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# Estimating the Change In Total Production Expenses for the Major Row Crops as Fuel Prices Change

## Background

- Row crop production agriculture has a common set of inputs that are used by many of the traditional crops.
  - ♦ These inputs include fertilizer, seed, fuel, machinery, labor, and land.
- However, each crop uses a different amount of a given input when compared to another crop.
- ♦ For example, soybeans use no nitrogen fertilizer while corn uses a large amount of nitrogen fertilizer.
- Thus, as the price of an input changes the profitability of each crop will be affected differently.

#### **Problem**

- Fuel is a somewhat unique input for crop production because other input prices are correlated to the fuel price.
- In addition, the fuel price is very variable from year to year which makes estimating the most profitable crop mix difficult.
- This poster examines the profitability of corn, soybeans, and cotton as diesel prices change. Included in the analysis is a stochastic analysis of the variability of fuel prices and the effects on profitability.

### **Data**

- Fuel prices come from the EIA
- Fertilizer prices come from the USDA
- Yearly data for the last 11 years (April of each year)

## **Procedure**

- Estimate the dollars spent on fuel and fertilizer by using the Mississippi State Budget Generator
- Simulate diesel and fertilizer prices for the past 11 years to determine the relationship between diesel and fertilizer prices

# **Budgets for Corn, Soybeans, and Cotton**

			-	pi, 2011	
ITEM	UNIT	PRICE	QUANTITY	AMOUNT	YOUR FARM
		dollars		dollars	
DIRECT EXPENSES					
CUSTOM SPRAY					
App by Air ( 5 gal)	appl	5.50	1.0000	5.50	
App by Air (3 gal)		4.00	1.0000	4.00	
FERTILIZERS					
DAP	cwt	25.00	1.8000	45.00	
Potash (60% K20)	cwt	23.00	1.3750	31.63	
Fert 10-34-0	cwt	22.00	0.5000	11.00	
UAN + Sulfur (28%)	cwt	12.00	3.5710	42.85	
UAN (32% N)	cwt	12.50	4.3750	54.69	
HERBICIDES					
Glyphosate 3lbs a.e.	pt	1.75	4.0000	7.00	
Clarity	pt	11.86	0.5000	5.93	
Lexar	pt	5.56	3.3000	18.35	
	Ъr	3.30	3.3000	10.33	
INSECTICIDES		1 66	4 0000	6 6 4	
Intrepid 2F	ΟZ	1.66	4.0000	6.64	
IRRIGATION SUPPLIES					
Roll-Out Pipe SEED/PLANTS	ft	0.20	33.0000	6.60	
Corn Seed BtRR CUSTOM FERTILIZE	thous	2.90	30.0000	87.00	
Custom Apply Fert	acre	6.25	1.0000	6.25	
HAULING Haul Corn/Field	bu	0.26	185.0000	48.10	
CUSTOM LIME					
Lime (Spread) OPERATOR LABOR	ton	46.00	0.5000	23.00	
Tractors	hour	11.35	0.4883	5.54	
Harvesters	hour	11.35	0.1009	1.15	
IRRIGATE LABOR					
Special Labor	hour	9.06	0.3250	2.96	
<u>-</u>	hour		0.0625	0.57	·
HAND LABOR	110 0.2	3.00	0.000		
	hour	9 06	0.1752	1.59	
UNALLOCATED LABOR		11.35			
DIESEL FUEL	11041	11.30	0.4331	J • Z Z	
	1	2 20	4 CEOE	11 11	
Tractors	gal		4.6505	11.11	
Harvesters					
Roll-Out Pipe Irr.	gal	2.39	10.5901	25.32	
REPAIR & MAINTENANCE					
Implements			1.0000	6.30	
Tractors	acre	1.90	1.0000	1.90	
Harvesters				2.64	
Roll-Out Pipe Irr.	acre	5.16	1.0000	5.16	
INTEREST ON OP. CAP.				11.36	
TOTAL DIRECT EXPENSES FIXED EXPENSES				488.40	
Implements	acre	9.08	1.0000	9.08	
Tractors	acre		1.0000	12.28	
	acre		1.0000	10.73	
Roll-Out Pipe Irr.			1.0000	24.98	
TOTAL FIXED EXPENSES				57.07	
TOTAT ETVED EVERNOSS					

Note: Cost of production estimates are based on 2010 input prices.

Fertilization decisions should be based on soil tests.

Intrepid application is necessary only on refuge acres.

ITEM	UNIT	PRICE	QUANTITY	AMOUNT	YOUR FARM
		dollars		dollars	
DIRECT EXPENSES CUSTOM SPRAY					
App by Air ( 5 gal) HARVEST AIDS	appl	5.50	3.5000	19.25	
Gramoxone Inteon Sodium Chlorate 3L FERTILIZERS	oz gal	0.25 3.35	4.0000 0.2500	1.00 0.84	
Phosphorus(46% P2O5) Potash (60% K2O)	cwt cwt	22.00 23.00	0.4000 0.6000	8.80 13.80	
FUNGICIDES Apron Maxx RTA	ΟZ	0.74	2.5000	1.85	
Quadris HERBICIDES	ΟZ	2.52	3.0000	7.56	
Glyphosate 31bs a.e.		1.75	6.0000	10.50	
2,4-D Amine 4	pt	1.74 4.72	2.0000	3.48	
Valor SX Dual Magnum	oz pt	12.64	1.0000	9.44 12.64	
INSECTICIDES	L C				
Gaucho 600	ΟZ	6.56	1.0000	6.56	
Karate Z Acephate 90SP	oz lb	2.87 6.46	0.9600 0.7500	2.76 4.85	
Intrepid 2F	OZ	1.66	1.0000	1.66	
IRRIGATION SUPPLIES Roll-Out Pipe	ft	0.20	33.0000	6.60	
SEED/PLANTS Soybean Seed RR	lb	0.99	50.0000	49.50	
ADJUVANTS Surfactant	pt	2.44	0.0750	0.18	
HAULING Haul Soybeans/Field	bu	0.26	65.0000	16.90	
CUSTOM LIME Lime (Spread)	ton	46.00	0.2000	9.20	
INOCULANT Nitragin S	ΟZ	0.27	2.7500	0.74	
OPERATOR LABOR Tractors	hour	11.35	0.5051	5.73	
Harvesters IRRIGATE LABOR	hour	11.35	0.1021		
Special Labor		9.06			
Implements HAND LABOR		9.06	0.0625		
Implements UNALLOCATED LABOR DIESEL FUEL	hour	9.06 11.36	0.1393 0.4758		
Tractors	gal	2.39	4.8145	11.50	
Harvesters Roll-Out Pipe Irr.	gal	2.39 2.39	1.3935	3.33 17.52	
REPAIR & MAINTENANCE				1 1 6	
Implements Tractors	acre	4.16 1 97	1.0000	4.16 1 97	
Harvesters	acre	2.46	1.0000	2.46	
Roll-Out Pipe Irr.	acre	5.16	1.0000	5.16	
INTEREST ON OP. CAP.	acre	5.42	1.0000	5.42	
TOTAL DIRECT EXPENSES FIXED EXPENSES				256.50	
Implements	acre	9.76	1.0000	9.76	
Tractors	acre	12.71	1.0000	12.71 9.99	
Harvesters Roll-Out Pipe Irr.	acre	46.78	1.0000	46.78	
TOTAL FIXED EXPENSES				79.24	
TOTAL SPECIFIED EXPENSES				335.74	

Note: Cost of production estimates are based on 2010 input prices.

These fertilizer rates are based on the assumption that 30-40% of the soybean fields would be mixed to light textured fields and not heavy clay exclusively. Also, rates are based on maintenance levels associated with the expected yield in the budget.

Fertilization decisions should be based on soil tests. The budget does not include a second fungicide application to control Asian soybean rust, but the cost of treatment could range from \$7 to \$12 per acre.

## Table 1.A Estimated costs per acre Cotton, 8R-38" solid, conservation tillage B2RF variety, Delta Area, Mississippi, 2013

TEM	UNIT	PRICE	QUANTITY	AMOUNT	YOUR FAI
		dollars		dollars	
DIRECT EXPENSES		3311312		0.011010	
CUSTOM SPRAY					
	appl	5.50	2.0000	11.00	
App by Air ( 3 gal)	appl	4.00	3.2500	13.00	
HARVEST AIDS					
Thidiazuron 4lb	ΟZ	1.74	2.0000	3.48	
Ethephon 6E	pt	2.85	1.3300	3.79	
Tribufos 6lb	pt	6.53	0.5000	3.27	
GINNING					
Gin & Haul	lb	0.09	900.0000	81.00	
FERTILIZERS					
Potash (60% K20)	cwt	23.00	1.5000	34.50	
UAN (32% N)	cwt	12.50	4.0000	50.00	
FUNGICIDES					
Cotton Seed Trt.	acre	20.00	1.0000	20.00	
HERBICIDES					
Clarity	pt	11.86	0.5000	5.93	
Glyphosate 3lbs a.e.		0.11	128.0000	14.08	
		12.64			
Dual Magnum	pt		1.0000	12.64	
Diuron 80%	lb	4.55	1.0000	4.55	
INSECTICIDES	- 1	2 2 3	1 = 2 2 2	40	
Acephate 90%	lb	8.21	1.5200	12.48	
Centric 40WG	ΟZ	4.22	2.0000	8.44	
Karate Z	ΟZ	2.87	0.5000	1.44	
Bidrin 8WM	ΟZ	0.85	2.0000	1.70	
Incidental Pest Trt	acre	12.00	1.0000	12.00	
SEED/PLANTS					
Cotton Seed B2RF	thous	0.61	45.0000	27.45	
TECHNOLOGY FEE	ciioab	0.01	10.0000	27.10	
	thous	1.49	45.0000	67.05	
B2RF Cot Tech Fee	chous	1.49	43.0000	67.03	
GROWTH REGULATORS		0 10	4.6.0000	1 60	
Mepiquat Chloride	ΟZ	0.10	16.0000	1.60	
CUSTOM FERTILIZE					
Custom Apply Fert	acre	6.25	1.0000	6.25	
ERADICATION FEE					
Eradication	acre	2.00	1.0000	2.00	
INSECT SCOUTING					
Insect Scouting	acre	7.00	1.0000	7.00	
CUSTOM LIME					
Lime (Spread)	ton	46.00	0.5000	23.00	
OPERATOR LABOR	0011	10.00	0.0000	20.00	
Tractors	hour	11.35	1.1134	12.65	
	hour	11.35	0.3018		
Self-Propelled	nour	11.33	0.3010	3.43	
HAND LABOR		0 0 6	0 4404	4 0 5	
Implements	hour	9.06	0.4491	4.07	
Self-Propelled	hour	9.06	0.2798	2.54	
UNALLOCATED LABOR	hour	11.34	1.1322	12.84	
DIESEL FUEL					
Tractors	gal	2.39	10.8888	26.03	
Self-Propelled	gal	2.39	5.0405	12.05	
REPAIR & MAINTENANCE	٦				
Implements	acre	9.46	1.0000	9.46	
Tractors	acre	4.45		4.45	
Self-Propelled		14.49		14.49	
	acre				
INTEREST ON OP. CAP.	acre	9.06	1.0000	9.06	
OTAL DIRECT EXPENSES				538.73	
IXED EXPENSES					
Implements	acre	16.18		16.18	
Tractors	acre	28.84	1.0000	28.84	
Self-Propelled	acre	59.84		59.84	
<u>-</u>					
OTAL FIXED EXPENSES				104.86	
OTAL SPECIFIED EXPENSES				643.59	
				070.00	

Note: Cost of production estimates are based on 2010 input prices.

Fertilization decisions should be based on soil tests.

This budget may be converted to an irrigated budget by adding the costs from either Appendix Table 8 or 9. Adjustments in yields may be required with the addition of supplemental irrigation.

In addition, Cotton irrigation adds \$23 to fuel costs plus \$100 in other

### Results

- Table 1 shows the dollar amounts of fuel and fertilizer relative to total expenses
- Simulating fuel and fertilizer prices and then comparing the difference between fuel and fertilizer price for each simulated data point shows that the percent change in fertilizer prices is less than one percent lower than the percent change in fuel prices (0.94 correlation).
- Thus if fuel goes up 10%, fertilizer prices are expected to rise by nearly 10%.
- Corn is most affected by fuel changes.

	Corn		Soybeans		Cot	ton
Fuel	\$	40.47	\$	32.35	\$	61.08
Fertilizer	\$	185.17	\$	22.60	\$	84.50
Fuel + Fertilizer	\$	225.64	\$	54.95	\$	145.58
Total Expenses	\$	545.47	\$	335.74	\$	766.59
Fuel & Ferl as % of Total		41%		16%		19%

