



## INSIDE:



The Hazelnut Production Costing Tool  
Google Workbook  
(spreadsheet)



National Institute of Food and Agriculture  
U.S. DEPARTMENT OF AGRICULTURE

# User Guide of the Hazelnut Production Costing Tool



The Hazelnut Production Costing Tool was developed by Tanya Murray, Farm Viability Specialist at Oregon Tilth, with assistance from Rich Schwartz, Principal Consultant at Alder Street Consulting.

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## 1. Purpose and Overview of the Costing Tool

### 1.1 Purpose

Hazelnut growers can use this tool to estimate their costs of production. This information can be used to help growers better understand their cost structure and explore how changes to production practices, yields and price will impact net returns and long-term viability.

### 1.2 Costing Approach Overview

This costing tool allows growers to account for costs that are directly related to hazelnut production. In this costing approach, production includes the cost of the labor required to produce hazelnuts, the cost of the machinery used in hazelnut production and the cost of other inputs such as materials and products that are applied to the orchard.

Growers can combine the cost results from this tool with business level costs, including marketing costs and general business costs, to evaluate the net returns for their business. Growers can also account for the cost of replacing machinery and infrastructure, establishment costs, and opportunity costs for a more complete picture of long-term viability.

### Labor Costs

Labor costs capture all the work done by people to establish and care for an orchard and harvest nuts. Labor costs are the product of labor hours and the average cost per hour of labor for your operation. In this costing process, estimating labor costs starts with identifying the labor activities involved in producing hazelnuts. Once you've identified your labor activities you will determine a rate for each activity. The labor activity rate is the amount of time (minutes or hours) the activity takes per orchard unit (such as acre or tree). Activity rates are applied to the number of acres or trees that the activity impacts and then multiplied by the number of occurrences of the activity for a single production year to get the labor hours for each labor activity. The labor hours for each labor activity get multiplied by the average cost of labor to get the labor cost for the labor activity. Labor costs are added together to get the total labor cost for the orchard for the production year being analyzed.





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## Machinery Costs

If you use machinery to carry out a production activity, you will need to account for the cost of using that machinery. The first step for estimating machinery costs is to identify what it costs to use each tractor and implement combination. Next you will need an estimate of the number of hours that each tractor and implement combination is used for each labor activity. In this costing process, we assume that all machinery is operated by one person. This means that the machinery hours for any labor activity that involves machinery will be the same as the labor hours for that labor activity. Machinery hours get multiplied by the cost per hour of use for the corresponding machinery to get the machinery cost for the labor activity. Machinery costs are added together to get the total machinery cost for the orchard for the production year being analyzed.

## Input Costs

You will also need to account for the costs of inputs, other than labor and machinery, that are used in hazelnut production. Typical inputs you will account for will be materials and products that are applied to the orchard to manage crop nutrition and soil fertility and to prevent and control weeds, pests, and disease. Estimating input costs starts with identifying the inputs involved in producing hazelnuts and the application rate for each input. In the same way the labor activity rate describes the quantity of labor (measured in minutes or hours) relative to an orchard unit, input application rates describe the quantity of the input you are applying relative to an orchard unit (acres or trees). The quantity of the input might be measured in pounds, tons, gallons, etc. and will depend on the input being accounted for.

Once the quantity of the input relative to an orchard unit is identified, the next step will be to determine the cost of the input per orchard unit. The cost of the input per unit (e.g. price per pound or gallon) combined with the application rate (e.g. pounds or gallons per tree or acre) yields the cost of the input per orchard unit. This cost is multiplied by the number of acres or trees that the input is applied to and multiplied again by the number of applications of the input for a single production year to get the total cost for each input. Adding up the cost for each input gives you the total input cost for the orchard for the production year being analyzed.

## Total Variable Costs

The sum of the total labor cost, the total machinery cost and the total input cost equals the total variable cost for the hazelnut orchard for the production year being analyzed. (This value is also referred to as the “operating cost.”)





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## Results

Once you've estimated the Total Production Costs for the production year, you can calculate the Total Revenues for the same production year by using estimates for yield and price. Comparing the Total Revenues for the production year to the Total Production Costs allows you to evaluate the returns for that production year. You can then use these results as the starting point for analyzing the net returns for the business overall and for creating a multi-year analysis.

## 2. Instructions for Using the Costing Tool: Single Year Hazelnut Production

### 2.1 General Instructions: Downloading, Saving, Layout and Rules

#### Download the Tool and Sample

The Hazelnut Production Costing Tool is a Google workbook (spreadsheet). You can access the [Costing Tool here](#). To use the costing tool, you will need to make a copy of the original workbook (which is Read Only). If you would like to use the costing tool online you can keep it as a Google workbook by selecting File/Make a Copy from the menu. Or, if you prefer to use the costing tool in Microsoft Excel you can download it by selecting File/Download/Microsoft Excel from the menu.

We have also provided a version of the tool that contains sample data, which you can view [here](#). You can use this version as a model to follow when entering data from your orchard.

#### Costing Tool Layout and Rules

The Costing Tool workbook is made up of the following seven worksheets:

- Instructions
- Activity Rates
- Activity Reference Rates
- Machinery Cost Estimator
- Machinery-Implement Costs
- Input Costs
- Base Year Cost Analysis

Use the tabs at the bottom of the workbook to access the different worksheets.



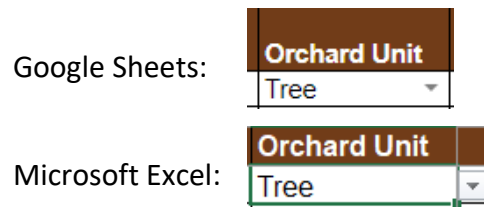


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Here are some general rules for using the Costing Tool:

- Only enter information into cells that are white.
- **DO NOT ENTER INFORMATION INTO GRAY CELLS.**
- **DO NOT EDIT FORMULAS IN GRAY CELLS.**
- **DO NOT INSERT ROWS.**
- **DO NOT SORT.**
- When you see a small arrow in a cell, this means there is a dropdown list. Click on the arrow to open the menu. Click on an item in the list to select it.



- The first column/s on the following worksheets are frozen to allow for scrolling to the right without losing track of the record you are entering information about: Activity Rates, Machinery Cost Estimator, and Base Year Cost Analysis.

The next section has detailed instructions for using each of the worksheets.

## 2.2 Instructions for Using the Activity Rates Worksheet

Use this worksheet to enter information that will be used to calculate the labor activity rates for each of the different labor activities that go into producing hazelnuts for your operation. To complete this worksheet, you will need to estimate the time it takes to complete the various production activities, either through estimation or by conducting time trials.

### Step 1: Determining Labor Activities

Start by thinking about all the things that you and the other people that work in your orchard will do over the course of the year to produce hazelnuts. It will likely be easiest to think about these steps in the order that they take place. Each of these steps is a labor activity. Enter the name of each labor activity in column A (“Labor Activity”). Each labor activity that you enter must be unique. For example, if you both weed the orchard by hand and weed it mechanically you will need separate entries for each (e.g. “Hand Weeding” and “Mechanical Weeding”).





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Similarly, if you wish to capture different pruning times for younger vs. more mature trees you could have separate entries for “Pruning Younger Trees” and “Pruning Mature Trees”, just be sure they have unique names.

For an idea of what activities you might want to include see [Appendix B: Sample Activities](#)

### Step 2: Selecting Orchard Units

Next select the orchard unit from the dropdown list in the column called “Orchard Unit” that corresponds with each labor activity. The orchard units you will choose from are “Tree”, “Acre” and “Event”. You can use whichever fits best with the corresponding activity, with Tree and Acre most appropriate for activities whose effort would increase by changing the planting density of the orchard or changing the size of the orchard, and Event most appropriate for activities that take the same amount of time regardless of the number of units impacted by the activity, such as equipment setup and travel to the orchard. So, for example, you might select the Tree unit for pruning and mulching activities, the Acre unit for mowing and harvesting activities, and the Event unit for setup and travel activities.

### Step 3: Calculating Activity Rates

Once you’ve identified labor activities and orchard units, next you will enter the information necessary to calculate the activity rates for each labor activity. There are a few options for how you might approach this.

#### *Option 1: Estimate Based on Experience*

It’s possible that you might be able to estimate the amount of time a labor activity takes relative to some number of trees or acres (or for a single event of the labor activity) based on your experience with doing these tasks in the past.

For example, you might think back on your experience pruning your orchard and estimate that it takes you about 4 hours to prune all 216 trees in your orchard. To use this as the estimate for your activity rate for the labor activity pruning, convert the hours to minutes by multiplying the total hours by 60. Enter the total minutes you’ve estimated that pruning takes into the column “Total Minutes”. In this case, you would enter “240”. Next enter the total number of orchard units you’ve estimated that you prune in that amount of time. In this case, the orchard unit is Tree, and you’d enter “216” for the “Total Orchard Units”.

Labor Activity	Orchard Unit	Total Minutes	Total Orchard Units	Rate 1
Pruning	Tree	240.0	216	1.1





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Alternatively, if it is easier to estimate the time it takes to prune a single tree, you could simply enter your time estimate (in minutes) and enter “1” for the number of trees pruned.

Labor Activity	Orchard Unit	Total Minutes	Total Orchard Units	Rate 1
Pruning	Tree	2.5	1	2.5

*Option 2: Estimate Based on Other Growers’ Experience*

If you don’t have a good sense of how long an activity takes you based on your own experience, you can refer to the Activity Reference Rates worksheet in the Costing Tool to look at the activity rates that we’ve gathered from a few Oregon organic hazelnut growers and hazelnut enterprise budgets published by agriculture extension researchers. If you use the reference rates provided, be very careful to select the same orchard unit on the Activity Rate worksheet as is used for the labor activity on the Reference Rate worksheet.

*Option 3: Estimate Based on Time Studies*

Although rough estimates are reasonable starting points, using activity rates that are based on actual measurements of how long different labor activities take YOU will give you better information about what it costs YOU to produce hazelnuts. Conducting time studies during the upcoming growing season is a great way to accurately capture this information. See [Appendix A: How to Conduct Time Studies](#) for suggestions on how to get started.

Entering your time study records into the Activity Rates worksheet is the same regardless of whether your information is coming from personal estimates, reference rates or time trials. Simply enter the Total Minutes and the Total Orchard Units for the labor activity and the tool will calculate the activity rate for you.

*Note: when you enter time study records, it’s important that you work from left to right across the spreadsheet, entering the information so that Rate 1 is calculated first, Rate 2 is calculated second and Rate 3 is calculated third.*







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### Step 4: Establishing Base Activity Rates

Finally, you need to set the Base Rates (in minutes per orchard unit) for each of the activities in Column M. These are the values which will be used by the tool as the starting point for calculating labor costs.

Once you've entered at least one estimate or record of the total time and total orchard units for a labor activity, the tool will calculate an "Average Rate" for the activity. Scroll right to see the "Average Rate" (Column L). The average rate will update as you add more estimates or time study records. (Note: the tool will only calculate this value correctly if the rate data is entered starting with Rate 1 and continuing with Rate 2 and Rate 3 in order.)

Next, review the calculated average rate and consider whether it seems too fast, too slow, or about right. If the average rate seems just right, simply copy the value from the Average Rate column to the Base Rate column. If the average rate seems too slow or too fast, you can adjust it by entering a number that is larger or smaller – simply enter the rate you want to use in the Base Rate column.

The Base Rate set here will be the initial rate value suggested by the tool when doing labor cost calculations. However, you will have another opportunity to adjust this rate later in the process to reflect that rates might change as the orchard matures or conditions change.

## 2.3 Instructions for Using the Machinery Cost Estimator Worksheet

Use this worksheet to estimate the costs of operating and maintaining the farm machinery you use to produce hazelnuts. In preparation for completing this worksheet you will need to know the PTO horsepower for any machine that has a PTO, and you will need to estimate the repair and maintenance costs of your machines.

### Step 1: Build the Machinery List

Start by entering the name of each tractor, self-propelled machine and implement in column A "Machinery Name". Enter each piece of machinery separately here. Later, when you complete the Machinery-Implement Costs worksheet, you will combine implements with the machinery that powers them.





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## Step 2: Fuel and Lube Estimates

Enter the cost (in dollars) for a gallon of fuel in cell D1. Next, we'll calculate the estimated fuel and lube cost per hour of operation based on the PTO horsepower. For any machinery that has a PTO, enter its PTO Horsepower in column B. From this value the tool will estimate the Fuel Use per Hour (column C) and generate a Fuel and Lube Cost per Hour (column D)<sup>1</sup>.

This value will be multiplied by 0.044 to generate the estimated Fuel Use per Hour (column C) and multiplied again by the fuel cost, adjusted for lube and oil usage to yield an estimated Fuel and Lube Cost per Hour (column D).

If machinery does not have a PTO and doesn't use fuel leave column B blank.

If you would prefer to use an alternative approach for estimating fuel, lube and oil costs you can enter that value in column E ("Alternate Fuel Cost per Hour"). You can also use this column to account for the cost of powering equipment with electricity or other energy sources.

## Step 3: Repair and Maintenance Costs

In this step you will account for repairs and maintenance of your machinery. If you have good records on what repair and maintenance has cost you in the past, you might use this information to predict what your repair and maintenance costs will be in the future. (Remember, however, that repair and maintenance costs are likely to increase as machinery ages.) If you don't have good records, you might refer to machinery owner's manuals to estimate maintenance costs based on the suggested maintenance schedule. Consider including an extra amount for unexpected repairs.

Regardless of the approach, you will need to enter a total repair and maintenance cost for a given time period into column F. The easiest time periods would be one growing season or one calendar year. Then in column G you should enter the total number of hours the machine was in operation during this same time period. Note for machines such as your tractor the total hours of use might include time on crops or activities other than hazelnut production.

Once you have completed Steps 1-3 above, the total fuel, lube, repair and maintenance costs will be automatically calculated and shown in Column H. For now, do not complete the Replacement Cost information on the worksheet. This will be covered later in Section 4.2.

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<sup>1</sup> See Penn State Extension's publication on [Managing Machinery and Equipment](#) for more information on converting PTO to fuel usage. Lube and oil cost calculations are based on [Iowa State Extension's publication on Estimating Farm Machinery Costs](#).





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## 2.4 Instructions for Using the Machinery-Implement Costs Worksheet

Use this worksheet to list the hourly costs of using your tractors, tractor-implement combinations, and other machinery based on calculations made in the Machinery Cost Estimator worksheet in section 2.3.

### Step 1: Generate Machinery-Implement List

Start by listing all the machines or machine-implement combinations you use for your production activities in Column A. (Begin listing your machines on line 3; be careful not to delete the entry “None” on line 2.) This would include your tractors, tractor/implement combinations, self-propelled machines, and motorized hand-held tools such as weed whackers. For tractor/implement combinations you will want to create an entry name that combines the two, e.g. “Tractor + 8’ Brush Flail”. Each entry in Column A must be unique. For example, you can only enter the name “Tractor” once. If you use two different tractors, give them different names.

### Step 2: Set a Cost per Hour

In Column B enter the estimated “Operating Cost per Hour of Use” value that was calculated in Column H of the Machinery Cost Estimator. For tractor/implement combinations (such as a Tractor + Flail Mower) you will need to add together the Operating Costs per Hour of Use for the tractor and the implement. For example, if the Tractor cost was calculated at \$15.00/hr and the Flail Mower cost was calculated at \$5.00/hr you would enter \$20.00 in column B for the Tractor + Flail Mower entry.

## 2.5 Instructions for Using the Input Costs Worksheet

Use this worksheet to enter the cost of inputs other than labor and machinery that are used in hazelnut production. In preparation for completing this worksheet you will need to know your expenditure for each of your inputs.

### Step 1: Generate List of Inputs

Start by thinking about all the materials and products that you apply to the orchard over the course of the year. Enter the name of each input in Column A. The name of each input that you enter must be unique. For example, you can only enter the input “Fertilizer” once; if you apply different types of fertilizers (that cost different amounts) you will need to specify the names of those fertilizers here.





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## Step 2: Set the Orchard Units

For each input listed you need to set a Unit value, either Tree or Acre, by selecting the value from the dropdown list in Column B. You can use whichever fits best with the corresponding input. For example, for the input “Pheromone Disruptors” you might be more likely to select “Tree” because you apply these per tree. On the other hand, for the input “Fertilizer” you might be more likely to choose “Acre” because you apply fertilizer by the acre.

## Step 3: Set the Input Costs

Finally, in column C you will enter the cost to apply each input to each input unit. So, if you have selected Acre as the application unit for Fertilizer you will want to use the cost per acre for a single application of fertilizer. (Later you will learn how to account for inputs that are applied multiple times in a typical production year.) The cost value can be determined in a variety of ways. If you know your application rate (pounds you apply per acre) and price per pound you can multiply them to get the cost per acre. If you know the total purchase price and the number of acres to which it was applied then you can divide price by acres. If you don’t have past season records you can also look up costs on input suppliers’ websites.

## 2.6 Instructions for Using the Base Year Cost Analysis Worksheet

Use this worksheet to apply activity rates, machinery costs and input costs to estimate your variable production costs for your base year. Your “base year” can be any year you want to use as the starting point for your cost analysis. Your base year will likely be this production year. Later you will learn how to use this tool to look at your costs for future years. You will also have the option to account for the costs of production for prior years.

### Step 1: Set an Average Hourly Labor Cost

To calculate the total labor cost the Hazelnut Production Costing Tool uses a single hourly labor rate, which you will enter into cell B1. The tool requires this value even if all labor is performed by you and your family members and thus is unpaid.





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If you have employees, the value used here should be the average “fully loaded” rate which includes all payroll taxes and any benefits you pay in addition to the base wage rate. If you have multiple employees at variable wage rates you will need to calculate an average value to use. The easiest way to calculate this average value is with a “weighted average”. Estimate the percentage of total time labor is performed at each of the wage rates, with the total percentages equal to 100%. Then multiple the wage rates by the percentages, adding up the results.

Here’s an example: imagine you have two employees working in the orchard. One of them has a fully loaded rate of \$25/hour and that employee performs 80% (by time) of the labor in the orchard. The remainder of the work is performed by a second employee who only helps with tasks that require two people, and their fully loaded rate is \$18/hour. The calculation for the weighted average is:

$$\$25.00 * 80\% + \$18.00 * 20\% = \$20.00 + \$3.60 = \$23.60$$

If you are an owner/operator and don’t pay yourself a wage it is still important to account for the cost of your labor when calculating your production costs, and you are required to enter an hourly wage value into cell B1. There are a few different ways to come up with this value. One option is to estimate the amount that you would pay if you were to hire someone to supervise your farm operations. Another option is to estimate the amount you would charge your business for your labor if you were to get paid by the business. Finally, you can consider the “opportunity cost” of working in your orchard and set the value to what you would earn if you worked another job during the hours you currently spend in the orchard.

### Step 2: Enter Total Trees and Total Acres

In cell B2 enter the total number of trees in your orchard. In cell B3 enter the total number of acres.

### Step 3: Select Labor Activities

Beginning in cell A6 and working down, select the labor activities that are involved in producing hazelnuts from the drop-down list. This list should look familiar: it is the same list you created on the Activity Rates worksheet. When you do this for your base year, you will likely select all the labor activities from the list that you entered on the Activity Rates worksheet. Later, when you determine costs for future production years, it is possible you might omit certain labor activities if they don’t continue to be part of your production system.





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*Note: the values in column A must match those from the Activity Rates worksheet. To ensure that is the case select the values from the dropdown list, rather than typing them in here. If you want to include activities that are not already listed on the Activity Rate worksheet then first add those entries to the Activity Rates worksheet and then select them here.*

If you have selected the Labor Activities correctly then the Orchard Unit and Base Rate values will appear in columns C and D.

#### Step 4: Assign Machinery to Activities

For each labor activity you include in this table go to Column B and select the machinery that is used to perform that activity from the dropdown list. Select “None” if a labor activity doesn’t involve machinery. Keep in mind that if you select machinery for a labor activity, every minute of that labor activity will be charged at the cost of using machinery that you entered on the Machinery-Implement Costs worksheet. Also, if you use different pieces of machinery for the *same* labor activity, you will need to return to the Activity Rates worksheet and create two different labor activities. For example, if you have two different mowers, you will have to create two different labor activities for mowing (e.g. “Mow with Mower 1” and “Mow with Mower 2”) to be able to account for mowing that is done with mower 1 versus mower 2.

*Note: the values in column B must match those from the Machinery-Implements Cost worksheet. As with the Activity values, use the dropdown list to ensure that the values match correctly.*

#### Step 5: Establish Activity Rates to Use

The next step is to indicate in column E the activity rates you would like to include in the cost calculations. In most cases, especially for your base year, this value will be the one calculated on the Activity Rates tab and appearing on this worksheet in column D (“Base Rate”) – simply enter that value here in column E. However, when calculating costs for future years you may expect certain labor activities to take more or less time. You can account for that fact by increasing or decreasing the value from the calculated base rate.

#### Step 6: Set the Percent of Orchard Units

Column F enables you to account for the fact that not all activities are performed on all activity units. For example, you may prune your trees every third year, meaning that the pruning activity in any given year is only done on 33% of the orchard. Enter the percent of the total trees or total acres that each labor activity applies to in column F. For Event type activities use 100%.





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### Step 7: Set the Number of Occurrences

Enter the number of times the labor activity happens in a single production year in column G “Occurrences of Labor Activity”. For example, if you flail mow 6 times during the season you would enter “6” in column G.

Once you have completed Steps 1-7 the tool will calculate machinery and labor costs. The calculated values will appear in columns H through K and are calculated as follows:

- **Labor Minutes:** *The Rate to Use (minutes per orchard unit) is multiplied by the Percentage of the Total Orchard Units that the labor activity impacts and then by either the Total Trees or the Total Acres (depending on the orchard unit; Events use the value 1) and by the Occurrences of the Labor Activity in a single production year.*
- **Labor Hours:** *Labor minutes are divided by 60 minutes to convert minutes to hours.*
- **Labor Cost:** *Labor Hours for the labor activity are multiplied by your Cost of Labor per Hour.*
- **Machinery Cost:** *Labor Hours for the labor activity are multiplied by the Cost per Hour of Use (on the Machinery-Implement Costs worksheet) for the machinery you designated as being used for this labor activity.*

Scroll the window down to see the Total costs calculated for Labor and Machinery.

### Step 8: List Inputs

Below the table that calculates labor and machinery costs is a second table for calculating input costs. Start by selecting in column A each input you use to produce hazelnuts, using the dropdown list. These values must match the ones you entered on the Input Costs worksheet, so make sure you select from the dropdown list rather than type the value names directly. When you do this for your base year, you will likely be selecting each of the inputs you entered on the Input Costs worksheet. Later, when you account for future production years, it is possible that you might add new inputs to your Input Costs worksheet to include here or omit certain inputs if they don't continue to be part of your production system.

Notice the orchard unit and the input cost that you entered earlier on the Input Costs worksheet will be automatically entered in columns B and C.





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### Step 9: Set Costs to Use

The next step is to indicate in column D the cost per orchard unit you would like to use in the cost calculations. For your base year it is likely that you will use the values you entered on the Input Costs worksheet, so simply copy the value from Column C. However, if you have reason to adjust the value up or down – such as for future years’ calculations – you can do so.

### Step 10: Set Percent of Orchard Units and Number of Occurrences

The last step for input cost calculations is to enter the percentage of trees or acres that the input applies to in Column E, and to indicate the number of times each input is applied to the orchard in Column F. So, for example, if you use pheromone disruptors on half of your trees you would set the value in Column E to 50%, and if you apply mulch to your trees twice during the season then you would put a 2 in Column F.

Once you have completed Step 10 the tool will calculate the input cost for each of the inputs using this formula:

The Cost to Use (per Application) is multiplied by the Percentage of the Total Orchard Units that the input is applied to and then by either the Total Trees or the Total Acres (depending on the orchard unit) and by the Occurrences of (the) Input Application in a single production year.

The total input cost is also calculated: scroll to the bottom of the table to see the total value.

## 2.7 Using Cost and Return Results

Once you have entered the information in section 2.6 above, the table and pie chart in the Results section of the worksheet (located below the Input Costs table) will show your Total Labor Costs, Total Machinery Costs and Total Input Costs for the production year you are analyzing. The sum of these values is your Total Variable Costs (TVC) of production.

To calculate the Returns for the production year, enter a Price per Pound and the Crop Yield (Pounds) for the production year being analyzed in cells C68 and C69. The tool will multiply these values to determine Total Revenues, shown in cell C70.

Finally, the tool will calculate your Returns over Total Variable Costs by subtracting the Total Variable Costs (TVC) from the Revenues. This amount represents the money that is available to cover other costs that you have not included yet.







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### Accounting for Other Non-Production Costs

At this point the tool has helped you calculate your variable production costs associated with labor, machinery and inputs. These, of course, are not the only costs your business incurs when growing and selling hazelnuts. Other categories of costs that might be factored in include *other cash costs* like land lease, interest on operating expenses, property insurance, property taxes, organic certification, costs associated with marketing and selling your nuts, miscellaneous supplies, etc., and *non-cash costs*, like interest paid on borrowed funds to purchase machinery, and depreciation cost. Because these cost categories and timelines (years to maturity) differ for each orchard business, a standard template for doing this analysis isn't available as part of this tool. But you can take the results from your Base Year Cost Analysis and create your own spreadsheet for analyzing these additional costs.

The example below shows how the cost of production results from the Hazelnut Cost Tool can be combined with other cash costs to evaluate the returns from a single year of production.

Table 1. Estimates of Costs and Returns – Single Year Analysis

<b>Results</b>	
<b>Variable Costs of Production</b>	
Total Labor Costs	\$3,678.83
Total Machinery Costs	\$1,908.95
Total Input Costs	\$1,560.78
<b>Total Variable Costs (TVC)</b>	<b>\$7,148.56</b>
<b>Revenues</b>	
Price per Pound	\$1.60
Crop Yield (Total Pounds)	7,200.00
<b>Total Revenues</b>	<b>\$11,520.00</b>
<b>Returns</b>	
<b>Returns over TVC<sup>z</sup></b>	<b>\$4,371.44</b>
<b>Other Cash Costs</b>	
Organic Certification	\$231.00
Property Insurance	\$1,300.00
Property Taxes	\$2,437.00
<b>Total Cash Costs (TCC)<sup>y</sup></b>	<b>\$11,116.56</b>
<b>Returns Net of TCC<sup>x</sup></b>	<b>\$403.44</b>

<sup>z</sup> Returns over TVC = Total returns minus total variable costs

<sup>y</sup> Total Cash Cost = Sum of total variable costs and other cash costs.

<sup>x</sup> Returns Net of TCC = Total returns minus total cash costs.

The information in this table is presented for demonstration purposes only and does not reflect actual costs for hazelnut production.





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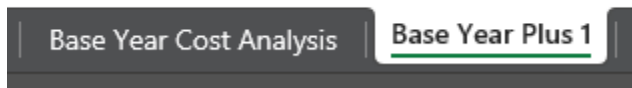
### 3. Instructions for Using the Costing Tool: Multi-year Analysis

If your orchard has already reached full maturity, looking at one year of production might give you a reasonable estimate of your annual returns into the future. If your orchard hasn't reached full production, you will likely want to do a multi-year analysis to look at how revenues and costs will change as your orchard matures.

#### Step 1: Create a Duplicate Worksheet

To use this costing tool to conduct a multi-year analysis, open the Base Year Cost Analysis worksheet and create a duplicate of the worksheet. *(To do this select the Base Year Cost Analysis tab with a right mouse click or with two fingers and select "Duplicate" if using Google Sheets or select "Move or Copy..." if using Excel.)* When you do this, the new worksheet will be named, "Copy of Base Year Cost Analysis". Rename the new worksheet so that the name signifies that it contains the cost analysis for the year *after* your base year. *(To rename the worksheet select the Copy of Base Year Cost Analysis tab as above, pick the Rename option from the popup menu, and enter the new worksheet name.)*

Let's call the duplicated worksheet "Base Year Plus 1".



#### Step 2: Consider Changes from Base Year

In the worksheet called "Base Year Plus 1" you can update any of the information you've entered for your base year analysis to reflect how revenues and costs change for the year that follows. Here are some of the changes you may want to consider:

##### Cost per Labor Hour

To account for the fact that the cost of labor tends to increase over time you can update the value you use for the cost per labor hour (cell B1)

##### Total Trees or Total Acres

Do you expect to plant any additional trees or remove trees that are included in your base year? Are you planning to plant any additional acreage or take acreage out of production? Update the Total Trees (B2) and Total Acres (B3) accordingly to reflect these changes.





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### Labor Activity

Are there any new labor activities that you will include as part of your production practices in the year after your base year? If so, you will need to add each new labor activity to the *Activity Rates* worksheet, entering the required information to calculate its base rate as described in section 2.2 above. Then select the new activities from the drop-down list on the Base Year Plus 1 worksheet, entering all the required information for the new labor activity as described in section 2.6, steps 3-7.

Similarly, consider if there are any labor activities you plan to discontinue. If so, simply delete the labor activity and all the information that was entered with it. (*Note: you should not delete labor activities from the Activity Rates worksheet, as that will impact the base year cost analysis.*)

### Machinery Used for Labor Activity

Do you plan to start using any new (or new to you) machinery in the year after your base year? If so you can add an entry for the machinery in the *Machinery Costs Estimator* worksheet as described in Section 2.3, and then add an entry for the machinery (in combination with a tractor if adding an implement) in the *Machinery-Implement Cost* worksheet as described in section 2.4. Once this is set up you can associate the machinery/implement with the labor activity that uses it as described in step 4 of section 2.6. (Make sure you select the machinery from the drop-down list, rather than typing it by hand.)

You can also change the machinery associated with an activity by selecting a different value from the drop-down menu, including selecting “None” if the activity no longer requires machinery.

### Rate to Use

Do you anticipate that a Labor Activity will take more time or less time as the orchard matures? If so, update the Rate to Use for the activity (column E).

### % of Orchard Units

Will the activity impact more or less of the total trees or total acres than in the past? If so, you can adjust the value in column F.

### Occurrences of Labor Activity

Will the activity occur more or less often? Adjust the number in column G.





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### Inputs

Are there any new inputs that you will include as part of your production practices in the year after your base year? If so, you will need to add an entry for each new input to the *Input Costs* worksheet as described in section 2.5. For each new input you will set its Orchard Unit and enter the Input Cost per Orchard Unit. Once this setup step is complete you can add the input to the analysis by selecting it from the drop-down list on the Base Year Plus 1 worksheet and entering all the required information in columns D-F.

Similarly, if there are any inputs you plan to discontinue you can delete their entries from the Inputs table on the Base Year Plus 1 worksheet. Alternatively, you can set the Occurrences value in column F to zero. (You should not delete inputs from the *Input Costs* worksheet.)

### Input Cost to Use

Do you anticipate that the cost of an Input you were already using will change in the future? If so, update the Cost to Use for the input.

### Input % of Orchard Units

Will the input be applied to more/less of the total trees or total acres than in the past?

### Occurrences of Input Application

Will the applications of the input occur more/less often?

### Price

If you expect the price per pound to change you can update the value in cell C67.

### Total Pounds

Of all the values to change in the multi-year analysis for a maturing orchard, the yield per tree or acre will likely change most dramatically. To account for this, you will need to update the Crop Yield value you use in cell C69.

## Step 3: Add More Years

Once you've made the changes you want to make for the Base Year + 1, continue creating duplicate worksheets, naming them to signify the next year in the timeline you want to analyze, and making changes to each worksheet to reflect how you think costs and revenues will change over time. Do this for every future year up to (and including) the first year that you think your orchard will be in full production.





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### Step 4: Consolidate Results

When you’ve created worksheets for all the years in the time horizon that you want to analyze, use the results from each year to perform your multi-year analysis. One way to do this is to copy the values in the results section from each of the single year worksheets, and then add a row at the bottom which shows the cumulative cash flows for each year. Table 2 below is an example of this type of analysis. In the example we look at four production years, with Base Year + 3 being the year that the orchard reaches full production.

Table 2. Estimates of Costs and Returns – Multi-Year Analysis

	Base Year	Base Year + 1	Base Year + 2	Base Year + 3
<b>Variable Costs of Production</b>				
Total Labor Costs	\$3,679	\$3,863	\$4,047	\$4,231
Total Machinery Costs	\$1,909	\$1,966	\$2,004	\$2,100
Total Input Costs	\$1,561	\$1,639	\$1,717	\$1,795
<b>Total Variable Costs (TVC)</b>	<b>\$7,149</b>	<b>\$7,468</b>	<b>\$7,768</b>	<b>\$8,125</b>
<b>Revenues</b>				
Price per Pound	\$1.60	\$1.60	\$1.60	\$1.60
Crop Yield (Total Pounds)	9,750	11,700	14,625	16,575
<b>Total Revenues</b>	<b>\$15,600</b>	<b>\$18,720</b>	<b>\$23,400</b>	<b>\$26,520</b>
<b>Returns</b>				
<b>Returns over TVC</b>	<b>\$8,451</b>	<b>\$11,252</b>	<b>\$15,632</b>	<b>\$18,395</b>
<b>Other Cash Costs</b>				
Organic Certification	\$231	\$243	\$255	\$267
Property Insurance	\$1,300	\$1,300	\$1,300	\$1,300
Property Taxes	\$2,437	\$2,583	\$2,738	\$2,903
<b>Total Cash Costs (TCC)</b>	<b>\$11,117</b>	<b>\$11,594</b>	<b>\$12,061</b>	<b>\$12,595</b>
<b>Returns Net of TCC</b>	<b>\$4,483</b>	<b>\$7,126</b>	<b>\$11,339</b>	<b>\$13,925</b>
<b>Cumulative Cash Flows</b>	<b>\$4,483</b>	<b>\$11,610</b>	<b>\$22,949</b>	<b>\$36,874</b>

For the Cumulative Cash Flows row, the value in the first column is equal to the Returns Net of TCC in the cell above. For each of the other columns you can enter a formula that adds together the values in the cell above (the Returns Net of TCC for that year) and the cell immediately to the left (the cumulative value up to the previous year).





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## 4. Other Considerations

In addition to the costs that have already been included in the analyses above, you may want to include Historical (Net) Returns and/or Replacement Costs in your analysis.

### 4.1 Historical (Net) Returns (Establishment Cost)

The Cumulative Cash Flows in Table 2 show how the returns (after accounting for total cash costs) accumulate over the period being forecasted. In other words, the returns from the Base Year are added to the returns from the Base Year +1; the returns from the Base Year +2 are added to that and so on. The Cumulative Returns at the end of Base Year +3 are the total returns for the whole 4-year period that is projected in the analysis. But what about the returns (gains or losses) from the years prior to the Base Year?

Unless your Base Year is the year you planted your orchard, you will have accumulated returns in prior years. Adding up the net return for each year of production between the time you planted your orchard, and your base year will give you your Historical (Net) Return. Because it takes several years for hazelnuts to produce a significant yield, it is likely that you will have many years where your costs were greater than the revenues you brought in. This means it is likely that your Historical (Net) Return will be negative. You can think of this negative Historical (Net) Return as the “Establishment Cost” for your orchard.

You may want to divide this establishment cost over future years of production to assess if your orchard business is profitable in the long term. One simple (but rough) way to do this is to divide your total Historical (Net) Return by the number of years you expect your orchard to be productive beyond the point that it reaches maturity. Then, subtract the resulting value from the net returns in your final year (full production year) of your multi-year analysis to evaluate your returns after accounting for the losses you incurred during establishment.

Let’s look at a (fictitious) example. Assume that you’ve done a multi-year analysis for five years as shown in Table 3 below, and in the fifth year (Base+4) your orchard reaches maturity. The Returns Net of Total Cash Costs is \$10,855. Also assume that in the years prior to your analysis your total cash costs were \$60,000 and your total revenues were \$10,000, for a net loss of \$50,000. This is your establishment cost. Finally, assume that your orchard will be in production for 20 years post maturity. To factor the establishment cost into your analysis, divide the total loss to that point (\$50,000) by 20 years to get \$2,500 per year. Your annual return net of Total Cash Costs and net of Establishment Costs would be \$10,855 - \$2,500 = \$8,355.





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Table 3: Accounting for Historical Net Returns

	Base	Base+1	Base+2	Base+3	Base+4
<b>Variable Costs of Production</b>	\$ 6,083	\$ 6,327	\$ 6,580	\$ 6,843	\$ 7,117
<b>Other Cash Costs</b>	\$ 1,689	\$ 1,723	\$ 1,757	\$ 1,793	\$ 1,828
<b>Total Cash Costs</b>	\$ 7,773	\$ 8,050	\$ 8,337	\$ 8,635	\$ 8,945
<b>Total Revenues</b>	\$ 8,100	\$ 11,700	\$ 15,300	\$ 18,000	\$ 19,800
<b>Returns Net of TCC</b>	\$ 327	\$ 3,650	\$ 6,963	\$ 9,365	<b>\$ 10,855</b>
<b>Cumulative Cash Flows</b>	\$ 327	\$ 3,978	\$ 10,941	\$ 20,305	\$ 31,160

Keep in mind that as long as your orchard is already planted and getting established for a few years it is unlikely that you will take your orchard out even if these initial losses aren't covered in a desirable time period. They are sunk costs after all. However, including these historical (net) returns in your analysis may still inform how you set prices if you are in a market where you have pricing power.

## 4.2 Depreciation/Replacement Costs

When you buy machinery and other equipment and infrastructure, the money you spend (whether it's yours or borrowed from the bank) is not considered a cash outlay to your business. However, the decline in value due to use and/or the passage of time is. The process for accounting for the declining value of assets is commonly referred to as depreciation. In this tool, the term "Replacement Costs" is used to differentiate the process of accounting for these costs from how you might depreciate assets for tax purposes. Here the goal is to account for the decline in utility value of machinery and other equipment and infrastructure. The idea is that at some point, due to use or due to the passage of time, machinery and other equipment and infrastructure will no longer be able to be utilized and will need to be replaced. By accounting for the amount that each tractor, implement or other piece of equipment or infrastructure declines in utility value due to use or due to the passage of time, you are essentially budgeting for replacing these assets.

In this costing process, there are two ways to account for replacement cost. Tractors and implement replacement costs are accounted for based on the number of hours they are used. Other equipment and infrastructure are accounted for based simply on the passage of time.

### Use-Based Replacement Costs

The Hazelnut Production Costing Tool has the capacity to help you estimate use-based replacement costs for your tractors, implements, and other machinery for which you can reasonably guess the number of hours the machinery provides utility. Recall that in the Machinery Cost Estimator worksheet you calculated a Machine Operating Cost for each hour of use. You can use the same worksheet to similarly calculate a Replacement Cost per Hour of Use.





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### Step 1: Estimate the Replacement Cost

Start by estimating what it will cost you to replace the machinery that you are currently using. This value would be the cost to purchase the replacement machinery minus any anticipated salvage value you would receive by selling the machinery you currently have. So, for example, if it would cost you \$6,000 to replace your 8' flail, and you believe you could sell the old flail for \$500 then you would enter \$5,500 for the 8' flail into column I.

### Step 2: Estimate the Lifetime Hours of Use

Next, estimate the total number of hours you expect the machinery to run over its useful life and enter the value in column J. For new machinery, you can refer to Table 3 in the publication *Costs of Owning and Operating Farm Machinery in the Pacific Northwest: 2011* for the hours of estimated life for different agricultural machinery. You might use this as a starting point and adjust as this makes sense for your operation. If the Replacement Cost you come up with is for used equipment, be sure to adjust the Hours of Use to take into account that the machinery was used when you bought it.

Once you have entered the replacement cost and lifetime hours of use the tool will calculate the Replacement Cost per Hour and Total Cost per Hour, where the total cost is the sum of the operating and replacement costs.

### Step 3: Integrate Replacement Costs into Analysis

To factor replacement costs for tractors and implements into your cost analysis, substitute the Total Cost per Hour of Use for each tractor/implement to the corresponding tractor/implement entry on the Machinery-Implement Costs worksheet. Remember to add together the costs of the tractor and implement where appropriate, as described in Step 2 of section 2.4.

Once you have updated the values in the Machinery-Implement Costs worksheet they will be used for the calculations in the Base Year Analysis worksheet (as well as any extended year analysis worksheets you may have created). The total machinery cost for the production year(s) will now include the replacement costs.

By doing this, the total machinery cost calculated by the tool will include both the operating cost and the replacement cost of the machinery, based on the hours the machinery is in use for the labor activities you specify for the production year.







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## Time-Based Replacement Costs

In contrast to machinery that declines in utility value based on use, some equipment and infrastructure decline in utility value simply due to the passage of time. To account for the replacement costs for this type of equipment and infrastructure, first make a list of any items you want to include. Next, estimate what it will cost you to replace each item on your list. If you expect to be able to sell any of the items on your list when they are retired from use, subtract any anticipated salvage value from the purchase price. Then estimate the number of years each item on your list will be able to be utilized. Divide the replacement cost (minus the salvage value) by the estimated years of use to get the annual replacement cost for each item on your list. Once you've calculated the annual replacement costs for equipment and infrastructure you can include these as fixed or non-cash costs for each year of your multi-year analysis.

In the near term, it's unlikely that you will take your orchard out of production if you can't cover the replacement costs for machinery, equipment, and infrastructure that you already own. But if you can't cover these replacement costs in the longer term, when it does come time to replace machinery, equipment, and infrastructure, it will be a challenge to continue production and remain profitable.





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## Appendix A: How to Conduct Time Studies

Time studies are a sampling technique that you can use to come up with activity rates for your operation. Conducting time studies is as simple as measuring the total time (minutes) you spend doing a labor activity and the total number of orchard units (trees or acres) impacted by the activity in that amount of time.

When you conduct time studies, you will likely notice that there are a lot of factors that affect the time it takes to do an activity - people work at different paces; weather conditions can slow down your work; your orchard is likely not perfectly uniform. It's not going to be possible to predict future costs with 100% accuracy. The idea here is to get ballpark samples of how long activities take and use these sample measurements to calculate average activity rates that can help you estimate costs that will inform your decision making.

### Time Study Considerations

Below are some things to keep in mind when you are conducting time studies:

- The total time should account for everyone's time spent working on the labor activity. For example, if you are working with one other person on pruning for 60 minutes, the total time for the activity would be 120 minutes (60 minutes per person x 2 people).
- Because time studies are a sampling approach, you don't have to prune every tree or mow every acre of your orchard to record a time study. Simply record the total trees pruned or total acres mowed relative to the amount of time that you record. Later you can apply the rate to every tree or acre in your orchard.
- When you're timing a labor activity, consider whether it makes sense to include the time it takes you to travel to and from the orchard or set up machinery. Generally, travel and machinery set-up will take the same amount of time regardless of the number of trees or acres impacted by a labor activity. If this is the case, keeping the time you spend on travel or set-up separate from the time you spend actually doing the labor activity will give you a more accurate measurement of the labor that varies with the number of trees or acres.





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- You can still capture the time you spend travelling to the orchard or setting up machinery. To do this, measure the time these activities take per travel event or per set-up event. In the Costing Tool, enter Travel to Orchard and Flail-Mower Set-up (for example) as labor activities. Enter the total minutes per travel event and per set-up event and select the orchard unit “Event”.
- The Activity Rates worksheet has room for up to three-time study records for each labor activity and calculates an “Average Rate” for each activity based on the time study records you enter. To get the best estimate you may want to perform the activity in different circumstances. For example, you may want to record flail mowing times in both spring and summer, and you may want to record pruning times for everyone who prunes.
- If you have different methods for doing a labor activity and this results in very different activity rates you might consider defining your different methods as two completely different labor activities. For example, if some people on your orchard crew remove suckers with manual pruners and others use electric pruners, you could define two different labor activities: “Removing Suckers, Manual” and “Removing Suckers, Electric”. These labor activities would have a different activity rate. You can then apply each rate to the percentage of trees that had suckers removed with manual pruners versus electric pruners (see Section 2.6, Step 6).

## Capturing Time Data

Before you start your time studies you will need to think about how you will capture your time study records when you are working out in the orchard. This includes both the process that you will use for keeping track of time as well as the way you record the data. The process is important, as participants will need to record the start and end times (or note the total elapsed time) and track the total number of units affected. There’s not one “right” way to do it – choose whatever tools and processes will make it easy for you and your crew to collect data as accurately as you can.





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One grower carried around a pocket planner with a page dedicated to recording time study data. Whenever he took a time measurement – by starting and stopping a timer on his cellphone – he wrote down the labor activity, the total minutes to complete the activity, and the number of orchard units completed. If he measured a second set of data for the same labor activity, he added extra columns (total time and units completed) to the right for the subsequent measurements. At the end of the season, he transferred all the data into the production costing tool.

Another grower had someone in the farm office in charge of overseeing the time trials. Workers in the fields texted the office when they started and ended the time trial, indicating how many units they had covered in that time. Back at the office the data was entered into a computer spreadsheet, and from there the data was ultimately transferred to the production costing tool.

A third grower set up a whiteboard in the barn that listed the activities being measured. Prior to starting an activity, they noted the start time, and when they were done, they wrote down the end time and the total units completed. The data was then transferred to the computer.





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## Appendix B: Sample Activities

Here are some sample activities that you might include when doing your production cost analysis. Select the ones that are relevant to your operations, making any modifications to activity names as appropriate.

### Pruning

- Pruning
- Pruning, 2-year-old trees
- Pruning, 5-year-old-trees
- Pruning, mature trees

### Suckering and Weeding

- Weeding
- Suckering
- Weed and sucker control – Mechanical
- Weed and sucker control – Chemical
- Weed and sucker control – Hand
- Weeding, young trees
- Brush stacking
- Brush pushing

### Amendments

- Fertilizer, spray
- Fertilizer, pellets
- Cover crop seeding
- Manure spreading
- Mulching

### Mowing

- Flail mowing
- Brush hog mowing
- 1<sup>st</sup> mow
- Subsequent mow
- Spring mowing
- Summer mowing





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### **Pest Management**

- Filbert worm – monitoring
- Filbert worm – spraying
- Lure placement
- Lure collection
- Tree painting
- Gopher control

### **Harvest**

- Harvest – blowing
- Harvest – sweeping
- Harvest – picker
- Hand Harvest

### **Events**

- Mower Setup
- Flail Setup
- Sprayer Setup
- Irrigation Setup
- Hauling
- Travel Time
- Equipment Repair
- Equipment Maintenance





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## Appendix C: Case Studies

### Case Study 1: Projecting Future Profitability

The farm at Steenson Hazelnut Orchards outside of Salem Oregon has been in production since the late 1960s. The orchard has historically been a conventional operation, but recently the farm converted just under 10 acres of young trees to organic production. In 2023, Steenson used the Hazelnut Costing Tool to analyze the production costs for its organic operation, when the trees were in leaf year 5. During the production year, Steenson recorded time trial data. Workers in the orchards texted the farm office when they started and completed activities, indicating what task they were working on and how many trees or acres were impacted. The data was then entered into a spreadsheet on the computer.

In the fall Steenson entered their data into the Hazelnut Costing Tool. In its base year analysis, Steenson saw that while its cash flow was positive, when the cost of the unpaid family labor was factored in, the tool showed them operating at a loss. Steenson was curious to project at what point they would be operating at a profit when all costs, including owner labor, were factored in. Following the guidance in the User's Guide, Steenson used the Hazelnut Costing Tool to project costs for 5 more years, when they anticipate the orchard will reach full maturity. Using these assumptions, they projected that profits from the orchard would cover their total cash costs in Base Year + 3, and that the cumulative cash flows would turn positive in Base Year + 5.

In addition to future profitability projections, Steenson used the tool to suggest possible changes to their orchard practices. Steenson recognized that they can be somewhat fastidious about pruning and weeding the orchard. Since this work is done by family members and thus is not directly connected to cash flow they had not thought much about the "cost" associated with this time. However, the Hazelnut Costing Tool showed that the labor associated with pruning and weeding accounts for nearly 50% of their total variable production costs. Given this finding, Steenson will be rethinking the tradeoff between completeness and efficiency when it comes to tasks like pruning and weeding.

### Case Study 2: A What-If Scenario

Skydance Farm west of Sherwood Oregon included an old cherry orchard and a conventional hazelnut operation. In 2018 and 2019 the farm planted 6 acres of organic hazelnut trees, and since that time they have been growing the trees using organic methods, though they have yet to file their organic certification paperwork. In 2023, Skydance Farm used the Hazelnut Costing Tool to understand their production costs with hopes of getting insights into profitability.





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Skydance collected time trial data throughout the growing season using a whiteboard set up in the barn, with the data periodically transferred to the computer.

At the end of the season, the time trial data was entered into the Hazelnut Costing Tool. Unfortunately, the relative immaturity of the orchard combined with a poor production year led to a very small harvest, and Skydance Farm decided not to process their nuts for commercial sales. As a result, Skydance Farm was able to generate cost information but not profitability information for their base year.

However, Skydance Farm was interested to know what revenues would be required for them to be profitable given the total variable production costs calculated by the tool. To answer this question, Skydance Farm performed a simple Price/Yield analysis. They built a spreadsheet that included the yield in pounds per acre across the columns and the price per pound going down the rows. In each cell of the spreadsheet, they entered this formula:

$$\text{Returns} = (6 \text{ acres} * \text{pounds per acre} * \text{price per pound}) - \text{Total Variable Costs}$$

The data is summarized in Table 4 below. Skydance Farm used this information to help set expectations about the ultimate profitability of the farm. According to the Skydance owners, “Putting in some numbers to see what might be possible when the orchard reaches maturity was heartening! The cost of operations even after paying ourselves for our labor was less than we thought.”

Table 4: Looking at net returns under varying price and yield assumptions.

	400	600	800	1000	1200	1400	1600	1800	2000
<b>\$1.00</b>	(\$9,617)	(\$8,417)	(\$7,217)	(\$6,017)	(\$4,817)	(\$3,617)	(\$2,417)	(\$1,217)	(\$17)
<b>\$1.10</b>	(\$9,377)	(\$8,057)	(\$6,737)	(\$5,417)	(\$4,097)	(\$2,777)	(\$1,457)	(\$137)	\$1,183
<b>\$1.20</b>	(\$9,137)	(\$7,697)	(\$6,257)	(\$4,817)	(\$3,377)	(\$1,937)	(\$497)	\$943	\$2,383
<b>\$1.30</b>	(\$8,897)	(\$7,337)	(\$5,777)	(\$4,217)	(\$2,657)	(\$1,097)	\$463	\$2,023	\$3,583
<b>\$1.40</b>	(\$8,657)	(\$6,977)	(\$5,297)	(\$3,617)	(\$1,937)	(\$257)	\$1,423	\$3,103	\$4,783
<b>\$1.50</b>	(\$8,417)	(\$6,617)	(\$4,817)	(\$3,017)	(\$1,217)	\$583	\$2,383	\$4,183	\$5,983
<b>\$1.60</b>	(\$8,177)	(\$6,257)	(\$4,337)	(\$2,417)	(\$497)	\$1,423	\$3,343	\$5,263	\$7,183
<b>\$1.70</b>	(\$7,937)	(\$5,897)	(\$3,857)	(\$1,817)	\$223	\$2,263	\$4,303	\$6,343	\$8,383
<b>\$1.80</b>	(\$7,697)	(\$5,537)	(\$3,377)	(\$1,217)	\$943	\$3,103	\$5,263	\$7,423	\$9,583
<b>\$1.90</b>	(\$7,457)	(\$5,177)	(\$2,897)	(\$617)	\$1,663	\$3,943	\$6,223	\$8,503	\$10,783
<b>\$2.00</b>	(\$7,217)	(\$4,817)	(\$2,417)	(\$17)	\$2,383	\$4,783	\$7,183	\$9,583	\$11,983







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### Case Study 3: Considering Transition to Organic Production

Nut House Farms near Silverton Oregon is a 55-acre conventional hazelnut farm that was planted in 2016. Nut House Farms owners have considered transitioning some or all of the orchard to organic production and decided to use the Hazelnut Costing Tool to help with their decision-making process.

As a first step Nut House Farms entered data from their current conventional operations. As the farm did not have time-trial data they instead estimated labor hours based on prior years' experience. The original analysis showed that 22% of the total variable production costs were attributed to labor, 17% were attributed to machinery, and 61% were attributed to inputs that were predominantly made up of fungicide, herbicide, pesticide, and chemical fertilizer.

As a second step Nut House Farms considered what changes would be required to transition the orchard to organic production. These changes included switching from a bare-earth orchard to a perennial cover crop; adding activities such as flail mowing and weeding; and adding alternative methods for fertilization and pest control. They also considered the changes in inputs, removing the chemicals that are not allowed for organic production and replacing them with substitutes that are allowed, and new equipment that would be required (e.g. flail mower). With these assumptions in place Nut House Farms created a second copy of the tool, using reference data to estimate the time associated with the new activities. This analysis showed a very different composition of total production costs, with more than 60% of the costs attributed to labor and less than 15% attributed to input costs.

With the new costs projected, Nut House Farms looked at profitability. Revenues to the farm would be impacted by both a decrease in yield (organic trees typically produce fewer pounds of nuts than conventional) and an increase in price per pound (with organic nuts fetching a price premium over conventional). They were able to play with these numbers to generate a range of outcomes. But perhaps the biggest insight came from seeing the large increase in labor hours required during the production cycle. As the farm further explores organic transition it will need to consider how much capacity the family members have for completing the extra work and what the process might look like for hiring workers to do the work the family cannot perform themselves.





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