

Cotton Harvest Equipment Investment Analysis Decision Aid

Developed by

**Lawrence Falconer-Texas Agrilife Extension Service, Brock Faulkner-Texas Agrilife Research and
Jeanne Reeves-Cotton Incorporated, Project Supervisor**

Introduction

The Cotton Harvest Equipment Investment Analysis Decision Aid is designed to allow the user to compare two different investments in cotton harvest machinery complements using capital budgeting techniques. Additionally, this decision support aid will (a) help producers develop alternative cotton harvest machinery investment scenarios, (b) provide information derived from alternative capital budgeting methods to the user as well as (c) help guide collection of relevant data and provide interpretation of results. This program is distributed as a MicroSoft© Excel workbook. This workbook is a collection of spreadsheets and is not menu driven, so the user must switch between worksheets by clicking on the worksheet title tabs at the bottom of the screen.

You can use the workbook to create many different equipment scenarios and example scenarios for five different situations are provided:

1. **Stripper_Basket_Picker_CottonHarvestSystemInvestmentDecisionAidv4.xls** – compares a single basket picker system to a system with two cotton stripper harvesters.
2. **Stripper_Rectangular_OBM_Picker_CottonHarvestSystemInvestmentDecisonAidv4.xls** – compares a single CaseIH module building picker to a system with two cotton stripper harvesters.
3. **Stripper_Round_OBM_Picker_CottonHarvestSystemInvestmentDecisonAidv4.xls** – compares a single John Deere module building picker to a system with two cotton strippers.
4. **Rectangular_OBM_Picker_CottonHarvestSystemInvestmentDecisonAidv4.xls**– compares a CaseIH on-board module building picker to a six row basket picker system.
5. **Round_OBM_Picker_CottonHarvestSystemInvestmentDecisonAidv4.xls** – compares a John Deere on-board module building picker to a six row basket picker system.

The above examples also incorporate some equations to generate default values. If you would like to create your own scenario that is not similar to those above, it is recommended you use the file **“Generic_CottonHarvestSystemInvestmentDecisonAidv4.xls”** is a version of the decision aid that does not use formulas for input values.

Title for 1st Alternative Cotton Harvest Machinery Complement **Picker - 6 Row - 1 Machine**

Title for 2nd Alternative Cotton Harvest Machinery Complement **Strippers - 8 Row - 2 Machines**

	Picker - 6 Row - 1 Machine	Strippers - 8 Row - 2 Machines
Expected Lint Yield (Pounds per Acre)	1470	1552
Expected Turnout %	36%	31%
Expected Pounds of Seed per Pound of Lint	1.39	1.41
Ginning, Bagging, Ties & Fees per Lint Pound	\$ 0.10	\$ 0.12
Cotton Seed Price \$/ton	\$ 200.00	\$ 200.00
Cotton Lint Price Per Pound	\$ 0.8000	\$ 0.7800
Gross Cotton Lint Revenue (\$ Per Acre)	\$ 1,176.00	\$ 1,210.56
Gross Cottonseed Revenue (\$ Per Acre)	\$ 204.33	\$ 218.83
Ginning, Bagging, Ties & Fees (\$ Per Acre)	\$ 147.00	\$ 186.24
Revenue Net of Ginning, Bagging, Ties & Fees (\$ Per Acre)	\$ 1,233.33	\$ 1,243.15

Cell B3 commented by ifalcone

Figure 1. Cotton Harvest Equipment Investment Analysis Decision Aid Titles and Revenue Data Input Screen.

Enter Title and Revenue Information for Alternative Scenarios

The screen used to enter the names and information related to the revenue net of ginning costs for the alternative investments are shown above in Figure 1. The user can access context-sensitive help by placing the cursor over any cell that is marked by a red triangle in the upper right corner of any input cell. All input cells are identified by a golden-yellow background. This screen provides the opportunity to enter the expected average yield in pounds of lint per acre for both harvest machinery investment alternatives. That value will be used along with the expected turnout % to calculate the yield of seed cotton per acre that will, in turn, be used to calculate the total cost of ginning, bagging, ties and fees per acre for this alternative. If any differential in yield and turnout exists between the two alternatives, that differential will be included in the investment analysis. In addition, this screen allows for entry of the expected price per pound of lint for both harvest machinery investment alternatives. If any differential in cotton quality exists between the two alternatives, that differential can be expressed with different prices for each alternative and will be included in the investment analysis, as the difference in revenue net of ginning, bagging, ties and fees per acre is calculated and weighted by the number of acres harvested by the second complement and included in the analysis.

Enter Defoliation Information

The screen used to enter defoliation program information is shown below in Figure 2. This feature allows the user to enter information about the use of both defoliation products and equipment which are used to calculate defoliation costs for both alternatives on a per-acre basis. This information is carried forward and used in the final net present value analysis for both alternatives. It should be noted that if the defoliation programs for both harvesting alternatives are the same, the user may enter that information for both alternatives or can leave the defoliation costs for both alternatives blank. The investment analysis will not be affected in that case as only differences in the cost streams are taken into account in development of the alternative cash flows for both investments. In this case, the user must make sure that when there is no difference in defoliation programs, both alternatives' defoliation cost data is blank.

Generic_CottonHarvestSystemInvestmentDecisionAid4_DRAFT3.xls [Compatibility Mode] - Microsoft Excel

Home Insert Page Layout Formulas Data Review View Developer Add-Ins

Clipboard Font Alignment Number Styles Cells Editing

A17 Thidiazuron (Ginstar)

DEFOLIATION COST/ ACRE - Picker - 6 Row - 1 Machine - (INCLUDE APPLICATION COSTS)

ITEM	UNIT	PRICE	QUANTITY	Total Amount
Thidiazuron (Ginstar)	oz	\$ 1.52	8	\$ 12.19
Ethephon + Cycilanilide (Finish 6 Pro)	oz	\$ 0.49	24	\$ 11.81
Silicone Surfactant	gal	\$ 109.00	0.025	\$ 2.73
Owned Ground Rig Application	trip	\$ 2.00	1	\$ 2.00
				\$ -
				\$ -
				\$ -
TOTAL DEFOLIATION COST PER ACRE FOR - Picker - 6 Row - 1 Machine				\$ 28.73

DEFOLIATION COST/ ACRE - Strippers - 8 Row - 2 Machines - (INCLUDE APPLICATION COSTS)

ITEM	UNIT	PRICE	QUANTITY	Total Amount
Thidiazuron (Ginstar)	oz	\$ 1.52	8	\$ 12.19
Ethephon + Cycilanilide (Finish 6 Pro)	oz	\$ 0.49	24	\$ 11.81
Silicone Surfactant	gal	\$ 109.00	0.025	\$ 2.73
Owned Ground Rig Application	trip	\$ 2.00	1	\$ 2.00
Paraquat dichloride (Grammoxone Int)	oz	\$ 0.31	32	\$ 9.89
Owned Ground Rig Application	trip	\$ 2.00	1	\$ 2.00
				\$ -
				\$ -
				\$ -
TOTAL DEFOLIATION COST PER ACRE FOR - Strippers - 8 Row - 2 Machines				\$ 40.62

Introduction QuickStartNotes BackgroundOnDefaultValues TitlesAndRevenue Defoliation Misc FirstComplement SecondComplement Summary

Ready

Figure 2. Defoliation Data Entry Screen.

Enter Miscellaneous Information

The screen used to enter miscellaneous information about both investment alternatives is shown below in Figure 3. This screen is designed to provide the user maximum flexibility when entering miscellaneous costs related to both investment alternatives. Because of this flexibility, the user should make sure that the data entered represent the total costs related to the specific investment alternative for that particular harvest season. This data entry screen does not calculate costs on a per acre basis as shown in the defoliation data entry screen. The total cost per year for both alternatives will be brought forward and used in the investment analysis with no adjustment for acreage harvested by that particular alternative.

As with the defoliation data entry screen, it should be noted that if the miscellaneous costs for both harvesting alternatives are the same, the user may either enter that information for both alternatives or leave the miscellaneous costs for both alternatives blank. The investment analysis will not be affected in that case as only differences in the cost strains are taken into account in development of the alternative cash flows for both investments. However, the user must make sure that in this case where there is no difference in miscellaneous costs, both alternatives' miscellaneous cost data are left blank. In the example shown in Figure 3, information has been entered about the cost of module tarps for the conventional picker system and the cost of plastic wrap for the module building picker.

MISCELLANEOUS COSTS - Picker - 6 Row - 1 Machine

ITEM	UNIT	PRICE	QUANTITY	Total Amount
Module Tarps - Prorated Charge	module	\$ 11.00	408	\$ 4,488.00
				\$ -
				\$ -
				\$ -
				\$ -
				\$ -
TOTAL MISCELLANEOUS COSTS PER YEAR FOR - Picker - 6 Row - 1 Machine				\$ 4,488.00

MISCELLANEOUS COSTS - Strippers - 8 Row - 2 Machines

ITEM	UNIT	PRICE	QUANTITY	Total Amount
Module Tarps - Prorated Charge	module	\$ 11.00	539	\$ 5,929.00
				\$ -
				\$ -
				\$ -
				\$ -
				\$ -
TOTAL MISCELLANEOUS COSTS PER YEAR FOR - Strippers - 8 Row - 2 Machines				\$ 5,929.00

Figure 3. Miscellaneous Cost Data Entry Screen.

Enter Information Related to the First Machinery Complement

The screen used to enter information related to the “First Machinery Investment Complement Alternative” is shown below in Figure 4. The top row of cells with colored backgrounds is used to label the items included in investment analysis for the cotton harvest machinery complement. The input data related to the harvester for the machinery complement should be entered in the first column. In the case of differing lengths of life for machinery within the complement, the useful life of the harvester will be used for the length of the net present value analysis. The second row of cells with colored backgrounds is used to enter the purchase price of each machine in the complement, and this value should represent the acquisition or purchase price of the machine net of any trade-in. This value will be used in the net present value calculation to represent the initial investment, and will also be used in conjunction with the salvage value entered for the machine to calculate annual depreciation. While annual depreciation does not enter into the net present value calculation, it is used to generate estimates of the annual ownership cost for the machinery complement that can be helpful as a cross check to assess the accuracy of data entered for this machinery complement. The useful life of the machine will be used to determine the length of the net present value analysis for this investment. In the case of differing lengths of life for machinery within the complement, the useful life of the harvester will be used for the length of the net present value analysis. The useful life will also be used in conjunction with the purchase price and salvage value to calculate annual depreciation that is used in estimation of the annual ownership cost of the machinery complement.

The next row is used to input the annual use in total hours, which is used in conjunction with the annual use for cotton harvest in hours to prorate the ownership costs (depreciation, insurance, property taxes and other miscellaneous charges) and repairs for the machinery complement. The annual use in hours input on this row should be consistent with the acres harvested value entered at the bottom of the screen. The acres harvested divided by the field capacity would be an appropriate value to enter for the machine to enter on this row. Field capacity estimates for selected harvesters are available in Appendix I.

The row titled “Salvage Value” is used to input the terminal value for the piece of equipment in the net present value calculation for the machinery complement. It is also used in the depreciation calculation included in the machinery complement’s annual ownership and operating cost. The row of cells titled “Annual Insurance/Housing/Taxes” is used to enter values that are included in the calculation of annual ownership costs for the machine, and are prorated using the percentage of cotton harvest hours divided by total hours the machine is used annually. In addition to insurance, housing or taxes (other than income taxes) other miscellaneous costs associated with the machine should be entered in this row of cells.

Fuel use per hour should be entered only for self-propelled machinery or tractors. The labor rate in \$ per hour in most cases should be entered only for self-propelled machinery or tractors. The labor rate is multiplied by the annual use for cotton harvest to calculate annual operating costs. If a labor rate is entered for the towed implements such as the boll buggy, labor costs would be double counted for that implement if the labor rate per hour is included for the tractor used in that operation. To analyze a scenario that includes financing the purchase of the machine, enter the percentage of the purchase price (the % down payment) required by the lending institution, the length of the note in years and the percent interest rate for the loan. The “Number of Machines in Complement” is used as a multiplier for all machinery that is included in this complement. If this number is greater than one, all salvage values, repairs and financing will be calculated identically for the specified number of machines. The definitions for data that are needed to complete the analysis for the second machinery complement are the same.

The screenshot shows a Microsoft Excel spreadsheet titled "Generic_CottonHarvestSystemInvestmentDecisionAidv4_DRAFT3.xls (Compatibility Mode) - Microsoft Excel". The active sheet is "FirstComplement". The data entry screen is titled "Picker 6-Row" and contains the following data:

Picker 6-Row	Builder
Machine	
Purchase Price (\$ per Machine)	\$ 500,000.00
Useful Life (Year)	7
Annual Use (Total Hours)	300
Annual Use (Cotton Harvest Hours)	300
Salvage Value	\$ 150,000.00
Annual Insurance/Housing/Taxes	\$ 10,000.00
Fuel Use-(Gallons per Hour)	2.00
Fuel Price-(\$ per Gallon)	\$ 2.50
Annual Repairs	\$ 30,000.00
Labor Rate (\$ per Hour)	\$ 13.50
Percent Down Payment	30.00%
Length of Note in Years	4
Percent Interest Rate for Loan	8.00%
Number of Machines in Complement	1
Acres Harvested per Year	2,000

Below the input fields, the following calculated costs are displayed:

Total Annual Ownership and Operating Cost	\$ 142,276.66
Annual Ownership and Operating Cost per Acre	\$ 71.14
Annual Ownership and Operating Cost per Pound of Lint	\$ 0.0484

Figure 4. First Machinery Complement Data Entry Screen.

Summary Screen

To complete the “Cotton Harvest System Investment Decision Analysis”, a discount rate needs to be entered on the Summary Screen shown below in Figure 5. The discount rate is used in the net present value calculations for both alternatives. The discount rate should be the annual rate of return you require for the investment in the harvest equipment. The discount rate should be selected such that it provides a rate of return comparable to an investment of similar risk.

The decision aid provides a diagnostic answer as to the preferred alternative based on the higher of the two net present value calculations made for the investment alternatives. In almost every case, this value will be a negative number as we are comparing cost-minimizing technologies. Because we may need to compare machinery complements that have different lengths of life, an annuity-equivalent calculation is included in the decision-support aid. The annuity-equivalent method determines the size of an annual annuity for the economic life of the investment that could be provided by the sum equal to the present value of its projected cash flow stream (Barry, Hopkin and Baker). In addition, we may be comparing equipment complements with different total annual acre harvest capacities that would make the calculation of the annuity equivalent on a per acre basis necessary. The annuity-equivalent per acre of the cost stream that is the largest will be preferred in any case.

Microsoft Excel - Generic_CottonHarvestSystemInvestmentDecisionAidv4_DRAFT3.xls [Compatibility Mode]															
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Discount Rate	7.0%	In this scenario the Picker - 6 Row - 1 Machine is preferred due to the higher annuity equivalent per acre of that complement.												
2															
3		Cost Per Acre	Cost per Lb												
4	Picker - 6 Row - 1 Machine	\$ 71.14	\$ 0.05												
5	Strippers - 8 Row - 2 Machines	\$ 71.83	\$ 0.05												
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Figure 5. Summary Screen.

Saving Data Files

To properly save a data file: First, select the **File** command from the Main Menu, then **Save As** from the File menu. The user should then enter a file name in the **File name** text box, and then click on the **Save** button. After saving the new file the first time, any updates to that data file can be saved by selecting the Save icon from the toolbar or the **Save** option from the File pull-down menu.

References

Barry, P.J., J.A. Hopkin and C.B. Baker. Financial Management in Agriculture, 4th Edition. Danville, IL: The Interstate Printers and Publishers, Inc., 1983.

Appendix I

Field Efficiency and Capacity Summary

		Field Capacity (acres per hr)	
	Speed (mph)	Average	Range
<i>First gear picking speed</i>			
John Deere 7760	4.2	7.7	5.8 – 8.1
Case IH 635	4.2	7.0	5.5 – 7.4
Conventional Picker 1	4.0	6.7	5.3 – 7.0
Conventional Picker 2	3.6	6.1	4.9 – 6.4
<i>Second gear picking speed</i>			
John Deere 7760	5.0	8.9	6.5 – 9.6
Case IH 635	5.0	8.1	6.1 – 8.6
Conventional Picker 1	4.8	7.7	5.9 – 8.2
Conventional Picker 2	3.8	6.4	5.1 – 6.7
<i>Average 1st and 2nd Gear</i>			
John Deere 7760	4.6	8.3	
Case IH 635	4.6	7.6	
Conventional Picker 1	4.4	7.2	
Conventional Picker 2	3.7	6.3	
Stripper Harvester (with field cleaner)			
Yield 1.5 bales per acre	5.5	7.8	
Yield 3.0 bales per acre	3.0	4.3	
Yield 4.0 bales per acre	2.4	3.5	

Cotton picker performance rates based on information from M.J. Buschermohle, M.H. Willcutt, , E.M. Barnes, and F. To. Field Performance Evaluation of On-Board Module Building and Conventional Basket-Type Cotton Harvesters – submitted for publication in Applied Engineering.

Cotton stripper harvester performance information from W.B. Faulkner, J.D. Wanjura, R.K. Boman, B.W. Shaw, and C.B. Parnell. Evaluation of Modern Cotton Harvest Systems on Irrigated Cotton: Harvester Performance – submitted for publication in Transactions of the ASABE.