



Enterprise Budgets

Guayule, Flood Irrigated, Southern Arizona

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This series of enterprise budgets estimate the typical economic costs and returns to establish, grow, and harvest guayule over a six-year period, using flood irrigation in southern Arizona. It should be used as a guide to estimate actual costs and returns and is not representative of any particular farm. The assumptions used in constructing these budgets are discussed below. Assistance provided by area producers and agribusinesses is much appreciated.

The results of this study are based on our current understanding of guayule production, market and yields. As research advances, we expect these assumptions to change.

Cropping Pattern

These budgets are based on a 1,500-tillable acre farm with 300 acres of guayule, 225 acres in cotton, 75 acres in corn, sorghum, and barley each, 225 acres in winter wheat, and 525 acres of alfalfa hay production. All crops are grown using flood irrigation. Typical guayule yield in this budget is 22,000 pounds per acre at 15 percent moisture content.

The six-year sequence for guayule production is to establish the crop in year 1, harvest in years 2, 4, and 6, and grow the crop between harvests in years 3 and 5. Crop removal occurs in year 6 after harvest.

Labor

Tractor driver labor cost is \$14.44 per hour and general labor \$13.13 per hour, both rates include social security, workers' compensation, unemployment insurance, and other labor overhead expenses. For this study, owner labor is valued at the same rate as tractor driver rates, and all labor is assumed to be a cash cost. Tractor labor hours are calculated based on machinery hours, plus ten percent.

Capital

Interest on operating capital for harvest and production inputs (6 percent) is treated as a cash expense, borrowed for 6-months. An interest rate of six percent is charged as an opportunity to the owner for machinery ownership.

Machinery and Equipment

The machinery and equipment used in this budget are sufficient for a 1,500-acre farm in crops. The machinery and equipment hours reflect producing guayule, cotton, corn, sorghum, barley, winter wheat, and alfalfa hay. A detailed breakdown of machinery values is shown in Table 6. Estimated labor, variable, and fixed costs for machinery are shown in Table 7, based on an hour and per acre basis. The machinery costs are calculated based on the total farm use of the machinery. Off-road diesel is \$2.70 per gallon.

Operations

Table 8 shows the machine operations by year during guayule production. A 175-hp tractor is used to pull the v-ripper, heavy disk, landplane, 4-row lister, bed shaper, and 8-row planter. A 125-hp tractor is used to pull the 8-row cultivator, baler, fertilizer spreader, and boom sprayer. A charge for miscellaneous and other expenses is five percent of production costs, including additional labor, repairs and maintenance, supplies and materials, tax preparation, memberships in professional organizations, and educational workshops not included in field operations.

Six-Year Sensitivity Analysis of Net Returns

Adding together the six years of costs and three years of guayule production results in a break-even price of \$0.045 per pound to cover all variable costs and \$0.056 per pound to cover total variable and fixed costs. Table 1 shows the total net returns over six-years of guayule production at various yields, prices, and a 20 percent increase and decrease in total costs. The \$0.07 cents per pound or mid-point on the sensitivity analysis (Table 1) was derived from the breakeven cost of production. This was used as there is no established market for guayule.

Annual Budgets

Table 2 represents the net cost and returns per year for the six-year production cycle of guayule. More detailed cost of

establishing guayule is \$604 per acre (Table 3) and \$551 per acre in the growing years between harvests (Table 5). The gross income in the harvest years is \$1,540 per acre; guayule price at \$0.07 per pound, with an average yield of 22,000 pounds (Table 4). Variable costs are \$505 per acre, giving a net return above variable cash costs of \$1,035 per acre. Total fixed costs are \$734 per acre, which includes an amortization charge of \$569 is included as an opportunity cost to establish and grow guayule in years 1, 3, and 5 during the six-year rotation. Total costs are \$1,238 per acre, variable costs are 41% of total costs.

Note: Not included in these budgets are family living withdrawals for unpaid labor, returns to management, depreciation and opportunity costs for vehicles, buildings and improvements, inflation, and local, state, and federal income taxes.

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Table 1. Estimated Total Net Returns from Six Years of Guayule Production at Varying Price, Yields, and Percentage of Production Costs, \$/acre.

% Change in Total Costs	Yield, Lbs/Acre	Guayule Price per Pound of Biomass				
		\$0.05	\$0.06	\$0.07	\$0.08	\$0.09
0%	19,000	(\$865)	(\$295)	\$275	\$845	\$1,415
	20,000	(\$715)	(\$115)	\$485	\$1,085	\$1,685
	21,000	(\$565)	\$65	\$695	\$1,325	\$1,955
	22,000	(\$415)	\$245	\$905	\$1,565	\$2,225
	23,000	(\$265)	\$425	\$1,115	\$1,805	\$2,495
	24,000	(\$115)	\$605	\$1,325	\$2,045	\$2,765
	25,000	\$35	\$785	\$1,535	\$2,285	\$3,035
-20%	19,000	(\$122)	\$448	\$1,018	\$1,588	\$2,158
	20,000	\$28	\$628	\$1,228	\$1,828	\$2,428
	21,000	\$178	\$808	\$1,438	\$2,068	\$2,698
	22,000	\$328	\$988	\$1,648	\$2,308	\$2,968
	23,000	\$478	\$1,168	\$1,858	\$2,548	\$3,238
	24,000	\$628	\$1,348	\$2,068	\$2,788	\$3,508
	25,000	\$778	\$1,528	\$2,278	\$3,028	\$3,778
20%	19,000	(\$1,608)	(\$1,038)	(\$468)	\$201	\$672
	20,000	(\$1,458)	(\$858)	(\$258)	\$342	\$942
	21,000	(\$1,308)	(\$678)	(\$48)	\$582	\$1,212
	22,000	(\$1,158)	(\$498)	\$162	\$822	\$1,482
	23,000	(\$1,008)	(\$318)	\$372	\$1,062	\$1,752
	24,000	(\$858)	(\$138)	\$582	\$1,302	\$2,022
	25,000	(\$708)	\$42	\$792	\$1,542	\$2,292

Table 2. Annual Net Returns of Income and Expenses to Establish and Produce Guayule, \$/acre.¹

	Variable			Annual Net Returns
	Income	Cash Cost	Fixed Cost	
Year 1: Establishment	\$0	\$383	\$220	-\$604
Year 2: Harvest ²	1,540	505	165	870
Year 3: Growing	0	387	164	-551
Year 4: Harvest ²	1,540	505	165	870
Year 5: Growing	0	387	164	-551
Year 6: Harvest ²	1,540	505	165	870

Table 3. Year 1: Guayule Establishment Year, Economic and Cash Costs, \$/acre.

Variable Cash Costs	Price	Quantity	Unit	Labor	Machinery	Materials	Total	
Land Preparation and Maintenance								
V- Ripper		1.00	acre	\$6.42	\$15.64	\$0.00	\$22.06	
Offset Disk		2.00	acre	\$3.64	\$8.69	\$0.00	\$12.33	
Lister		1.00	acre	\$4.10	\$8.90	\$0.00	\$12.99	
Bed Shaper		1.00	acre	\$2.20	\$4.64	\$0.00	\$6.84	
Crop Production								
Row Cultivator		2.00	acre	\$3.67	\$11.29	\$40.50	\$55.46	
Seed		40.50	acre					
Fertilizer Spreader		1.00	acre	\$1.56	\$2.73	\$67.00	\$71.29	
Nitrogen	\$0.25	100.00	pounds					
Phosphorus	\$0.21	200.00	pounds					
Boom Sprayer		1.00	acre	\$1.34	\$1.83	\$90.42	\$93.59	
Prowl	\$6.50	9.00	pints					
Aim	\$5.62	1.80	ounces					
Fusilade	\$1.09	20.00	ounces					
Row Planter		1.00	acre	\$1.64	\$2.25	\$0.00	\$3.89	
Irrigation, Flood				\$9.85	\$0.00	\$60.00	\$69.85	
Water	\$60.00	1.00	ac ft					
Labor	\$13.13	0.75	hour					
Other Charges								
Other Expenses		0.05		\$0.00	\$0.00	\$17.73	\$17.73	
Interest on Operating Capital		0.06		\$0.00	\$0.00	\$11.17	\$11.17	
Total Variable Cash Costs				\$36.34	\$60.32	\$286.81	\$383.47	
Total Returns minus Total Variable Cash Costs							-\$383.47	
Fixed Cash Costs						Unit	\$/Unit	Value
Property Insurance					acre	\$0.85	\$0.85	
Property Taxes					acre	\$9.44	\$9.44	
Annual Cash Rent Payment					acre	\$150.00	\$150.00	
Total Fixed Cash Costs							\$160.29	
Fixed Non-Cash Costs						Unit	\$/Unit	Value
Power Units, Machinery & Equipment, depreciation & interest					acre	\$59.89	\$59.89	
Total Fixed Non-Cash Costs							\$59.89	
Total Annual Costs							\$603.65	
Returns minus Total Annual Costs							-\$603.65	

Table 4. Years 2,4 and 6: Guayule Harvest Years, Economic and Cash Costs and Returns, \$/acre.

<i>Returns</i>		Unit	\$/Unit		Quantity	Value	
Guayule Biomass		pound	\$0.07		22,000.00	\$1,540.00	
Total Returns							
Variable Cash Costs	Price	Quantity	Unit	Labor	Machinery	Materials	Total
Land Preparation and Maintenance							
Offset Disk		0.20	acre	\$0.36	\$0.87	\$0.00	\$1.23
Broom Sprayer		1.00	acre	\$1.34	\$1.83	\$90.42	\$93.59
Prowl	\$6.50	9.00	pints				
Aim	\$5.62	1.80	ounces				
Fusilade	\$1.09	20.00	ounces				
Row Cultivator		1.00	acre	\$1.83	\$5.65	\$0.00	\$7.48
Irrigation, Flood				\$9.85	\$0.00	\$247.00	\$256.85
Water	\$60.00	3.00	ac ft				
Labor	\$13.13	0.75	hour				
Harvest							
Harvest, Custom		1.00	acre	\$0.00	\$0.00	\$100.00	\$100.00
Other Charges							
Other Expenses		0.05		\$0.00	\$0.00	\$23.33	\$23.33
Interest on Operating Capital		0.06		\$0.00	\$0.00	\$14.70	\$14.70
Total Variable Cash Costs				\$15.22	\$14.00	\$475.45	\$504.66
Total Returns minus Total Variable Cash Costs							\$1,035.34
Fixed Cash Costs					Unit	\$/Unit	Value
Property Insurance					acre	\$0.85	\$0.85
Property Taxes					acre	\$9.44	\$9.44
Annual Cash Rent Payment					acre	\$150.00	\$150.00
Total Fixed Cash Costs							\$160.29
Fixed Non-Cash Costs					Unit	\$/Unit	Value
Power Units, Machinery & Equipment, depreciation & interest					acre	\$4.70	\$4.70
Amortized Establishment and Maintenance Costs					acre	\$568.69	\$568.69
Total Fixed Non-Cash Costs							\$573.39
Total Annual Costs							\$1,238.35
Returns minus Total Annual Costs							\$301.65

Table 5. Years 3 and 5: Guayule Growing Years, Economic and Cash Costs, \$/acre.

<i>Variable Cash Costs</i>	Price	Quantity	Unit	Labor	Machinery	Materials	Total
Land Preparation and Maintenance							
Row Cultivator		1.00	acre	\$1.83	\$5.65	\$0.00	\$7.48
Boom Sprayer		1.00	acre	\$1.34	\$1.83	\$90.42	\$93.59
Prowl	\$6.50	9.00	pints				
Aim	\$5.62	1.80	ounces				
Fusilade	\$1.09	20.00	ounces				
Irrigation, Flood				\$9.85	\$0.00	\$247.00	\$256.85
IWater	\$60.00	3.00	ac ft				
Labor	\$13.13	0.75	hour				
Other Charges							
Other Expenses		0.05		\$0.00	\$0.00	\$17.90	\$17.90
Interest on Operating Capital		0.06		\$0.00	\$0.00	\$11.27	\$11.27
Total Variable Cash Costs				\$13.02	\$7.48	\$366.59	\$387.09
Total Returns minus Total Variable Cash Costs							-\$387.09
Fixed Cash Costs							
					Unit	\$/Unit	Value
Property Insurance					acre	\$0.85	\$0.85
Property Taxes					acre	\$9.44	\$9.44
Annual Cash Rent Payment					acre	\$150.00	\$150.00
Total Fixed Cash Costs							\$160.29
Fixed Non-Cash Costs							
					Unit	\$/Unit	Value
Power Units, Machinery & Equipment, depreciation & interest					acre	\$3.83	\$3.83
Total Fixed Non-Cash Costs							\$3.83
Total Annual Costs							\$551.21
Returns minus Total Annual Costs							-\$551.21

Table 6. Machinery Cost Assumptions

Machine	Width (feet)	Market Value	Hours of	Expected
			Annual Use	Life (Years)
175 HP Tractor	N/A	\$180,000	947	15
125 HP Tractor	N/A	\$80,000	1,502	10
V-Ripper	8.0	\$22,000	152	10
Offset Disk	18.0	\$30,000	195	15
Landplane	16.0	\$18,000	52	15
Lister	10.0	\$6,500	110	15
Bed Shaper	20.0	\$6,500	38	20
Row Planter	20.0	\$40,000	84	15
Row Cultivator	20.0	\$22,000	144	10
Fertilizer Spreader	20.0	\$18,000	56	20
Boom Sprayer	30.0	\$9,500	171	20

Table 7. Machinery Cost Calculations, on a per hour and per acre basis.

Machine		Variable Costs		Fixed Cost	
		Fuel & Lube	Repair & Maint.	Deprec & Interest	Total Cost
Costs Per Hour					
175 HP Tractor		\$24.84	\$7.67	\$21.05	\$53.56
125 HP Tractor		\$12.42	\$3.60	\$6.86	\$22.88
V-Ripper		\$0.00	\$6.16	\$18.76	\$24.92
Offset Disk		\$0.00	\$5.40	\$17.18	\$22.58
Landplane		\$0.00	\$3.24	\$39.04	\$42.28
Lister		\$0.00	\$2.01	\$6.64	\$8.64
Bed Shaper		\$0.00	\$0.97	\$18.77	\$19.73
Row Planter		\$0.00	\$16.43	\$55.63	\$72.26
Row Cultivator		\$0.00	\$5.81	\$19.42	\$25.23
Fertilizer Spreader		\$0.00	\$11.76	\$36.60	\$48.36
Boom Sprayer		\$0.00	\$5.64	\$6.37	\$12.00
Costs Per Acre					
Field Operation	Acres/Hour	Operator Labor	Variable Costs	Fixed Costs	Total Costs
175 HP Tractor & V-Ripper	2.47	\$6.42	\$15.64	\$16.10	\$38.16
175 HP Tractor & Offset Disk	8.73	\$1.82	\$4.34	\$4.38	\$10.54
175 HP Tractor & Landplane	8.24	\$1.93	\$4.34	\$7.29	\$13.56
175 HP Tractor & Lister	3.88	\$4.10	\$8.90	\$7.14	\$20.13
175 HP Tractor & Bed Shaper	7.21	\$2.20	\$4.64	\$5.52	\$12.37
175 HP Tractor & Planter	8.67	\$1.83	\$5.65	\$8.87	\$16.35
125 HP Tractor & Cultivator	9.70	\$1.64	\$2.25	\$2.71	\$6.60
125 HP Tractor & Fertilizer Spreader	10.18	\$1.56	\$2.73	\$4.27	\$8.56
125 HP Tractor & Boom Sprayer	11.82	\$1.34	\$1.83	\$1.12	\$4.30

Table 8. Machine Operations by Year in Guayule Production

	Establishment Year	Harvest Years	Growing Years
Machine Operation	X/Acre	X/Acre	X/Acre
175 HP Tractor & V-Ripper	1.00		
175 HP Tractor & Offset Disk	2.00	0.20	
175 HP Tractor & Landplane	1.00		
175 HP Tractor & Lister	1.00		
175 HP Tractor & Bed Shaper	1.00		
175 HP Tractor & Planter	1.00		
125 HP Tractor & Cultivator	2.00	1.00	1.00
125 HP Tractor & Fertilizer Spreader	1.00		
125 HP Tractor & Boom Sprayer	1.00	1.00	1.00



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