



Financial Decision Support Tools for Agroforestry

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Excel-based financial decision support tools can help potential growers better understand the economics behind various management practices for some of the most common temperate agroforestry crops. The University of Missouri Center for Agroforestry has developed four model-based tools, including:

The Eastern Black Walnut Financial Decision Support Tool (timber production); the Black Walnut Financial Model (nut production); the Chestnut Decision Support Tool (nut production); and the Elderberry Financial Decision Support Tool (berry production). These tools are publicly available, free to use, and can be found at the www.CenterForAgroforestry.org.

The following Chestnut Decision Support Tool example illustrates how these models can be used. The tool asks users a series of questions designed for inputting data about the user's orchard, and outputs financial results based on those inputs. These instructions are designed to help you answer the user input questions after you've opened the spreadsheet to begin data entry. Please read these instructions before you begin using the Financial Model.

The Chestnut Decision Support Tool spreadsheet consists of six tabs:

1. Management Input
2. Cost Budgets
3. Financial Analysis
4. Input Tables
5. Chemical Costs
6. Growth Models

Users can select and enter their own information in the Management Input, Financial Analysis, Input Tables, and Chemical Costs tabs. The Cost Budgets and Growth Models tabs are for calculation purposes and cannot be edited by users.

Inputs

The Management Input tab consists of four sections: Establishment Decisions, Management Decisions, Harvesting and Marketing Decisions, and Financial Results. Blocks highlighted in yellow indicate areas where users should enter their own decision information. Once data is entered for each of the "Decisions" sections, financial results will automatically be calculated and will appear in "Financial Results". Establishment decisions include site prep, spacing, layout/design, site quality, planting stock, graft technique, fertilization, tree staking, and irrigation system. Each establishment decision offers a drop down option list to choose from (except for spacing). Choose one option for each decision that best reflects your establishment plan. For example, "site prep" has tree options: herbicide only, herbicide with discing, and user defined. For "user defined", you may enter your own cost per acre for site prep into cells B5 (cost per acre) and C5 (cost per tree). Estimated Cost per Acre = Estimated Cost per Tree * Initial Number of Trees per Acre, where the spacing indicated determines Trees per Acre.

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The same procedure should be followed when entering any user-defined decision.

The Management Decisions tab consists of options for thinning, fertilizing, pruning, weed control, pest control, disease control, and deer control. In order to provide the necessary input for "thinning", enter a number between 0 and 1 indicating percentage of trees removed at each thinning. For example, if the grower chooses to thin one-third of the trees at each thinning, enter .33 or 33% in the blank. Other questions in this tab should include both quantity and occurrence of the corresponding management decisions. For example, after selecting a fertilization method from the drop down menu, go to the Input Tables tab and enter the frequency of fertilization in cell G35, and the starting and ending years of application in cells G36 and J35. Costs will vary depending on frequency and duration of management activities.

	A	B	C	D	E	F	G
1	Site Prep	Estimated Cost/ac	Cost per Tree				Occurrence
2	Discing only	\$ 100.00	\$ 2.07	1			
3	Herbicide only (1 qt./ac.)	\$ 120.00	\$ 2.48	1			
4	Herbicide with Discing	\$ 150.00	\$ 3.10	1			
5	User Defined	\$ -	\$ -				
6							
7	Layout/Design	Estimated Cost/ac	Cost per Tree				Occurrence
8	Diamond						
9	Hexagonal				No Cost		
10	Rectangular/Square						
11							
12	Planting Stock	Estimated Cost/ac	Cost per Tree				Occurrence
13	Grafted Seedlings	\$ 968.00	\$ 20.00	1			
14	Seed	\$ 169.40	\$ 3.50	1			
15	Seedlings (bare root)	\$ 193.60	\$ 4.00	1			
16	Seedlings (RPM™)	\$ 847.00	\$ 17.50	1			
17	User Defined	\$ -	\$ -	1			
18							
19	Fertilization (initial)	Estimated Cost/ac	Cost per Tree				Occurrence
20	Good early growth (>8")	\$ 49.37	\$ 1.02	1			
21	Slow early growth (<8")	\$ -	\$ -	1			
22	User Defined	\$ -	\$ -	1			
23							
24	Thinning	Estimated Cost/ac	Cost per TC				Occurrence
25	33%	\$ -	\$ 0.04				As per model
26							
27	Tree Staking	Estimated Cost/ac	Cost per Tree				Occurrence
28	Re-Bar	\$ 67.28	\$ 1.39	1			
29	Steel conduit pipe	\$ 96.80	\$ 2.00	1			
30	T-posts	\$ 338.80	\$ 7.00	1			
31	User Defined	\$ -	\$ -	1			
32	Wooden stakes	\$ 19.36	\$ 0.40				
33							
34	Fertilization (maintenance)	Estimated Cost/ac	Cost per Tree				Occurrence
35	Bearing trees (33% N)	\$ 90.00	\$ 1.86		Fertilizer applied every	1	
36	Bearing trees (46% N)	\$ 90.00	\$ 1.86		First Year of Application	2	

Input Tables: enter values in each yellow cell

Further, if users want to specify the chemical application rate and calculate their own costs, use the detailed information in the Chemical Costs tab. Enter your own application rates (Low App Rate/ac in cell B2, or Hi App Rate/ac in cell C2). Be sure to select the correct unit from the options in cell E2.

Harvesting and Marketing Decisions includes four categories: harvest method, expected rate of return, expected price per lb for nuts, and number of acres.

Establishment Decisions:

Site Prep:

Spacing (Ft): x

Layout/Design:

Site Quality:

Planting Stock: Graft Technique

Fertilization:

Tree Staking:

Irrigation system:

Management Decisions:

Thinning: Enter a % of trees removed (i.e. 50%, 0%)

Fertilization:

Pruning:

Weed Control:

Pest Control:

Disease Control:

Deer Control:

Select from a list of drop-down menu options for each management decision.

Enter a discount rate (expected rate of return on investment) in this section. For example, if a grower would like to earn 5% from their investment, they should enter .05 or 5% in the blank.

Outputs

- Financial Results:
 - The Chestnut Decision Support Tool outputs indicate the financial performance of the orchard over a 60-year period. Six financial indicators are provided to better understand the economics of growing black walnuts. These indicators include:
 - Present Value of Revenues (PV of Revenues)
 - Present Value of Costs (PV of Costs)
 - Net Present Value per acre (NPV)
 - Rate of Return / Modified Internal Rate of Return (MIRR)
 - Annual Equivalent Value (AEV), and
 - Years to Break Even

For information about the interpretation of and calculations used for these indicators, see *Economic Budgeting for Agroforestry Practices*.

The Chestnut Decision Support Tool, among other agroforestry models, also provides an enterprise budget. Go to the Cost Budgets tab for a printable budget with costs. A cash flow diagram is available on the Financial Analysis tab, which shows Total Revenues, Total Costs, and Net Revenues for each year.

Advanced Options

Most of the agroforestry Financial Decision Support Tool programs have been locked to prevent keystroke errors by users. However, different costs can be manually applied to the model by "unprotecting" the Input Tables. To unprotect the spreadsheet, click Review, then Unprotect Sheet.

Model Limitations

The Financial Decision Support Tools are simplified decision models, and thus have limitations. The models are based on the best information available at this time for each of the factors accounted for. For instance, nut production can be impacted by different management decisions (e.g. tree spacing, thinning); however, due to the limited field data on nut production over time, a simple linear regression model simulates nut production over 60 years in the Chestnut Decision Support Tool model. The predicted revenues and other financial values are estimates; thus these models are intended as a guide, not a crystal ball. The purpose of the models is to identify how varying establishment, management, harvesting, and marketing decisions affect the financial outcome of the system. While the models cannot provide a promised level of income, they are accurate in predicting whether or not a decision will increase or decrease returns.

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All Financial Decision Support Tools can be downloaded from the University of Missouri Center for Agroforestry website. Below are direct links for each agroforestry crop.

Black Walnut Financial Model: <http://centerforagroforestry.org/profit/walnutfinancialmodel.php>

Chestnut Decision Support Tool: www.centerforagroforestry.org/profit/ChestnutDecisionSupportTool.xlsm

Eastern Black Walnut Financial Decision Support Tool: <http://www.centerforagroforestry.org/profit/walnutfinancialmodel.asp>

Elderberry Financial Decision Support Tool: <http://centerforagroforestry.org/profit/elderberryfinance.php>

