



Bioenergy Feedstock Production - Activity

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INTRODUCTION

Enterprise budgets can be used to determine potential returns from different crops. When examining budgets from different sources, make sure the budgets use the same assumptions so you are comparing apples to apples. For example, corn and soybean budgets from Ohio State include management and land charges while Miscanthus and switchgrass budgets from Penn State do not.

QUESTIONS

Using the included enterprise budgets, answer the following questions:

1. Compare the returns from average-yielding corn (160 bu/acre) to switchgrass or Miscanthus production. Be sure to remove management charges and land costs from the corn budget. Next, compare returns with lower-yielding corn (128 bu/acre). Lastly, modify the corn budget to simulate 100 bu/acre corn. What does the difference in returns for the three scenarios tell you about the potential for producing switchgrass or Miscanthus on high- or lower-yielding corn soils? (See answer below.)
2. Repeat the same process with soybeans using average (47 bu/acre, low 37 bu/acre, or very low 30 bu/acre) production levels. In some relatively productive fields, other factors can cause soybean yields to be low and this should be considered in the planning process. For example, low soybean yields can be a result of wildlife damage on fields near wooded areas- crops like Miscanthus or switchgrass are usually not impacted by wildlife.

EXERCISE

Budgets can also provide an example of the benefits of value-added marketing. Use the switchgrass budget for this example.

1. The base budget lists a potential revenue price of \$55/ton which results in annual revenue of \$108/acre in years 3 through 15 for a total return of \$1,022 over 15 years. Estimate the impact annual revenue and total revenue if you were able to increase the potential revenue price to either \$65 or \$75/ton with some efforts in value-added market development.

SOLUTION

Question #1: Below is the OSU corn budget with management and land costs removed. Annual returns above all costs were \$121.21 per acre for the 160 bu/acre corn and \$24.38/acre for the 128 bu/acre corn. Also shown is the switchgrass budget, showing a long term annual return of \$59/yr. Thus when higher corn yields are expected at these prices, corn will have higher returns, but at the lower yield, the switchgrass enterprise will be more profitable.

CORN PRODUCTION BUDGET- 2014									
Conservation Tillage Practices: N-Source - NH3									
Reflects 2000 acres, Conservation Tillage Corn/No-Till RR Soybeans									
									Updated
ITEM	EXPLANATION			YOUR	PRICE PER	YIELD (bu/			
				PROD.	UNIT				
				NUMBERS		128	160		
RECEIPTS									
Corn ¹					\$4.50 /bu	576.00	720.00		
Grower or Market Premium						0.00	0.00		
TOTAL RECEIPTS						576.00	720.00		
VARIABLE COSTS									
Seed (kernels) ³	28000	32000	34000	34000	\$3.44 /1000	96.25	110.00		
	Seed Cost Per Bag				\$275.00 /bag				
Fertilizer ⁴						0.00	0.00		
Starter Fertilizer						0.00	0.00		
N (lbs.)	130.0	160.0	190.0	190.0	0.457 /lb	66.45	80.17		
P ₂ O ₅ (lbs)	47.4	59.2	71.0	74.0	0.5962 /lb	28.23	35.29		
K ₂ O(lbs)	34.6	43.2	51.8	54.0	0.3750 /lb	12.96	16.20		
Lime(ton)		0.25		0.25	25 /ton	6.25	6.25		
Chemicals ⁵	Herbicide					55.93	55.93		
	Fungicide					0.00	0.00		
	Insecticide					0.00	0.00		
Drying - Fuel & Electric only ⁶	\$2.00	/gal LP			0.21 /bu	26.88	33.60		
Trucking - Fuel Only ⁷	\$4.00	/gal Diesel			30 miles	3.13	3.91		
Fuel, Oil, Grease ⁸						20.14	20.14		
Repairs ⁹						26.78	26.78		
Crop Insurance ¹⁰						20.00	21.00		
Miscellaneous ¹¹						12.00	12.00		
Int. on Oper. Cap. ¹²		7 mo.			4.00%	8.05	8.95		
Hired Labor ¹³						0.00	0.00		
TOTAL VARIABLE COSTS				-Per Acre		383.05	430.23		
				-Per Bushel		2.99	2.69		
FIXED COSTS									
Labor Charge ¹⁴	3	hours			15.00 /hr	45.00	45.00		
Management Charge ¹⁷	0%	of gross revenue				0.00	0.00		
Mach. And Equip. Charge ¹⁵						123.57	123.57		
Land Charge ¹⁶	Rent					0.00	0.00		
TOTAL FIXED COSTS						168.57	168.57		
TOTAL COSTS				-Per Acre		551.62	598.79		
				-Per Bushel		4.31	3.74		
RETURN ABOVE VARIABLE COSTS						192.95	289.77		
RETURN ABOVE VARIABLE AND LAND COSTS						192.95	289.77		
RETURN ABOVE TOTAL COSTS						24.38	121.21		
RETURN TO LAND						24.38	121.21		
RETURN TO LABOR AND MANAGEMENT¹⁸						69.38	166.21		
RETURN TO LAND, LABOR AND MANAGEMENT						69.38	166.21		

Switchgrass Budget 2013				QTY	Unit	Price /Unit	Yr 1 (Establishment)	Yr 2	Yr 3	Yr 4-15	Total	Present value ⁸
SELECT CASH EXPENSES												
Plant Material												
	Seed	8	8 lbsPLS/A	\$10.00	\$80.00	\$0	\$0	\$0			\$80	\$80
Soil Fertility												
	Nitrogen ¹	10	lb/expected ton per acre	\$ 0.56	\$0	\$28.00	\$ 39.20	\$39.20			\$537.60	\$403
	P ₂ O ₅ ¹	4	lb/expected ton per acre	\$ 0.63	\$0	\$12.60	\$ 17.64	\$17.64			\$241.92	\$181
	K ₂ O ¹	15	lb/expected ton per acre	\$ 0.48	\$0	\$36.00	\$ 50.40	\$50.40			\$691.20	\$519
	Fertilizer application ²	annually	per acre	\$10.60	\$0	\$10.60	\$10.60	\$10.60			\$148.40	\$112
	Lime ³	see inputs	ton	\$ 38.00	\$152	\$17.54	\$17.54	\$17.54			\$397.54	\$337
	Soil Testing ⁴		per soil test	\$ 15.00	\$3.00	\$1.00	\$1.00	\$1.00			\$17.00	\$14
Weed Control												
	Burn-Down ⁵	32 ounces	acre	\$ 6.50	\$6.50	\$0.00	\$0.00	\$0.00			\$6.50	\$7
	Post-Emergence ⁶	8 ounces	acre	\$ 23.00	\$23.00	\$0.00	\$0.00	\$0.00			\$23.00	\$23
	Post-Emergence ⁶	8 oz	acre	\$ 3.00	\$0.00	\$3.00	\$0.00	\$0.00			\$3.00	\$3
	Sprayer-3 sprays ²	3	acre	\$11.50	\$23.00	\$11.50	\$0.00	\$0.00			\$34.50	\$34
Establishment & Maintenance												
	Brush Mowing ²	1	acre	\$24.90	\$25	\$0	\$0	\$0			\$24.90	\$25
	Moldboard Plow ²	1	acre	\$23.90	\$24	\$0	\$0	\$0			\$23.90	\$24
	Disking-2 passes ²	2	acre	\$17.50	\$35	\$0	\$0	\$0			\$35.00	\$35
	Soil Finish-2 passes ²	2	acre	\$18.90	\$38	\$0	\$0	\$0			\$37.80	\$38
	Drill ²	1	acre	\$18.30	\$18	\$2	\$0	\$0			\$20.59	\$20
Harvesting												
	Mowing/conditioning ²	1	acre	\$16.20	\$0	\$16	\$16	\$16			\$226.80	\$171
	Baling - lg round ^{2&7}	16.22	bale	\$7.70	\$0	\$85	\$125	\$125			\$1,708.37	\$1,281
TOTAL CASH EXPENSES							\$427	\$223	\$277	\$277	\$4,258	\$3,306
REVENUES												
	Biomass	Mature yield (estimation)	7	dry ton	\$0	\$5	\$7.0	\$7			\$96	\$3,961
		Revenue Stream			\$ 55.00	\$0	\$275	\$385	\$385		\$5,280.00	
REV ABOVE EXPENSES							-\$427	\$52	\$108	\$108	\$1,022	\$655
							EQUAL ANNUAL INCOME (Annualized over 15 years)				\$59	NPV
							BREAK EVEN PAYBACK PERIOD⁸				\$54.41	5 years

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