input used. The total cost of establishing the asparagus in year 1 is \$4,124.03 per acre, with variable and fixed costs being \$2,947.28 and \$1,176.75 per acre respectively. The asparagus bed is prepared in the spring. The soil is plowed, fertilized, and then disked to prepare the ground. The crowns are planted using a custom operation and are covered with a machinery operation using a dragging board. Weed control is done several times during the first year, from April through June through cultivation, hand weeding and chemical spray applications. The asparagus crowns are transplanted in year one and the spears are allowed to grow into the fern stage to contribute to the health of the crowns. Since no spears are harvested there is no harvest expense or revenue.

## Second-Year Establishment Costs

During the second year of establishment total costs are \$2,121.52 per acre. The fixed costs increase from year one, but the variable costs decline significantly. The itemized costs and schedule of operations are represented in Appendix Tables 2A and 2B, respectively. In the spring, the ferns are beat with a rotary mower and Treflan is applied as weed control. The ground is cultivated with a mulch tiller in March before the start of the growing season. A small harvest occurs for the first time in the second year; the asparagus field yields 1,000 pounds per acre and

is sold at a market price of \$0.67 per pound. Harvest costs are paid on a per pound basis. It is assumed that there are additional fully producing asparagus acres that the harvest crew is cutting so the mix of establishing acres and fully productive acres pays the harvest crew above minimum wage. The second year has a net revenue loss of -\$1,451.52.

In the second year, interest on the first year production establishment cost is in the budget as the amortized net establishment fixed cost. This accounts for the interest that could have been earned on an alternative investment. The \$226.02 establishment cost is based on year one's net production establishment expenses of \$3,228.87 at 7.0% interest.

## Years Three to Five Establishment Costs

Appendix Tables 3A to 5B show the detailed itemized costs and schedule of operations budgets for the third through fifth years of asparagus establishment. The operations are the same for each year beginning with the spring work of beating the ferns, spray weed control, mulch tillage, harvest, fertilization and summer insect control. Operating expenses increase as the labor costs of harvesting rise due to larger yields over years 3 to 5. Revenues generated are enough to cover the variable costs in year three, but not total costs. Year 5 is the first year of economic profit, \$134.45 over all costs.

## Production Costs and Profit Levels for Asparagus Bed in Full Production

In the sixth year, the asparagus bed is in full production with a yield of 7,000 pounds per acre. This level of production is assumed to hold on average over years 6 to 15 of the bed. Appendix Tables 6A and 6B summarize the annual costs of producing asparagus at full production. The total revenue is \$4,690 per acre, total costs are \$4,181.27 per acre producing net revenue of \$508.73 per acre after covering all fixed production and opportunity costs. This represents returns to land and management after paying a 5% management fee, establishment amortization expense and the land opportunity cost.

## Machinery Complement and Operating Costs

Appendices Tables 7A and 7B report the machinery and equipment needed in the operation to produce asparagus and the associated costs. Included in the tables are the machinery and equipment purchase price, years of life before trade-in, salvage value, and fixed and variable costs. The fixed costs such as depreciation, interest, insurance, taxes and housing are reported on a cost per hour basis. Repair and fuel/lube variable costs are also reported as cost per hour. Annual hours of use for the machinery and equipment are also reported. For the irrigation system, the information is reported as the acreage irrigated by the system rather than annual hours of use.

#### Sensitivity Analysis on Yield and Price

Profitability varies depending on the price received and the yield an asparagus bed generates. A sensitivity analysis is provided in Table 7 to examine how price and yield combinations that impact net returns in a fully productive asparagus bed, or the net return found in the years 6-15 budget, Table 6A. Table 7 systematically varies yield from a 25% yield reduction to a 25% yield increase in 5% increments. Price varies from \$0.55 to \$0.90 per pound in five cent increments and includes the budget assumption price of \$0.67 per pound. The sensitivity analysis adjusts all costs that vary when yield and price change. The yield and price changes affect all of the establishment years and the fully producing year. For example, harvest costs vary with yield. The establishment amortization cost will also vary as yield and price affects net returns in years 1 to 4, and the management fee also varies as yield and price varies. To interpret Table 7 you can look at the 7,000 pound yield and the price of \$0.67 per pound. These are the basic budget assumptions and Table 7 reports a net return of \$508.73 per acre which matches the net return found in Table 6A. As yield and price decrease from this point net returns per acre decrease.

Table 7 shows dramatic sensitivity in net returns as yield and price varies. For example, a five percent yield reduction from 7,000 pounds per acre to 6,650 pounds per acre in the fully producing asparagus bed years 6 to 15 (note, the 5% yield reduction also affects yields in years 2 to 5) and holding price fixed at the budget assumption of \$0.67 per pound results in a 28% decrease in net return per acre from \$508.73 to \$367.37. Looking at the sensitivity of price change holding yield fixed at the budget assumption of 7,000 lbs per acre for the fully producing years and changing price from the budget assumption of \$0.67 per pound to \$0.70 per pound increases net returns from \$508.73 to \$743.63 per acre. This represents a price change of 4.48 percent and a net revenue change of 46 percent.

Note you can <u>not</u> use Table 7 to examine changes in pack out percent and price. Pack out determines the pounds of product or yield an asparagus producer is paid for on delivery. The producer must pay harvest cost on the yield weight extracted from the field. Table 7 adjusts the harvest cost in coordination with yield weight changes.

Yield Change	-25%	-20%	-15%	-10%	-5%	0%	5%	10%	15%	20%	25%
Yield (lbs) Yr. 6	5,250	5,600	5,950	6,300	6,650	7,000	7,350	7,700	8,050	8,400	8,750
Price		Net Return \$ per Acre									
\$0.55	-902.77	-808.40	-714.02	-619.65	-525.27	-430.90	-336.52	-242.15	-147.78	-53.40	40.97
\$0.60	-609.14	-495.19	-381.24	-267.29	-153.34	-39.39	74.56	188.51	302.46	416.41	530.36
\$0.65	-315.51	-181.98	-48.45	85.07	218.60	352.12	485.65	619.17	752.70	886.22	1,019.75
\$0.67	-198.05	-56.70	84.66	226.01	367.37	508.73	650.08	791.44	932.79	1,074.15	1,215.50
\$0.70	-21.87	131.23	284.33	437.43	590.53	743.63	896.73	1,049.83	1,202.93	1,356.04	1,509.14
\$0.75	271.76	444.44	617.11	789.79	962.47	1,135.14	1,307.82	1,480.50	1,653.17	1,825.85	1,998.52
\$0.80	565.39	757.64	949.90	1,142.15	1,334.40	1,526.65	1,718.90	1,911.16	2,103.41	2,295.66	2,487.91
\$0.85	859.03	1,070.85	1,282.68	1,494.51	1,706.34	1,918.16	2,129.99	2,341.82	2,553.65	2,765.47	2,977.30
\$0.90	1,152.66	1,384.06	1,615.46	1,846.87	2,078.27	2,309.67	2,541.08	2,772.48	3,003.88	3,235.29	3,466.69

 Table 7. Sensitivity Analysis Economic Net Return with Varying Yield and Price Levels for Asparagus (\$/Acre)

#### **Financial Based Analysis of Asparagus Production**

This study generated economic budgets. These budgets are comprised of total or full economic costs, which include opportunity costs and management fees. An opportunity cost is the revenue that could have been earned by using the land or the machinery in next best alternative. For example when the decision is made to produce asparagus the land owner gives up the opportunity to rent out the land. In the budget appendix tables 1A to 6B these economic assumptions are used and the net return is the return after paying all production and economic costs. A positive return is required to achieve what is defined as an economic profit.

An analysis can be made by adjusting the economic budgets to financial budgets by removing the economic opportunity costs and management fees. Financial cost budgets are needed to calculate a net present value analysis. This is done in Table 8.

Table 8 takes the economic analysis results as the basic information. You will see the line in Table 8, Economic Net Revenue or Loss is exactly the same as you find in tables 1A to 6A. The following line Economic to Finance Adjustment adds back to Economic Net Revenue the Tractor/Machinery Interest, the Land Rent Opportunity Cost, the Management Fee and the Amortized Net Establishment costs to calculate Net Cash Flow. The Tractor / Machinery Depreciation, although a non-cash expense, is <u>not</u> added back, because it is used to approximate the tractor / machinery / irrigation capital cost needed to produce asparagus. If this cost was added back the production costs would be underestimated and the profitability overestimated.

The Cumulative Cash Income line keeps a running total of the cash position in establishing and producing asparagus. The maximum cash outlay is in year 2 at -\$3,561.27, and all cash establishment expenses are recovered in year 6 when the cumulative cash flow becomes positive. The net present value (NPV) of the asparagus stand using a 8.00 % discount rate is \$6,918.27 and the internal rate of return (IRR) is 27%.

Year	1	2	3	4	5	6 -15
Yield (lbs)	0.00	1000.00	3000.00	4500.00	6000.00	7000.00
Price (\$/lb)	0.67	0.67	0.67	0.67	0.67	0.67
REVENUE	0.00	670.00	2010.00	3015.00	4020.00	4690.00
VARIABLE COSTS						
Planting Crowns, Listing, etc.	2130.00	0	0	0	0	0
Aerial spraying	7.50	7.50	7.50	7.50	7.50	7.50
Disyston	19.16	19.16	19.16	19.16	19.16	19.16
Sevin XLR Plus	8.75	8.75	8.75	8.75	8.75	8.75
Roundup	13.68	0	4.68	4.68	4.68	4.68
Lorox	13.33	0	0	0	0	0
Treflan FP	0	5.00	5.00	7.60	7.60	7.60
Labor (total harvest)	0	250.00	750.00	1125.00	1500.00	1750.00
Karmex	0	7.26	7.26	7.26	7.26	7.26
Sencor	0	8.19	8.19	8.19	8.19	8.19
Hand Weeding	150.00	0.00	0.00	0.00	0.00	0.00
Custom Fertilzer Application	7.50	7.50	7.50	7.50	7.50	7.50
Nitrogen	76.95	68.40	68.40	68.40	68.40	68.40
Phosphate and Potassium	94.05	0	0	0	0	0
Irrigation Water	60.00	60.00	60.00	60.00	60.00	60.00
Irrigation Electricity	50.00	50.00	50.00	50.00	50.00	50.00
Overhead	60.00	60.00	60.00	60.00	60.00	60.00
Interest on Operating Capital	56.44	16.45	24.62	29.51	34.36	37.59
Tractor/Mach Fuel/Lube/Repair	127.69	86.55	129.50	129.50	129.50	129.50
Labor	72.24	49.56	50.16	50.16	50.16	50.16
Total Variable Cost	2947.28	704.32	1260.72	1643.21	2023.06	2276.29
FIXED COSTS						
Tractor / Machinery Depreciation	94 16	101 43	125 97	125 97	125 97	125 97
Tractor / Machinery Interest	93.99	91 94	100 77	100 77	100.77	100 77
Tractor / Mach Taxes Ins Housing	11 65	11 12	14.33	13.09	13.09	13 09
Land Taxes	134 60	134 60	134 60	152 15	152 15	152 15
Labor Taxes	41 18	50.93	136.03	199 78	263 53	306.03
Land Rent Opportunity Cost	566.67	566.67	566.67	566.67	566.67	566.67
Management Fee	234.50	234.50	234.50	234.50	234.50	234.50
Amortized Net Establishment	0	226.02	249.29	225.60	405.81	405.81
Total Fixed Cost	1176.75	1417.20	1562.16	1618.53	1862.49	1904.99
Total Coat	4124.02	2121 52	2022.00	2261 75	2005 55	1101 07
Foonomia Not Povonuo or Loss	4124.03	2121.02	2022.00	3201.73	124 45	4101.27 509.72
+ Economic to Einance Adjustmente	-4124.03 205 16	1110 12	-012.00 1151 00	-240.10 1107 51	134.43	1207 75
	090.10	222.20	220.25	000.70	1307.75	1016 47
Cumulative Cash Income	-3220.01	-332.39 2561 27	330.35 2222 02	000.79	144Z.ZU	016 55
Cumulative Cash income	-3220.01	-3001.27	-3222.92	-2342.12	-099.92	910.00
Net Present Value 15 year production u	ising discou	nt rate of:		8.00%	NPV =	\$6,918.27
						21 70

Table 8.	Financial	Cost /	Analysis	for an A	Asparagus	<b>Field Per</b>	Acre
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#### Conclusions

The enterprise budget analysis of asparagus production is particularly interesting. On a financial basis, asparagus is a highly profitable crop generating an IRR of 27%, primarily because of the long life of the asparagus bed, 15 years in this analysis. However it has a relatively long payback period to recover the cash investment of 6 years. Asparagus is a high value crop, produced on high value lands thus requiring large economic opportunity costs. A strong assumption was made in this budget, not to fully charge all of the opportunity costs in calculating the net establishment cost as previously described in the budget. Fully charging these costs results in economic unprofitability across the life of the asparagus bed. It does not make sense to have this large disparity between economic and financial profits, so the establishment cost assumption was used to better reflect the economic profile of asparagus production.

The budget does point to the long term planning horizon associated with establishing asparagus beds. Six years to the financial breakeven point and 15 years of productive life, and the high economic opportunity costs associated with asparagus production. Asparagus profitability is also highly sensitive to yield and price changes, which has positive and negative risk aspects. Asparagus's enterprise budget economic profile helps explain both why asparagus acreage has declined in Washington as asparagus beds mature and producers are unwilling to invest in the long time frame required to recover asparagus establishment costs. And why some producers continue to invest in establishing new asparagus beds based on projected long term profitability. Asparagus also provides early season cash flow because asparagus harvest and sales occur early in Washington's growing season.

#### References

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Ball, Trent, Raymond J. Folwell, and Dan Holmes, Establishment and Annual Production Costs for Washington Asparagus in 2001, Farm Business Management Reports EB 1779, Cooperative Extension Washington State University.

Smathers, Robert, Costs of Owning and Operating Farm machinery in the Pacific Northwest, PNW0346, Pacific Northwest Extension Publications, 2007.

		Р	rice or		Value or	Your
	Unit	Co	st / Unit	Quantity	Cost	Farm
REVENUE		•				
Asparagus Harvest	LB	\$	0.67	0.00	0.00	
VARIABLE COSTS			50.00	4.00	50.00	
Custom Listing	ACRE		50.00	1.00	50.00	
Custom Planting	ACRE		300.00	1.00	300.00	
Supervise Planting	ACRE		20.00	1.00	20.00	
Asparagus Crown			80.00	22.00	1760.00	
Custom Fertilizer Application	AURE		7.50	7.00	7.50	
Phosphate	LB		0.75	75.00	56.25	
Potassium	LB		0.84	45.00	37.80	
Nitrogen	LB		0.57	135.00	76.95	
Roundup	GAL		36.00	0.25	9.00	
	LB		13.33	1.00	13.33	
Roundup (spot spraying)	GAL		36.00	0.13	4.68	
Hand Hoeing	ACRE		150.00	1.00	150.00	
Aerial Spraying	ACRE		7.50	1.00	7.50	
	GAL		147.36	0.13	19.16	
Sevin XLR Plus	GAL		35.00	0.25	8.75	
Irrigate	ACRE		60.00	1.00	60.00	
Irrigation Electricity	ACRE		50.00	1.00	50.00	
I ractor-Machinery Fuel / Lube / Repair	ACRE		127.69	1.00	127.69	
Labor (Tractor / Machinery)	ACRE		72.24	1.00	72.24	
Interest on Operating	ACRE		56.44	1.00	56.44	
Overhead	ACRE		60.00	1.00	60.00	
TOTAL VARIABLE COST					2947.28	
FIXED COSTS						
Tractor / Machinery Depreciation	ACRE		94.16	1.00	94.16	
Tractor / Machinery Interest	ACRE		93.99	1.00	93.99	
Tractor / Mach. Taxes, Ins. Housing	ACRE		11.65	1.00	11.65	
Land Taxes	ACRE		134.60	1.00	134.60	
Labor Taxes	ACRE		41.18	1.00	41.18	
Land Rent Opportunity Cost	ACRE		566.67	1.00	566.67	
Management Fee	ACRE		234.50	1.00	234.50	
TOTAL FIXED COST					1176.75	
TOTAL COST					4124.03	
NET REVENUE OR LOSS					-4124.03	

Appendix Table 1 A. Itemized Costs per Acre for Establishing an Asparagus Field - Year 1

Appendix Table 1B. Schedule of Operations and Estimated Costs per acre for Establishing an Asparagus Field - Year 1

						Total	Fuel					Total	
				Machine	Labor	Fixed	Lube					Variable	Total
Operation	Tooling	Month	Year	Hours	Hours	Cost	Repairs	Labor	Service	Materials	Interest	Cost	Cost
Plow	200 HP Tractor, Plow	MAR	1	0.60	0.73	10.74	24.92	10.22	0.00	0.00	0.68	35.82	46.56
Fertilize	Custom Fertilizer Application	MAR	1	0.00	0.00	0.00	0.00	0.00	7.50	171.00	3.46	181.96	181.96
Disk	200 HP Tractor 13' Disk	MAR	1	0.30	0.40	6.52	13.19	5.60	0.00	0.00	0.36	19.15	25.67
Listing	Custom Listing	MAR	1	0.00	0.00	0.00	0.00	0.00	50.00	0.00	0.97	50.97	50.97
Planting	Custom Planting	MAR	1	0.00	0.00	0.00	0.00	0.00	300.00	1760.00	39.91	2099.91	2099.91
Planting	Supervise Planting	MAR	1	0.00	2.00	0.00	0.00	20.00	0.00	0.00	0.39	20.39	20.39
Cover Roots	85 HP Tractor Dragging Board	MAR	1	0.52	0.62	1.79	7.42	8.68	0.00	0.00	0.31	16.41	18.20
Cultivate	85 HP Tractor, 2 Row Lilliston	APR	1	0.46	0.55	3.59	7.52	7.70	0.00	0.00	0.20	15.41	19.01
Spray Weeds	85 HP Tractor PTO Sprayer	APR	1	0.15	0.18	1.57	2.56	2.52	0.00	9.00	0.18	14.26	15.83
Irrigation	Irrigate May to September	SEA	1	-	0.80	149.77	27.34	11.20	0.00	110.00	5.76	154.30	304.06
Hand Hoeing	Hand Hoeing	MAY	1	0.00	6.00	0.00	0.00	150.00	0.00	0.00	0.97	150.97	150.97
Cultivate	85 HP Tractor, 2 Row Lilliston	MAY	1	0.91	1.10	7.11	14.87	15.40	0.00	0.00	0.20	30.47	37.58
Spray Weeds	85 HP Tractor PTO Sprayer	MAY	1	0.15	0.18	1.57	6.22	2.52	0.00	13.33	0.14	22.21	23.78
Spot Spray	85 HP Tractor PTO Sprayer	JUN	1	0.50	0.60	5.24	8.52	8.40	0.00	4.68	0.00	21.60	26.84
Spray Insects	Custom Aerial Spraying	JUN	1	0.00	0.00	0.00	0.00	0.00	7.50	27.91	0.00	35.41	35.41
Management Fee	5% of Full Production Revenue	ANN	1	0.00	0.00	234.50	0.00	0.00	0.00	0.00	0.00	0.00	234.50
Labor Pickup	Miscellaneous Use	ANN	1	0.25	0.00	3.48	3.79	0.00	0.00	0.00	0.15	3.93	7.41
Pickup	Miscellaneous Use	ANN	1	0.75	0.00	8.42	11.36	0.00	0.00	0.00	0.44	11.80	20.22
Land	Land Rent Opportunity Cost	ANN	1	0.00	0.00	566.67	0.00	0.00	0.00	0.00	0.00	0.00	566.67
Taxes	Real Estate Taxes, Year 1	ANN	1	0.00	0.00	134.60	0.00	0.00	0.00	0.00	0.00	0.00	134.60
Taxes	Labor Taxes	ANN	1	0.00	0.00	41.18	0.00	0.00	0.00	0.00	0.00	0.00	41.18
Overhead	Utilities, Telephone, Etc.	ANN	1	0.00	0.00	0.00	0.00	0.00	0.00	60.00	2.33	62.33	62.33
Total Per Acre	Total Per Acre			4.59	13.16	1176.75	127.69	242.24	365.00	2155.92	56.44	2947.28	4124.03

		Pi	rice or		Value or	Your
	Unit	Cos	st / Unit	Quantity	Cost	Farm
REVENUE						
Asparagus Harvest	LB	\$	0.67	1000.00	670.00	
VARIABLE COSTS						
Aerial Spraying	ACRE		7.50	1.00	7.50	
Disyston	GAL		147.36	0.13	19.16	
Sevin XLR Plus	GAL		35.00	0.25	8.75	
Treflan FP	GAL		20.00	0.25	5.00	
Cut Labor	LB		0.22	1000.00	220.00	
Swamping (loading) Labor	LB		0.01	1000.00	10.00	
Harvest Supervision Labor	LB		0.02	1000.00	20.00	
Karmex	LB		6.05	1.20	7.26	
Sencor	LB		13.00	0.63	8.19	
Custom Fert. Application	ACRE		7.50	1.00	7.50	
Nitrogen	LB		0.57	120.00	68.40	
Irrigation Water	ACRE		60.00	1.00	60.00	
Irrigation Electricity	ACRE		50.00	1.00	50.00	
Tractor-Machinery Fuel / Lube / Repair	ACRE		86.55	1.00	86.55	
Labor (Tractor / Machinery)	ACRE		49.56	1.00	49.56	
Interest on Operating	ACRE		16.45	1.00	16.45	
Overhead	ACRE		60.00	1.00	60.00	
TOTAL VARIABLE COST					704.32	
FIXED COSTS						
Tractor / Machinery Depreciation	ACRE		101.43	1.00	101.43	
Tractor / Machinery Interest	ACRE		91.94	1.00	91.94	
Tractor / Mach. Taxes, Ins. Housing	ACRE		11.12	1.00	11.12	
Land Taxes	ACRE		134.60	1.00	134.60	
Labor Taxes	ACRE		50.93	1.00	50.93	
Land Rent Opportunity Cost	ACRE		566.67	1.00	566.67	
Management Fee	ACRE		234.50	1.00	234.50	
Amoritized Net Establishment	ACRE		226.02	1.00	226.02	
TOTAL FIXED COST					1417.20	
TOTAL COST					2121.52	
NET REVENUE OR LOSS					-1451.52	

Appendix Table 2A. Itemized Costs per Acre for Establishing an Asparagus Field - Year 2

						Total	Fuel					Total	
				Machine	Labor	Fixed	Lube					Variable	Total
Operation	Tooling	Month	Year	Hours	Hours	Cost	Repairs	Labor	Service	Materials	Interest	Cost	Cost
Beat Ferns	85 HP Tractor Rotary Mower	MAR	2	0.37	0.45	4.23	6.30	6.30	0.00	0.00	0.24	12.85	17.08
Weed Control	85 HP Tractor PTO Sprayer	MAR	2	0.15	0.18	1.57	2.56	2.52	0.00	5.00	0.20	10.27	11.84
Tillage	85 HP Tractor Mulch Tiller	MAR	2	0.69	0.83	15.13	15.19	11.62	0.00	0.00	0.52	27.33	42.46
Irrigation	Irrigate April to September	SEA	2	0.00	1.90	149.77	27.34	26.60	0.00	110.00	6.35	170.29	320.06
Cut	Cost per lb of production	SEA	2	0.00	0.00	0.00	0.00	220.00	0.00	0.00	2.84	222.84	222.84
Swamping	Load & Haul to Packer - Pickup	SEA	2	0.44	0.54	9.88	7.47	10.00	0.00	0.00	0.23	17.70	27.57
Harvest	Supervise Harvest	SEA	2	0.00	2.00	0.00	0.00	20.00	0.00	0.00	0.26	20.26	20.26
Apply Herbicide	85 HP Tractor PTO Sprayer	JUN	2	0.15	0.18	1.57	2.56	2.52	0.00	15.45	0.00	20.53	22.10
Fertilize	Custom Fertilizer Application	JUN	2	0.00	0.00	0.00	0.00	0.00	7.50	68.40	0.00	75.90	75.90
Insect Control	Custom Aerial Spray	JUL	2	0.00	0.00	0.00	0.00	0.00	7.50	27.91	2.52	37.92	37.92
Management Fee	5% of Full Production Revenue	ANN	2	0.00	0.00	234.50	0.00	0.00	0.00	0.00	0.00	0.00	234.50
Labor Pickup	Miscellaneous Use	ANN	2	1.00	0.00	13.92	15.14	0.00	0.00	0.00	0.59	15.73	29.65
Pickup	Miscellaneous Use	ANN	2	0.75	0.00	8.42	10.00	0.00	0.00	0.00	0.39	10.38	18.80
Interest	Ammortized Net Establishment	ANN	2	0.00	0.00	226.02	0.00	0.00	0.00	0.00	0.00	0.00	226.02
Land	Land Rent Opportunity Cost	ANN	2	0.00	0.00	566.67	0.00	0.00	0.00	0.00	0.00	0.00	566.67
Taxes	Real Estate Taxes, Year 1	ANN	2	0.00	0.00	134.60	0.00	0.00	0.00	0.00	0.00	0.00	134.60
Taxes	Labor taxes	ANN	2	0.00	0.00	50.93	0.00	0.00	0.00	0.00	0.00	0.00	50.93
Overhead	Utilities, Telephone, Etc.	ANN	2	0.00	0.00	0.00	0.00	0.00	0.00	60.00	2.33	62.33	62.33
Total Per Acre	Total Per Acre			3.55	6.08	1417.20	86.55	299.56	15.00	286.76	16.45	704.32	2121.52

Appendix Table 2B. Schedule of Operations and Estimated Costs per acre for Establishing an Asparagus Field - Year 2

		Price or		Value or	Your
	Unit	Cost / Unit	t Quantity	Cost	Farm
REVENUE					
Asparagus Harvest	LB	\$ 0.67	3000.00	2010.00	
VARIABLE COSTS					
Aerial Spraying	ACRE	7.50	0 1.00	7.50	
Disyston	GAL	147.36	6 0.13	19.16	
Sevin XLR Plus	GAL	35.00	0.25	8.75	
Treflan FP	GAL	20.00	0.25	5.00	
Spot Spray Roundup	GAL	36.00	0.13	4.68	
Cut Labor	LB	0.22	2 3000.00	660.00	
Swamping (loading) Labor	LB	0.01	1 3000.00	30.00	
Harvest Supervision Labor	LB	0.02	2 3000.00	60.00	
Karmex	LB	6.05	5 1.20	7.26	
Sencor	LB	13.00	0.63	8.19	
Custom Fert. Application	ACRE	7.50	0 1.00	7.50	
Nitrogen	LB	0.57	7 120.00	68.40	
Irrigation Water	ACRE	60.00	0 1.00	60.00	
Irrigation Electricity	ACRE	50.00	0 1.00	50.00	
Tractor-Machinery Fuel / Lube / Repair	ACRE	129.50	0 1.00	129.50	
Labor (Tractor / Machinery)	ACRE	50.16	5 1.00	50.16	
Interest on Operating	ACRE	24.62	2 1.00	24.62	
Overhead	ACRE	60.00	0 1.00	60.00	
TOTAL VARIABLE COST				1260.72	
FIXED COSTS					
Tractor / Machinery Depreciation	ACRE	125.97	7 1.00	125.97	
Tractor / Machinery Interest	ACRE	100.77	7 1.00	100.77	
Tractor / Mach. Taxes, Ins. Housing	ACRE	14.33	3 1.00	14.33	
Land Taxes	ACRE	134.60	0 1.00	134.60	
Labor Taxes	ACRE	136.03	3 1.00	136.03	
Land Rent Opportunity Cost	ACRE	566.67	7 1.00	566.67	
Management Fee	ACRE	234.50	0 1.00	234.50	
Amoritized Net Establishment	ACRE	249.29	9 1.00	249.29	
TOTAL FIXED COST				1562.16	
TOTAL COST				2822.88	
NET REVENUE OR LOSS				-812.88	

Appendix Table 3A. Itemized Costs per Acre for Establishing an Asparagus Field - Year 3

Appendix Table 3 B. Schedule of Operations and Estimated Costs per acre for Establishing an Asparagus Field - Year 3

						Total	Fuel					Total	
				Machine	Labor	Fixed	Lube					Variable	Total
Operation	Tooling	Month	Year	Hours	Hours	Cost	Repairs	Labor	Service	Materials	Interest	Cost	Cost
Beat Ferns	85 HP Tractor Rotary Mower	MAR	3	0.37	0.45	3.90	6.30	6.30	0.00	0.00	0.24	12.85	16.75
Weed Control	85 HP Tractor PTO Sprayer	MAR	3	0.15	0.18	1.57	2.56	2.52	0.00	5.00	0.20	10.27	11.84
Tillage	85 HP Tractor Mulch Tiller	MAR	3	0.69	0.83	15.13	15.19	11.62	0.00	0.00	0.52	27.33	42.46
Irrigation	Irrigate April to September	SEA	3	0.00	1.90	149.77	27.34	26.60	0.00	110.00	6.35	170.29	320.06
Cut	Cost per lb of production	SEA	3	0.00	0.00	0.00	0.00	660.00	0.00	0.00	8.53	668.53	668.53
Swamping	Load & Haul to Packer - Pickup	SEA	3	0.44	0.54	9.88	7.47	30.00	0.00	0.00	0.48	37.95	47.83
Harvest	Supervise Harvest	SEA	3	0.00	2.00	0.00	0.00	60.00	0.00	0.00	0.78	60.78	60.78
Spot Spray	85 HP Tractor PTO Sprayer	APR	3	0.05	0.06	0.52	0.85	0.60	0.00	4.68	0.08	6.21	6.73
Apply Herbicide	85 HP Tractor PTO Sprayer	JUN	3	0.15	0.18	1.57	2.56	2.52	0.00	15.45	0.00	20.53	22.10
Fertilize	Custom Fertilizer Application	JUN	3	0.00	0.00	0.00	0.00	0.00	7.50	68.40	0.00	75.90	75.90
Insect Control	Custom Aerial Spray	JUL	3	0.00	0.00	0.00	0.00	0.00	7.50	27.91	2.52	37.92	37.92
Management Fee	5% of Full Production Revenue	ANN	3	0.00	0.00	234.50	0.00	0.00	0.00	0.00	0.00	0.00	234.50
Labor Pickup	Miscellaneous Use	ANN	3	1.80	0.00	25.05	27.26	0.00	0.00	0.00	1.06	28.31	53.37
Pickup	Miscellaneous Use	ANN	3	3.00	0.00	33.67	39.98	0.00	0.00	0.00	1.55	41.53	75.21
Interest	Ammortized Net Establishment	ANN	3	0.00	0.00	249.29	0.00	0.00	0.00	0.00	0.00	0.00	249.29
Land	Land Rent Opportunity Cost	ANN	3	0.00	0.00	566.67	0.00	0.00	0.00	0.00	0.00	0.00	566.67
Taxes	Real Estate Taxes, Year 1	ANN	3	0.00	0.00	134.60	0.00	0.00	0.00	0.00	0.00	0.00	134.60
Taxes	Labor Taxes	ANN	3	0.00	0.00	136.03	0.00	0.00	0.00	0.00	0.00	0.00	136.03
Overhead	Utilities, Telephone, Etc.	ANN	3	0.00	0.00	0.00	0.00	0.00	0.00	60.00	2.33	62.33	62.33
Total Per Acre	Total Per Acre			6.65	6.14	1562.16	129.50	800.16	15.00	291.44	24.62	1260.72	2822.88

		P	rice or	•	Value or	Your
	Unit	Cos	st / Unit	Quantity	Cost	Farm
REVENUE	•••••					
Asparagus Harvest	LB	\$	0.67	4500.00	3015.00	
		Ŧ				
VARIABLE COSTS						
Aerial Spraying	ACRE		7.50	1.00	7.50	
Disyston	GAL		147.36	0.13	19.16	
Sevin XLR Plus	GAL		35.00	0.25	8.75	
Treflan FP	GAL		20.00	0.38	7.60	
Spot Spray Roundup	GAL		36.00	0.13	4.68	
Cut Labor	LB		0.22	4500.00	990.00	
Swamping (loading) Labor	LB		0.01	4500.00	45.00	
Harvest Supervision Labor	LB		0.02	4500.00	90.00	
Karmex	LB		6.05	1.20	7.26	
Sencor	LB		13.00	0.63	8.19	
Custom Fert. Application	ACRE		7.50	1.00	7.50	
Nitrogen	LB		0.57	120.00	68.40	
Irrigation Water	ACRE		60.00	1.00	60.00	
Irrigation Electricity	ACRE		50.00	1.00	50.00	
Tractor / Machinery Fuel/Lube/Repair	ACRE		129.50	1.00	129.50	
Labor (Tractor / Machinery)	ACRE		50.16	1.00	50.16	
Interest on Operating	ACRE		29.51	1.00	29.51	
Overhead	ACRE		60.00	1.00	60.00	
					00100	
TOTAL VARIABLE COST					1643.21	
FIXED COSTS						
Tractor / Machinery Depreciation	ACRE		125.97	1.00	125.97	
Tractor / Machinery Interest	ACRE		100.77	1.00	100.77	
Tractor / Mach. Taxes. Ins. Housing	ACRE		13.09	1.00	13.09	
Land Taxes	ACRE		152.15	1.00	152.15	
Labor Taxes	ACRE		199 78	1.00	199 78	
Land Rent Opportunity Cost	ACRE		566 67	1.00	566 67	
Management Fee	ACRE		234 50	1.00	234 50	
Amoritized Net Establishment	ACRE		225 60	1.00	204.00	
	AORE		220.00	1.00	220.00	
TOTAL FIXED COST					1618.53	
TOTAL COST					3261.75	
NET REVENUE OR LOSS					-246.75	

Appendix Table 4 A. Itemized Costs per Acre for Establishing a 40-acre Asparagus Field - Year 4

Appendix Table 4 B. Schedule of Operations and Estimated Costs per acre for Establishing an Asparagus Field - Year 4

						Total	Fuel					Total	
				Machine	Labor	Fixed	Lube					Variable	Total
Operation	Tooling	Month	Year	Hours	Hours	Cost	Repairs	Labor	Service	Materials	Interest	Cost	Cost
Beat Ferns	85 HP Tractor Rotary Mower	MAR	4	0.37	0.45	3.90	6.30	6.30	0.00	0.00	0.24	12.85	16.75
Weed Control	85 HP Tractor PTO Sprayer	MAR	4	0.15	0.18	1.57	2.56	2.52	0.00	7.60	0.25	12.92	14.49
Tillage	85 HP Tractor Mulch Tiller	MAR	4	0.69	0.83	15.13	15.19	11.62	0.00	0.00	0.52	27.33	42.46
Irrigation	Irrigate April to September	SEA	4	0.00	1.90	149.77	27.34	26.60	0.00	110.00	6.35	170.29	320.06
Cut	Cost per lb of production	SEA	4	0.00	0.00	0.00	0.00	990.00	0.00	0.00	12.79	1002.79	1002.79
Swamping	Load & Haul to Packer - Pickup	SEA	4	0.44	0.54	9.88	7.47	45.00	0.00	0.00	0.68	53.15	63.03
Harvest	Supervise Harvest	SEA	4	0.00	2.00	0.00	0.00	90.00	0.00	0.00	1.16	91.16	91.16
Spot Spray	85 HP Tractor PTO Sprayer	APR	4	0.05	0.06	0.52	0.85	0.60	0.00	4.68	0.08	6.21	6.73
Apply Herbicide	85 HP Tractor PTO Sprayer	JUN	4	0.15	0.18	1.57	2.56	2.52	0.00	15.45	0.00	20.53	22.10
Fertilize	Custom Fertilizer Application	JUN	4	0.00	0.00	0.00	0.00	0.00	7.50	68.40	0.00	75.90	75.90
Insect Control	Custom Aerial Spray	JUL	4	0.00	0.00	0.00	0.00	0.00	7.50	27.91	2.52	37.92	37.92
Management Fee	5% of Full Production Revenue	ANN	4	0.00	0.00	234.50	0.00	0.00	0.00	0.00	0.00	0.00	234.50
Labor Pickup	Miscellaneous Use	ANN	4	1.80	0.00	23.81	27.26	0.00	0.00	0.00	1.06	28.31	52.12
Pickup	Miscellaneous Use	ANN	4	3.00	0.00	33.67	39.98	0.00	0.00	0.00	1.55	41.53	75.21
Interest	Ammortized Net Establishment	ANN	4	0.00	0.00	225.60	0.00	0.00	0.00	0.00	0.00	0.00	225.60
Land	Land Rent Opportunity Cost	ANN	4	0.00	0.00	566.67	0.00	0.00	0.00	0.00	0.00	0.00	566.67
Taxes	Real Estate Taxes	ANN	4	0.00	0.00	152.15	0.00	0.00	0.00	0.00	0.00	0.00	152.15
Taxes	Labor Taxes	ANN	3	0.00	0.00	199.78	0.00	0.00	0.00	0.00	0.00	0.00	199.78
Overhead	Utilities, Telephone, Etc.	ANN	4	0.00	0.00	0.00	0.00	0.00	0.00	60.00	2.33	62.33	62.33
Total Per Acre	Total Per Acre			6.65	6.14	1618.53	129.50	1175.16	15.00	294.04	29.51	1643.21	3261.75

		Pi	rice or		Value or	Your
	Unit	Cos	st / Unit	Quantity	Cost	Farm
REVENUE						
Asparagus Harvest	LB	\$	0.67	6000.00	4020.00	
VARIABLE COSTS						
Aerial Spraving	ACRE		7 50	1 00	7 50	
Disyston	GAI		147 36	0.13	19.16	
Sevin XI & Plus	GAL		35.00	0.10	8 75	
Treflan FP	GAL		20.00	0.20	7.60	
Spot Spray Roundup	GAL		36.00	0.00	4 68	
Cut Labor	I B		0.22	6000.00	1320.00	
Swamping (loading) Labor	LB		0.01	6000.00	60.00	
Harvest Supervision Labor	LB		0.02	6000.00	120.00	
Karmex	LB		6.05	1.20	7.26	
Sencor	LB		13.00	0.63	8.19	
Custom Fert. Application	ACRE		7.50	1.00	7.50	
Nitrogen	LB		0.57	120.00	68.40	
Irrigation Water	ACRE		60.00	1.00	60.00	
Irrigation Electricity	ACRE		50.00	1.00	50.00	
Tractor / Machinery Fuel/Lube/Repair	ACRE		129.50	1.00	129.50	
Labor (Tractor / Machinery)	ACRE		50.16	1.00	50.16	
Interest on Operating	ACRE		34.36	1.00	34.36	
Overhead	ACRE		60.00	1.00	60.00	
TOTAL VARIABLE COST					2023.06	
FIXED COSTS						
Tractor / Machinery Depreciation	ACRE		125.97	1.00	125.97	
Tractor / Machinery Interest	ACRE		100.77	1.00	100.77	
Tractor / Mach. Taxes, Ins. Housing	ACRE		13.09	1.00	13.09	
Land Taxes	ACRE		152.15	1.00	152.15	
Labor Taxes	ACRE		263.53	1.00	263.53	
Land Rent Opportunity Cost	ACRE		566.67	1.00	566.67	
Management Fee	ACRE		234.50	1.00	234.50	
Amoritized Net Establishment	ACRE		405.81	1.00	405.81	
TOTAL FIXED COST					1862.49	
TOTAL COST					3885.55	
NET REVENUE OR LOSS					134.45	

Appendix Table 5 A. Itemized Costs per Acre for Establishing an Asparagus Field - Year 5

						Total	Fuel					Total	
				Machine	Labor	Fixed	Lube					Variable	Total
Operation	Tooling	Month	Year	Hours	Hours	Cost	Repairs	Labor	Service	Materials	Interest	Cost	Cost
Beat Ferns	85 HP Tractor Rotary Mower	MAR	5	0.37	0.45	3.90	6.30	6.30	0.00	0.00	0.24	12.85	16.75
Weed Control	85 HP Tractor PTO Sprayer	MAR	5	0.15	0.18	1.57	2.56	2.52	0.00	7.60	0.25	12.92	14.49
Rotovate	85 HP Tractor Rotovator	MAR	5	0.69	0.83	15.13	15.19	11.62	0.00	0.00	0.52	27.33	42.46
Irrigation	Irrigate April to September	SEA	5	0.00	1.90	149.77	27.34	26.60	0.00	110.00	6.35	170.29	320.06
Cut	Cost per lb of production	SEA	5	0.00	0.00	0.00	0.00	1320.00	0.00	0.00	17.05	1337.05	1337.05
Swamping	Load & Haul to Packer - Pickup	SEA	5	0.44	0.54	9.88	7.47	60.00	0.00	0.00	0.87	68.34	78.22
Harvest	Supervise Harvest	SEA	5	0.00	2.00	0.00	0.00	120.00	0.00	0.00	1.55	121.55	121.55
Spot Spray	85 HP Tractor PTO Sprayer	APR	5	0.05	0.06	0.52	0.85	0.60	0.00	4.68	0.08	6.21	6.73
Apply Herbicide	85 HP Tractor PTO Sprayer	JUN	5	0.15	0.18	1.57	2.56	2.52	0.00	15.45	0.00	20.53	22.10
Fertilize	Custom Fertilizer Application	JUN	5	0.00	0.00	0.00	0.00	0.00	7.50	68.40	0.00	75.90	75.90
Insect Control	Custom Aerial Spray	JUL	5	0.00	0.00	0.00	0.00	0.00	7.50	27.91	2.52	37.92	37.92
Management Fee	5% of Full Production Revenue	ANN	5	0.00	0.00	234.50	0.00	0.00	0.00	0.00	0.00	0.00	234.50
Labor Pickup	Miscellaneous Use	ANN	5	1.80	0.00	23.81	27.26	0.00	0.00	0.00	1.06	28.31	52.12
Pickup	Miscellaneous Use	ANN	5	3.00	0.00	33.67	39.98	0.00	0.00	0.00	1.55	41.53	75.21
Interest	Ammortized Net Establishment	ANN	5	0.00	0.00	405.81	0.00	0.00	0.00	0.00	0.00	0.00	405.81
Land	Land Rent Opportunity Cost	ANN	5	0.00	0.00	566.67	0.00	0.00	0.00	0.00	0.00	0.00	566.67
Taxes	Real Estate Taxes	ANN	5	0.00	0.00	152.15	0.00	0.00	0.00	0.00	0.00	0.00	152.15
Taxes	Labor Taxes	ANN	3	0.00	0.00	263.53	0.00	0.00	0.00	0.00	0.00	0.00	263.53
Overhead	Utilities, Telephone, Etc.	ANN	5	0.00	0.00	0.00	0.00	0.00	0.00	60.00	2.33	62.33	62.33
Total Per Acre	Total Per Acre			6.65	6.14	1862.49	129.50	1550.16	15.00	294.04	34.36	2023.06	3885.55

Appendix Table 5 B. Schedule of Operations and Estimated Costs per acre for Establishing an Asparagus Field - Year 5

		Р	rice or		Value or	Your
	Unit	Co	st / Unit	Quantity	Cost	Farm
REVENUE						
Asparagus Harvest	LB	\$	0.67	7000.00	4690.00	
VARIABLE COSTS						
Aerial Spraying	ACRE		7.50	1.00	7.50	
Disyston	GAL		147.36	0.13	19.16	
Sevin XLR Plus	GAL		35.00	0.25	8.75	
Treflan FP	GAL		20.00	0.38	7.60	
Spot Spray Roundup	GAL		36.00	0.13	4.68	
Cut Labor	LB		0.22	7000.00	1540.00	
Swamping (loading) Labor	LB		0.01	7000.00	70.00	
Harvest Supervision Labor	LB		0.02	7000.00	140.00	
Karmex	LB		6.05	1.20	7.26	
Sencor	LB		13.00	0.63	8.19	
Custom Fert. Application	ACRE		7.50	1.00	7.50	
Nitrogen	LB		0.57	120.00	68.40	
Custom Irrigate	ACRE		60.00	1.00	60.00	
Irrigation Electricity	ACRE		50.00	1.00	50.00	
Tractor / Machinery Fuel/Lube/Repair	ACRE		129.50	1.00	129.50	
Labor (Tractor / Machinery)	ACRE		50.16	1.00	50.16	
Interest on Operating	ACRE		37.59	1.00	37.59	
Overhead	ACRE		60.00	1.00	60.00	
TOTAL VARIABLE COST					2276.29	
FIXED COSTS						
Tractor / Machinery Depreciation	ACRE		125.97	1.00	125.97	
Tractor / Machinery Interest	ACRE		100.77	1.00	100.77	
Tractor / Mach. Taxes. Ins. Housing	ACRE		13.09	1.00	13.09	
Land Taxes	ACRE		152.15	1.00	152.15	
Labor Taxes	ACRE		306.03	1.00	306.03	
Land Rent Opportunity Cost	ACRE		566.67	1.00	566.67	
Management Fee	ACRE		234.50	1.00	234.50	
Amoritized Net Establishment	ACRE		405.81	1.00	405.81	
					4004.00	
TOTAL FIXED COST					1904.99	
TOTAL COST					4181.27	
NET REVENUE OR LOSS					508.73	

Appendix Table 6 A. Itemized Costs per Acre for Producing an Asparagus Field - Full Production

						Total	Fuel					Total	
				Machine	Labor	Fixed	Lube					Variable	Total
Operation	Tooling	Month	Year	Hours	Hours	Cost	Repairs	Labor	Service	Materials	Interest	Cost	Cost
Beat Ferns	85 HP Tractor Rotary Mower	MAR	6	0.37	0.45	3.90	6.30	6.30	0.00	0.00	0.24	12.85	16.75
Weed Control	85 HP Tractor PTO Sprayer	MAR	6	0.15	0.18	1.57	2.56	2.52	0.00	7.60	0.25	12.92	14.49
Rotovate	85 HP Tractor Rotovator	MAR	6	0.69	0.83	15.13	15.19	11.62	0.00	0.00	0.52	27.33	42.46
Irrigation	Irrigate April to September	SEA	6	0.00	1.90	149.77	27.34	26.60	0.00	110.00	6.35	170.29	320.06
Cut	Cost per lb of production	SEA	6	0.00	0.00	0.00	0.00	1540.00	0.00	0.00	19.89	1559.89	1559.89
Swamping	Load & Haul to Packer - Pickup	SEA	6	0.44	0.54	9.88	7.47	70.00	0.00	0.00	1.00	78.47	88.35
Harvest	Supervise Harvest	SEA	6	0.00	2.00	0.00	0.00	140.00	0.00	0.00	1.81	141.81	141.81
Spot Spray	85 HP Tractor PTO Sprayer	APR	6	0.05	0.06	0.52	0.85	0.60	0.00	4.68	0.08	6.21	6.73
Apply Herbicide	85 HP Tractor PTO Sprayer	JUN	6	0.15	0.18	1.57	2.56	2.52	0.00	15.45	0.00	20.53	22.10
Fertilize	Custom Fertilizer Application	JUN	6	0.00	0.00	0.00	0.00	0.00	7.50	68.40	0.00	75.90	75.90
Insect Control	Custom Aerial Spray	JUL	6	0.00	0.00	0.00	0.00	0.00	7.50	27.91	2.52	37.92	37.92
Management Fee	5% of Full Production Revenue	ANN	6	0.00	0.00	234.50	0.00	0.00	0.00	0.00	0.00	0.00	234.50
Labor Pickup	Miscellaneous Use	ANN	6	1.80	0.00	23.81	27.26	0.00	0.00	0.00	1.06	28.31	52.12
Pickup	Miscellaneous Use	ANN	6	3.00	0.00	33.67	39.98	0.00	0.00	0.00	1.55	41.53	75.21
Establishment	Ammortized Net Establishment	ANN	6	0.00	0.00	405.81	0.00	0.00	0.00	0.00	0.00	0.00	405.81
Land	Land Rent Opportunity Cost	ANN	6	0.00	0.00	566.67	0.00	0.00	0.00	0.00	0.00	0.00	566.67
Taxes	Real Estate Taxes, Year 1	ANN	6	0.00	0.00	152.15	0.00	0.00	0.00	0.00	0.00	0.00	152.15
Taxes	Labor Taxes	ANN	3	0.00	0.00	306.03	0.00	0.00	0.00	0.00	0.00	0.00	306.03
Overhead	Utilities, Telephone, Etc.	ANN	6	0.00	0.00	0.00	0.00	0.00	0.00	60.00	2.33	62.33	62.33
Total Per Acre	Total Per Acre			6.65	6.14	1904.99	129.50	1800.16	15.00	294.04	37.59	2276.29	4181.27

Appendix Table 6B. Schedule of Operations and Estimated Costs per acre for Establishing an Asparagus Field - Full Production

			Annual			
	F	Purchase	Years of	S	alvage	Hours of
Machinery		Price	Use		Value	Use
200 HP Tractor	\$	105,000	15	\$	60,000	1,000
85 HP Tractor	\$	42,000	15	\$	28,000	1,200
Plow Moldboard	\$	10,250	10	\$	1,812	200
2-Row Lilliston	\$	3,750	15	\$	375	100
13' Tandem Disk	\$	9,500	15	\$	912	100
13' Mulch Tiller	\$	14,000	10	\$	4,500	100
10' Rotary Mower	\$	5,000	10	\$	826	100
1500 PTO Sprayer	\$	2,500	10	\$	471	50
Utility Trailer	\$	3,300	10	\$	1,200	50
3/4 Ton Pickup	\$	35,000	4	\$	15,000	650
Labor Pickup	\$	26,000	8	\$	5,000	300
IRRIGATION						ANNUAL ACRES
Center Pivot	\$	85,000	30	\$	-	40

Appendix Table 7A. Machinery and Equipment Data

#### Appendix Table 7 B. Machinery Hourly or Irrigation Per Acre Costs

		Years							Total		Fuel	Total	
	Purchase	to	Annual						Fixed		And	Variable	Total
Machinery	Price	Trade	Hours	Deprec.	Interest	Insurance	Taxes	Housing	Cost	Repairs	Lube	Cost	Cost
200 HP Tractor	105,000	15	1,000	3.00	5.78	0.39	0.87	0.62	10.65	5.81	32.89	38.70	49.35
85 HP Tractor	42,000	15	1,200	0.78	2.04	0.13	0.29	0.21	3.45	1.94	12.33	14.27	17.72
Plow Moldboard	10,250	10	200	4.22	2.11	0.19	0.43	0.30	7.25	2.83	0.00	2.83	10.08
2-Row Lilliston	3,750	15	100	2.25	1.44	0.14	0.31	0.22	4.37	2.07	0.00	2.07	6.44
13' Tandem Disk	9,500	15	100	5.73	3.64	0.35	0.79	0.56	11.07	5.25	0.00	5.25	16.32
13' Mulch Tiller	14,000	10	100	9.50	6.48	0.52	1.16	0.83	18.48	7.74	0.00	7.74	26.22
10' Rotary Mower	5,000	10	100	4.17	2.04	0.19	0.42	0.30	7.11	2.77	0.00	2.77	9.87
1500 PTO Sprayer	2,500	10	50	4.06	2.08	0.19	0.42	0.30	7.03	2.77	0.00	2.77	9.80
Utility Trailer	3,300	10	50	4.20	3.15	0.24	0.55	0.39	8.53	3.65	0.00	3.65	12.18
3/4 Ton Pickup	35,000	4	650	7.69	2.69	0.17	0.39	0.28	11.22	2.98	10.35	13.33	24.55
Labor Pickup	26,000	8	300	8.75	3.62	0.32	0.72	0.51	13.92	4.79	10.35	15.14	29.06
IRRIGATION		ACRESCOST PER ACRE											
Center Pivot System	85,000	30	40	70.83	74.38	1.37	3.19	0.00	149.77	27.34	0.00	27.34	177.11