Net Returns of Alternative Crops on Flood-Prone Land: Louisa County, Iowa, and Saline County, Missouri

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Working Paper 95-WP 132 February 1995

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This study was funded under Cooperative Agreement CR 8220450-10 between the Center of Agricultural and Rural Development at Iowa State University and the U.S. Environmental Protection Agency, Office of Policy Analysis.

ABSTRACT

The profitability of planting flood tolerant crops in flood plains relative to traditional row crops is evaluated under different assumptions concerning flood frequency and the level of government crop subsidy. The alternative crops evaluated are short rotation woody crops and herbaceous energy crops. The analysis is conducted for two growing environments: Louisa County, Iowa, and Salina County, Missouri. The economic indicator used to value the alternative scenarios is annualized net return per acre. This indicator can account for the significant time lags between planting and harvesting of the two alternative crops. The results indicate that row crops dominate the flood tolerant crops until flood frequency approaches 50 percent. The positive environmental benefits that would occur from converting land to flood tolerant crops could justify additional government subsidies to offset, at least in part, the higher net returns of traditional crops.

NET RETURNS OF ALTERNATIVE CROPS ON FLOOD-PRONE LAND: LOUISA COUNTY, IOWA, AND SALINE COUNTY, MISSOURI

The 1993 floods in the Upper Midwest were a catalyst for focusing attention on how flood-prone agricultural land should be managed and how government policy affects farmer cropping decisions. Current federal commodity programs encourage the production of program crops on flood-prone land (as well as other land) through direct subsidies. And federal disaster relief has encouraged production in flood-prone areas because farmers could depend on payments if their land (and enough of their neighbors' land) was flooded. In addition, the construction and repair of levees has encouraged cultivation of flood-prone land by decreasing the probability of crop losses from floods. The net result of these subsidies is an increase in the production of high-value crops that are very susceptible to flood-damage.

Many argue that a change in federal policy would result in a net positive benefit for society because of large environmental gains that would accrue from alternative uses of flood-prone land. For example, letting natural vegetation return to flood-prone land or having farmers plant flood-tolerant perennial crops would result in a number of environmental benefits. Some of the key ones include a reduction the frequency and severity of role flood stages, greater recharging of groundwater supplies, increased provision of water-based recreational benefits, improvements in water quality, and enhanced and protected wetland ecosystems.

In a previous study, (Kruse, Bouzaher, and Smith 1994) the economic costs and benefits of alternatives to rebuilding levees to pre-1993 flood conditions and the impact of removing commodity program support were analyzed. The analysis indicates that, in both Louisa County, Iowa, and Saline County, Missouri, the net present value of direct economic benefits, a common indicator of financial performance, is higher when levees are rebuilt and government programs maintained than for any of the scenarios over the 1995-99 simulation period. The analysis indicates that lower returns from these program crops would have detrimental effects on local

and state economies. However, this analysis did not consider the economic benefits that might accrue from production of flood-tolerant crops. Two such crops are short rotation woody crops (SRWC) and herbaceous energy crops (HEC) that are well adapted to flood conditions and the general soil and climate conditions in the Midwest. In addition, the previous analysis did not account for the environmental benefits that would accrue from alternative uses of flood-prone land.

This report estimates the net returns from these two alternative crops under various assumptions about the level of government subsidy and flood frequency for the same two counties as the previous study: Louisa County, lowa, and Salina County. Missouri. Study results allow insight into the conditions under which alternative crops will be an attractive alternative to current cropping patterns. In addition, a qualitative analysis of the environmental benefits that accrue from alternative cropping patterns are summarized.

Alternative Cropping Systems

Interest in HEC and SRWC as alternative crops for flood-prone land has increased because of their potential commercial vaiable as biomass crops and because they offer increased environmental amenities when compared with traditional row crops. Biomass crops are perennials that require establishment times of at least one year for grasses and at least four years for trees. These crops can yield multiple harvests before requiring replanting.

Among HEC, switchgrass has been identified as one of the most promising energy crops (Iowa DNR 1994) and is one of the species recommended for cover on Conservation Reserve Program land. Switchgrass is a warm-season grass native to the Midwest and grows 3 to 6 feet tall in all parts of Iowa. It is a deeply rooted perennial, well adapted to hold erodible soil. Its resistance to drought makes it somewhat more vulnerable to flooding than reed canarygrass, but it has comparatively lower establishment cost and higher yields. Experience in Iowa suggests that switchgrass, when seeded in early May, achieves maximum growth from June through September and is harvested in the fall. It requires yearly phosphorus and potassium applications,

and can use 100 pounds of nitrogen per acre each year except during establishment years because nitrogen may encourage weed growth. Because switchgrass is vulnerable to weed competition during establishment, typically atrazine (2 pounds per acre) and 2,4-D (0.5 pounds per acre) applications are recommended for the first year (Hallam 1994).

SRWC are typically a mixture of several species and require intensive management. Tree species well adapted to midwestern flood plain conditions were identified as the best for SRWC in the study areas. These species include cottonwood, hybrid poplars, willow, silver maple, and sycamore. SRWC are planted in densities of 800 to 1,600 trees per acre and require herbicide during establishment, but little or no fertilizer during standing years. Trees are typically grown in rotations of 4 to 10 years and will regrow from their root stock after harvesting two or three times before requiring replanting. Trees, once established, are very tolerant of the severest flood conditions and normally suffer no stock or yield loss due to flooding. SRWC are only vulnerable to flood damage during establishment years.

The economic indicator used to value the alternative scenarios is annualized net return per acre for each crop, including payments from the Conservation Reserve Program. For row crops, projected local prices and yields are used to project net returns per acre for 1995-99 and to calculate a five-year average. The biomass crops use a 20-year constant dollar cash flows with yearly budgets that differentiate between establishment years and standing years to calculate annualized net returns per acre. Net returns per acre are computed as cash receipts minus variable costs (including establishment cost, but not land rent). Net returns are calculated with and without government subsidies under various assumptions about the frequency of floods.

Because investments in HEC and SWRC will yield returns only in future years, a time horizon of more than one year is required to analyze their net returns. We use a 20-year time horizon in this study because 20 years allows for two complete rotations of SRWC.

Switchgrass is assumed to have an average yield of 10 metric tons per hectare per year and a high yield of 11 metric tons per hectare per year. No harvest is assumed for establishment years and the stands are assumed to last until their 10th year, when re-seeding is needed. In the

case of SRWC, an annual yield of 10 metric tons per hectare per year for the first harvest (in the 10th year) and 12.5 metric tons per hectare per year for the second harvest (in the 20th year) is assumed for the average yield scenario. For the high-yield scenario, an annual equivalent yield of 11 metric tons per hectare per year for the first harvest and 13.75 metric tons per hectare per year for the second harvest are assumed. In this analysis, prices received for biomass crops are \$40.00 per metric ton for the average price and \$50.00 per metric ton for the high price. Typical establishment and standing year budgets for switchgrass are given in Tables C.1 and C.2 and those for SRWC are given in Tables C.3 and C.4.

Flood Frequency, Timing, and Severity

Assumptions about flood frequency, timing, and severity are crucial to estimating crop damage. Ideally, a flood simulation model, calibrated to site-specific environmental conditions and historic records, would be used to guide the analysis. But the lack of such a simulation model forces a different method. We analyze net returns under the following set of flood probabilities: 0, 10, 20, 50, and 100 percent. Floods are also assumed to occur at seeding and/or during the active growing season. Severity is assumed to be a flood at least two weeks long with still waters and low oxygen.

For all row crops, total crop loss is assumed during a flood year. Thus, expected revenue in any given year is revenue that would accrue with no flood multiplied by the probability of a flood. Net returns are then found by subtracting variable costs from expected revenue cash. This method overstates the losses from floods because harvesting costs would not be incurred in flood years.

Flood losses for switchgrass are assumed to be a total stock loss during an establishment year and a 50 percent stock loss and 50 percent yield loss during a standing year. For SRWC, which have only one establishment year during the 20-year simulation period, stock loss during a seeding year depends on the probability of flooding.

Probability of Flood	Seedling Loss
pero	cent
100	50
50	40
20	20
10	0

Results

Louisa County

Table A.1 presents Louisa County average net returns with and without government subsidies for wheat, soybeans, continuous corn, corn after soybeans, switchgrass, and hybrid poplars for the five flood frequencies. Tables A.2 through A.11 present the data from which the results in Table A.1 are obtained.

From Table A.1, with no chance of flooding and with government subsidies, corn is the most profitable crop. This dominance continues until the fllod frequency increases to 50 percent, at which time the biomass crops become competitive. Soybeans become the most profitable crop if government subsidies are removed under all flood frequency scenarios except the 100 percent scenario. The implication of these results is that row crop production will likely continue on flood-prone land without increased subsidies for the biomass crops or more productive biomass cultivars.

Saline County

Table B.1 presents Saline County average net returns with and without government subsidies for wheat, soybeans, corn, switchgrass, and hybrid poplars for the five flood frequencies. Tables B.2 through B.11 present the data from which the results in Table B.1 are obtained.

In general, soybeans are the most profitable crop for flood frequencies less than 50 percent. Corn only outperforms soybeans in the 0 percent scenario with government support, and then only by \$1.27 per acre. Wheat follows corn, then switchgrass is next, and SRWC are

the least profitable crop under all three scenarios with average biomass yields and prices. Not until the 50 percent scenario do biomass crops with average yields and prices outperform row crops, but the actual returns per acre are far below those for the lower probability scenarios. By the 100 percent scenario, only SRWC are profitable.

High yields and high prices increase the viability of biomass crops substantially. particularly for switchgrass. Even in the 0 percent scenario, switchgrass compares favorably with corn and soybeans. As flood probability increases, the returns per acre for switchgrass surpass all row crops, as long as government subsidies are maintained. In the 10, 20, and 50 percent scenarios, with high biomass yields and prices and government support, switchgrass is the most profitable crop, then soybeans and corn; wheat and SRWC are the least profitable. Without government support, soybeans remain the most profitable crop until the 50 percent scenario.

As in Louisa County, biomass crops require high yields and high prices and increased flooding to be economically preferential to row crops. In the 0, 10, and 20 percent scenarios, the viability of biomass crops must depend on environmental criteria and/or a substantial increase in government subsidies. Currently available government subsidies for land rent are not included in this analysis.

Qualitative Environmental Analysis of Biomass Production

The net returns analysis does not account for changes in environmental benefits from converting land to biomass production. Biomass crops create agro-ecosystems that provide habitat significantly different from natural ecosystems, but they still benefit plant and animal species. Both biomass crop types create additional wildlife habitat. For instance, HEC benefit grassland bird, rodent, and snake species, while SRWC benefit comparable forest species. Furthermore, SRWC include tree species that are usually found in flood plains of this region (silver maple, cottonwood, willow, and sycamore). The planting of SRWC can thus be

considered the return of native species to their natural habitat, albeit in an artificial and highly controlled manner.

Biomass crops in areas not subject to frequent flooding generally provide more significant environmental benefits in ways other than providing habitat. The production and burning of biomass crops recycles atmospheric CO₂, while burning fossil fuels releases CO₂ from long-term storage and results in a net increase in atmospheric CO₂. Biomass fuels are cleaner burning than fossil fuels and release minimum SO₂ and NO₂. Both gases contribute to acid precipitation and nitrous oxides are also greenhouse gases (lowa DNR 1994).

Perennial biomass crops also significantly benefit soil. The lack of annual tillage reduces soil compaction and thus increases soil porosity. Their deeper and more extensive root systems create substantially greater below-ground biomass, which increases the soil porosity and organic matter to levels above those found in soil dedicated to typical row crops and pasture. This enhances the soil's quality and increases its water holding capacity. This soil/root system can also more effectively immobilize nitrogen and other agricultural chemicals passing through the area in the surface water and root zone. Furthermore, water infiltration rates are substantially higher for this soil, which increases the flood storage capacity of the flood plain. Additional benefits include a larger transpiring surface, particularly for SRWC, which optimizes water and agricultural chemical uptake from the root zone and results in less nonpoint source pollution (Schultz et al. 1993). This greater rate of evapotranspiration also lowers the water table more quickly (especially significant for SRWC from mid-April to early October) and increases the flood storage capacity of the flood plain.

Other environmental benefits of biomass production include reduced agricultural chemical use. Herbicides are usually only needed in establishment years and SRWC require little or no fertilization, although HEC typically require annual fertilizer applications. These reduced requirements, coupled with the greater efficiency of biomass crops in agricultural chemical uptake, result in lower nonpoint source pollution from these fields. Finally, soil loss due to erosion by wind and water is greatly reduced.

If toppable levees (Louisa County) or set-back levees (Saline County) were built, these levees would create areas more prone to flooding. These areas might be economically viable for biomass production, as well as providing additional environmental benefits. In Louisa County the existing oxbow lakes and wetlands, which under the original levee design were usually seasonal wetlands, would increase in area and depth, as well as duration. Areas in Saline County (such as those enrolled in the EWRP/WRP) would develop in a similar manner as the Missouri River became reconnected with a part of its flood plain. This expansion and quality enhancement of moist soil and wetland habitat would have numerous positive impacts on plants and wildlife in these flood plains.

In Louisa County, the existing wetlands already serve as habitat for many plant and animal species, but their potential would expand. They could be used as off-channel nursery areas for a wide variety of fish species, including game species such as largemouth bass and bluegill. These seasonal wetlands already support moist soil plant species, such as wild millet and smartweed, as well as numerous grasses and sedges. These are an important source of food for water fowl and other migratory bird species using the Mississippi Flyway. A wide variety of water fowl currently use the area during migration, and wood ducks and hooded mergansers commonly breed in the area. Other migratory bird species such as mourning dove, woodcock, and passerine birds use the area for migratory habitat, while wading and shore birds use it for both migratory and breeding habitat. Saline County is similar and would develop in a similar manner in response to increased flooding. In general, as the frequency of flooding increases, the size and quality of these habitats increase, and they are used more by both plants and wildlife.

If flood-prone crop land were converted to biomass production, the loss of corn and soybean products would decrease the overall volume of migratory bird food available, but the quality would increase. HEC would provide food and habitat for migrating song birds, while SRWC would supply migrating water fowl with invertebrates in wet leaf litter as food. Habitat for Canada geese, however, would actually decrease. The enhancement of wildlife habitat would

increase the potential for recreation in the area, such as hunting, trapping, fishing, bird watching, photography, wildlife observation, and spiritual renewal.

The toppable levees and the set-back levees would both expand the flood storage capacity of the flood plain without severely damaging the biomass crops subject to flooding. Biomass crops, especially SRWC, would reduce stream velocity from increased frictional interference, and thereby reduce flood stages. Furthermore, perennial soil cover and reduced current velocity both increase the retention of sediment and nutrients on the flood plain. The wetlands also help to retain sediment and nutrients, as well as process and remove some of the pollutants in flood water.

Concluding Remarks

The conversion of flood-prone lands from row crop production to biomass crop production is not likely to occur voluntarily unless (1) government subsidies to biomass crops are increased significantly above the level assumed in this analysis; or (2) market returns to biomass crops increase relative to row crops. Relative market returns could increase if new high-yielding biomass varieties are developed, the demand for biomass crops increase, or the demand for row crops decrease.

The positive environmental benefits that would occur from converting land to biomass crops could partly offset the lower market value placed on these crops. That is, it is possible that social welfare could be increased by withdrawing subsidies to row crops while maintaining or increasing subsidies to biomass crops on flood-prone land. Setting a value for the environmental amenities from biomass crops is critical to a judgment of whether or not this policy is justified. Efforts to conduct this valuation are the focus of future research.

APPENDIX A. LOUISA COUNTY RESULTS

Table A1: Average Net Returns by Crop and Levee Type for Louisa County, Excluding Levee Costs

	Wheat	Soybeans	Corn following Corn	Corn following Soybeans	Switchgrass	Hybrid Poplars
0% Probability of Flooding			dollars	per acre		
With Government Support						
Average Yield, Average Price	88.84	126.34	142.87	156.16	54.67	31.25
High Yield, High Price	88.84	126.34	142.87	156.16	107.16	75.29
No Government Support			07.07	02.42	27.22	/s = =
Average Yield, Average Price	53.92	126.34	87.27	93.43	37.22 89.71	0.55
High Yield, High Price	53.92	126.34	87.27	93.43	89 - 1	44.59
10% Probability of Flooding						
With Government Support	-4.0	102.72	110.22	121.51	50.10	21.25
Average Yield, Average Price	76.40	103.72	118.23	131.51	52.18	31.25 75.29
High Yield, High Price	76.40	103.72	118.23	131.51	102.58	75.29
No Government Support	40.03	102.72	66.70	81 15	31.78	0.55
Average Yield, Average Price	40.82	103.72	66.79 66.79	81.15	31.78 82.18	44.59
High Yield, High Price	40.82	103.72	66.79	81.15	82.18	44.39
20% Probability of Flooding						
With Government Support		0.4.00	02.50	106.07	40.02	20.07
Average Yield, Average Price	63.95	81.09	93.58	106.87	48.92	28.87 72.06
High Yield, High Price	63.95	81.09	93.58	106.87	96.43	72.00
No Government Support	27.72	01.00	10.15	54.51	25.34	-5.56
Average Yield, Average Price	27.73	81.09	40.15 40.15	54.51 54.51	72.85	37.63
High Yield, High Price	27.73	81.09	40.13	34 31	72.63	.0.7.0.2
50% Probability of Flooding						
With Government Support	04.40	12.22	10.65	22.02	39.08	24 35
Average Yield, Average Price	26.62	13.22	19.65	32.93	39.08 77.85	24 33 66 05
High Yield, High Price	26.62	13.22	19.65	32.93	77.83	(II) (I)
No Government Support	11.67	12.22	-39.78	-25.42	5.88	-17.21
Average Yield, Average Price	-11.57	13.22 13.22	-39.78 -39.78	-23.42 -25.42	3.66 44.65	24.49
High Yield, High Price	-11.57	13.22	-39.78	-23.42	44.0.7	24.47
100% Probability of Flooding						
With Government Support	25.60	-99.90	-103.58	-90.29	-30.66	20.72
Average Yield, Average Price	-35.60		-103.58 -103.58	-90.29 -90.29	-30.66	20.72 60.94
High Yield, High Price No Government Support	-35.60	-99.90	-103.38	-90.29	00.00-	00.94
Average Yield, Average Price	-77.07	-99.90	-173.00	-158.64	-106.43	-26.82
High Yield, High Price	-77.07	-99.90	-173.00	-158.64	-106.43	13 40

Table A2: No Flooding, Average Yield, Average Price for Louisa County

	1995	1996	1997	1998	1999	Average
Yield Per Harvested Acre, No	Governmen	t Programs				•
***	44.2	115	bushels pe 44.7	r acre 44.9	45.2	4.4.5
Wheat	44.2	44.5				44.1 39.8
Soybeans	39.4	39.6	39.8	40.0	40.2	
Corn	121.7	122.3	122.9	123.6	124.2	122.9
Baseline Crop Prices, No Gov	ernment Pro		ero nor buchol	or matria tan		
331b	3.12	3.07	irs per busner 2.87	or metric ton 2.82	2.77	2.93
Wheat	5.60	5.78	5.69	5.68	5.69	5.69
Soybeans		2.20	2.11	2.18	2.20	2.1
Corn Biomass	2.15 40.00	40.00	40.00	40.00	40.00	40.0
				40.00	10.00	10.0
Variable Costs of Production	, No Governr		i <mark>s, No Tax</mark> Iollars per pla	inted acre		
Wheat	72.45	74.41	76.82	79.39	82.27	77.0
Sovbeans	95.48	97.34	99.96	102.18	104.55	99.9
	162.50	167.32	172.61	178.30	184.28	173.00
Corn following Corn Corn following Soybeans	162.50	153.43	172.61	178.30	168.98	158.6
Corn tonowing Soybeans	149.01	155.45	130.20	105.50	100.70	150.0
Harvested Net Returns Over	Variable Cos		nment Progra			
Wheek	65.40	62.17	51.67	47.36	43.01	53.9
Wheat	124.94	131.42	126.26	125.01	124.08	126.3
Soybeans		101.42	87.14	90.72	89.08	93.4
Corn following Corn	98.73	101.49	101.47	105.52	104.37	107.7
Corn following Soybeans	112.22	113.36	101.47	103.32	104.57	107.7
Net Returns Over Variable (Costs, No Gov			nsidered plan	tad aara	
Wheat	65.40	62.17	51.67	47.36	43.01	53.93
Soybeans	124.94	131.42	126.26	125.01	124.08	126.3
Corn following Corn	98.73	101.49	87.14	90.72	89.08	93.4
Corn following Soybeans	112.22	115.38	101.47	105.52	104.37	107.7
	37.22	37.22	37.22	37.22	37.22	37.2
Switchgrass Hybrid Poplars	0.55	0.55	0.55	0.55	0.55	0.5
Hybrid Fopiais	0.55	0.55	0.55	0.55	0.55	0.5
Government Support Deficiency Payments		dollars ner n	lanted and co	nsidered plan	ted acre	
Wheat	31.13	32.70	39.61	41.49	43.14	37.6
	0.00	0.00	0.00	0.00	0.00	0.0
Soybeans Corn	58.43	53.49	61.70	55.47	53.15	56.4
Cost Share Assistance	.70,43	33.47	01.70	55.47	33.13	20.1
Switchgrass (Total)	17.45	17.45	17.45	17.45	17.45	17.4
	9.36	9.36	9.36	9.36	9.36	9.3
75% of Establishment						
50% of Management	8.09	8.09	8.09	8.09	8.09	8.0
Hybrid Poplars (Total)	30.70	30.70	30.70	30.70	30.70	30.7
75% of Establishment	22.61	22.61	22.61	22.61	22.61	22.6
50% of Management	8.09	8.09	8.09	8.09	8.09	8.0
Net Returns Over Variable C	Costs, With G			ب حاجات مودانات	lad ages	
Wheat	93.27	dollars per p 91.76	lanted and co	nsidered plan 86.49	ted acre 84.00	88.8
	124.94	131.42	126.26	125.01	124.08	126.3
Soybeans Corn following Corn						
Corn following Corn	149.76	147.37	142.31	139.39	135.55	142.8
Corn following Soybeans	162.23	160.21	155.56 54.67	153.08	149.70	156.16
Switchgrass	54.67	54.67	54.67	54.67	54.67	54.6
Hybrid Poplars	31.25	31.25	31.25	31.25	31.25	31.2:

Table A3: No Flooding, High Yield, High Price for Louisa County

	1995	1996	1997	1998	1999	Average
Yield Per Harvested Acre, No	Governmer	nt Programs				
	11.2	315	bushels po	er acre 44.9	45.2	44.7
Wheat	44.2 39.4	44.5 39.6	39.8	40.0	40.2	39.8
Soybeans	39.4 121.7	122.3	39.6 122.9	123.6	124.2	122.9
Corn	121.7	144.3	122.9	123.0	127.2	1.2.7
Baseline Crop Prices, No Gov	ernment Pro		llars per bushel	Lor metric ton		
Wheat	3.12	3.07	2.87	2.82	2.77	2.93
Wheat Soybeans	5.60	5.78	5.69	5.68	5.69	5.69
Corn	2.15	2.20	2.11	2.18	2.20	2.17
Corn Biomass	50.00	50.00	50.00	50.00	50.00	50.00
				20		
Variable Costs of Production	, No Govern	ment Progra	ams, No Tax dollars per pl	anted acre		
Wheat	72.4	74.4	76.8	79.4	82.3	77.07
Wheat Soubsons	95.5	97.3	100.0	102.2	104.5	99.9(
Soybeans Corn following Corn	162.5	167.3	172.6	178.3	184.3	173.00
Corn following Soybeans	149.0	153.4	158.3	163.5	169.0	158.64
Corn following Soybeans	147.0	155.4	156.5	105.5	107.0	150.0
Harvested Net Returns Over	Variable Co	sts, No Gove	ernment Progr dollars per har			
3371 4	65.40	62.17	51.67	47.36	43.01	53.92
Wheat	124.94	131.42	126.26	125.01	124.08	126.34
Soybeans	98.73	101.42	87.14	90.72	89.08	93.43
Corn following Corn	112.22	115.38	101.47	105.52	104.37	107.79
Corn following Soybeans				105.52	104.57	1077
Net Returns Over Variable C	osts, No Gov	ernment Pr	ograms planted and co	meidarad plan	ted acre	
Wheat	65.40	62.17	51.67	47.36	43.01	53.93
	124.94	131.42	126.26	125.01	124.08	126.34
Soybeans Corn following Corn	98.73	101.49	87.14	90.72	89.08	93.43
Corn following Soybeans	112.22	115.38	101.47	105.52	104.37	107.79
	89.71	89.71	89.71	89.71	89.71	89.71
Switchgrass Hybrid Poplars	44.59	44.59	44.59	44.59	44.59	44.59
Hybrid Popiars	44.37	44.57	44.57	11.57	71.57	11.57
Government Support		dollars ne	planted and co	onsidered plan	ted acre	
Deficiency Payments Wheat	31.13	32.70	39.61	41.49	43.14	37.61
	0.00	0.00	0.00	0.00	0.00	0.00
Soybeans	58.43	53.49	61.70	55.47	53.15	56.45
Corn	20.43	33.47	01.70	55.17	55.15	
Cost Share Assistance	17.45	17.45	17.45	17.45	17.45	17.45
Switchgrass (Total)		9.36	9.36	9.36	9.36	9.36
75% of Establishment	9.36		8.09	8.09	8.09	8.09
50% of Management	8.09	8.09				
Hybrid Poplars (Total)	30.70	30.70	30.70	30.70	30.70	30.70 22.61
75% of Establishment	22.61 8.09	22.61 8.09	22.61 8.09	22.61 8.09	22.61 8.09	8.09
50% of Management	8.09	8.09	0.09	0.03	0.09	0.03
Net Returns Over Variable C	osts, With C			oneidorad plan	ted sere	
Wheat	93.27	-	r planted and co 88.70	onsidered pian 86.49	84.00	88.8-
Wheat		91.76 131.42	88.70 126.26	80.49 125.01	124.08	126.34
Soybeans	124.94					142.81
Corn following Corn	149.76	147.37	142.31	139.39	135.55	142.8.
Corn following Soybeans	162.23	160.21	155.56	153.08	149.70	
Switchgrass	107.16	107.16	107.16	107.16	107.16 75.29	107.16 75.29
Hybrid Poplars	75.29	75.29	75.29	75.29	13.29	13.25

Table A4: 10% Probability of Flooding, Average Yield, Average Price for Louisa County

	1995	1996	1997	1998	1999	Average
Yield Per Harvested Acre, No	Governmer	it Programs				
	112	11.5	bushels p 44.7	er acre 44.9	45.2	44.7
Wheat	44.2 39.4	44.5 39.6	39.8	40.0	40.2	39.8
Soybeans	39.4 121.7	122.3	122.9	123.6	124.2	122.9
Corn	121.7	122.3	122.9	125.0	124.2	122.7
Baseline Crop Prices, No Gov	ernment Pro	ograms	llare ner huche	el or metric ton		
Wheat	3.12	3.07	2.87	2.82	2.77	2.93
Soybeans	5.60	5.78	5.69	5.68	5.69	5.69
Corn	2.15	2.20	2.11	2.18	2.20	2.17
Biomass	40.00	40.00	40.00	40.00	40.00	40.00
Variable Costs of Production	. No Govern	ment Progra	ıms, No Tax			
variable costs of Froduction	,		dollars per pl	lanted acre		
Wheat	72.45	74.41	76.82	79.39	82.27	77.07
Soybeans	95.48	97.34	99.96	102.18	104.55	99.90
Corn following Corn	162.50	167.32	172.61	178.30	184.28	173.00
Corn following Soybeans	149.01	153.43	158.28	163.50	168.98	158.64
Harvested Net Returns Over	Variable Co					
	C# 10		dollars per ha		43.01	53.92
Wheat	65.40	62.17 131.42	51.67 126.26	47.36 125.01	124.08	126.34
Soybeans	124.94		87.14	90.72	89.08	93.43
Corn following Corn	98.73 112.22	101.49 115.38	101.47	105.52	104.37	107,79
Corn following Soybeans	112.22	112.30	101.47	105.52	104.57	107,77
Net Returns Over Variable C	Costs, No Gov			onsidered plan	ited acre	
Wheat	51.62	48.51	38.82	34.69	30.48	40.82
Soybeans	102.90	108.54	103.64	102.29	101.22	103.72
Corn following Corn	72.61	74.61	61.17	63.82	61.74	66.79
Corn following Soybeans	86.10	88.50	75.50	78.62	77.04	81.15
Switchgrass	31.78	31.78	31.78	31.78	31.78	31.78
Hybrid Poplars	0.55	0.55	0.55	0.55	0.55	0.55
Government Support						
Deficiency Payments		dollars per	planted and c	onsidered plan	ited acre	
Wheat	31.13	32.70	39.61	41.49	43.14	37.61
Soybeans	0.00	0.00	0.00	0.00	0.00	0.00
Corn	58.43	53.49	61.70	55.47	53.15	56.45
Cost Share Assistance						
Switchgrass (Total)	20.40	20.40	20.40	20.40	20.40	20.40
75% of Establishment	12.31	12.31	12.31	12.31	12.31	12.31
50% of Management	8.09	8.09	8.09	8.09	8.09	8.09
Hybrid Poplars (Total)	30.70	30.70	30.70	30.70	30.70	30.70
75% of Establishment	22.61	22.61	22.61	22.61	22.61	22.61
50% of Management	8.09	8.09	8.09	8.09	8.09	8.09
Net Returns Over Variable C	Costs, With G	overnment	Programs		. 1	
33.7	00.17	•	•	onsidered plar 74.44		76.40
Wheat	80.17	78.79	76.50	102.29	72.09 101.22	103.72
Soybeans	102.90	108.54	103.64	102.29	101.22	103.72
Corn following Corn	125.59	122.50	118.28	128.20	124.41	131.51
Corn following Soybeans	138.07	135.35 52.18	131.53 52.18	52.18	52.18	52.18
Switchgrass Unbrid Poplars	52.18		31.25	31.25	31.25	31.25
Hybrid Poplars	31.25	31.25	31.23	31.43	31.43	31.23

Table A5: 10% Probability of Flooding, High Yield, High Price for Louisa County

	1995	1996	1997	1998	1999	Average
Yield Per Harvested Acre, No	Governmen	t Programs			·	
***	11.2	115	bushels pe 44.7	r acre 44.9	45.2	44.
Wheat	44.2	44.5				39.1
Soybeans	39.4	39.6	39.8	40.0	40.2	
Corn	121.7	122.3	122.9	123.6	124.2	122.
Baseline Crop Prices, No Gov	ernment Pro			ar matria tan		
XX*1	3.12	3.07	rs per busner 2.87	or metric ton 2.82	2.77	2.9.
Wheat	5.60	5.78	5.69	5.68	5.69	5.6
Soybeans	2.15	2.20	2.11	2.18	2.20	2.1
Corn Biomass	50.00	50.00	50.00	2.18 50.00	50.00	50.0
Diomass	20.00	20.00	30.00	J 77.11.11	2 11 11 11	* ',
Variable Costs of Production	, No Governi		i s, No Tax Iollars per pla	inted acre		
Wheat	72.4	74.4	76.8	79.4	82.3	77.0
Soybeans	95.5	97.3	100.0	102.2	104.5	99,9
Corn following Corn	162.5	167.3	172.6	178.3	184.3	173.0
Corn following Soybeans	149.0	153.4	158.3	163.5	169.0	158.6
.,			_			
Harvested Net Returns Over	Variable Cos		iment Progr ollars per harv			
Wheat	65.40	62.17	51.67	47.36	43.01	53.9
	124.94	131.42	126.26	125.01	124.08	126.3
Soybeans			87.14	90.72	89.08	93.4
Corn following Corn	98.73 112.22	101.49 115.38	101.47	105.52	104.37	107.7
Corn following Soybeans	112,22	110.50	101.47	105.52	104.57	11/7.7
Net Returns Over Variable (losts, No Gov			nsidered plan	tad our	
Wheat	51.62	48.51	38.82	34.69	30.48	40.8
Soybeans	102.90	108.54	103.64	102.29	101.22	103.7
Corn following Corn	72.61	74.61	61.17	63.82	61.74	66.7
Corn following Soybeans	86.10	88.50	75.50	78.62	77.04	81.1
Switchgrass	82.18	82.18	82.18	82.18	82.18	82.1
Hybrid Poplars	44.59	44.59	44.59	44.59	44.59	44.5
Government Support Deficiency Payments		dollars per p	lanted and co	nsidered plan	ted acre	
Wheat	31.13	32.70	39.61	41.49	43.14	37.6
Sovbeans	0.00	0.00	0.00	0.00	0.00	0.0
Corn	58.43	53.49	61.70	55.47	53.15	56.4
Cost Share Assistance	⊋(O.1 7)	33.47	01.70	22.47	55.15	
	20.40	20.40	20.40	20.40	20.40	20.4
Switchgrass (Total)		12.31	12.31	12.31	12.31	12.3
75% of Establishment	12.31			8.09	8.09	8.0
50% of Management	8.09	8.09	8.09			
Hybrid Poplars (Total)	30.70	30.70	30.70	30.70	30.70	30.7
75% of Establishment	22.61	22.61	22.61	22.61	22.61	22.6
50% of Management	8.09	8.09	8.09	8.09	8.09	8.0
Net Returns Over Variable C	Costs, With G			naidored -1	tad no-"	
Wheat	80.17	dollars per p 78.79	lanted and co 76.50	nsidered plan 74,44	ted acre 72.09	76.4
Wheat				102.29	101.22	103.7
Soybeans	102.90	108.54	103.64			
Corn following Corn	125.59	122.50	118.28	114.50	110.26	118.2
Corn following Soybeans	138.07	135.35	131.53	128.20	124.41	131.5
Switchgrass	102.58	102.58	102.58	102.58	102.58	102.5
Hybrid Poplars	75.29	75.29	75.29	75.29	75.29	75.2

Table A6: 20% Probability of Flooding, Average Yield, Average Price for Louisa County

	1995	1996	1997	1998	1999	Average
Yield Per Harvested Acre, No	o Governmen	t Programs				
Wil	44.2	44.5	bushels pe 44.7	r acre 44.9	45.2	44.7
Wheat	39.4	39.6	39.8	40.0	40.2	39.8
Soybeans Corn	121.7	122.3	122.9	123.6	124.2	122.9
Corn	121.7	122.3	122.7	123.0	127.2	155.7
Baseline Crop Prices, No Go	vernment Pro	grams dolla	rs ner bushel	or metric ton		
Wheat	3.12	3.07	2.87	2.82	2.77	2.93
Soybeans	5.60	5.78	5.69	5.68	5.69	5.69
Corn	2.15	2.20	2.11	2.18	2.20	2.17
Biomass	40.00	40.00	40.00	40.00	40.00	40.00
Variable Costs of Production	. No Governn	nent Program	s. No Tax			
variable costs of Froduction	.,		lollars per pla	inted acre		
Wheat	72.45	74.41	76.82	79.39	82.27	77.07
Soybeans	95.48	97.34	99.96	102.18	104.55	99.90
Corn following Corn	162.50	167.32	172.61	178.30	184.28	173.00
Corn following Soybeans	149.01	153.43	158.28	163.50	168.98	158.64
Harvested Net Returns Over	Variable Cos	ts, No Goverr	ıment Progra	ams		
			ollars per harv			
Wheat	65.40	62.17	51.67	47.36	43.01	53.92
Soybeans	124.94	131.42	126.26	125.01	124.08	126.34
Corn following Corn	98.73	101.49	87.14	90.72	89.08	93.43
Corn following Soybeans	112.22	115.38	101.47	105.52	104.37	107.79
Net Returns Over Variable O	Costs, No Gov	ernment Prog	rams			
				nsidered plant	ted acre	
Wheat	37.83	34.85	25.97	22.01	17.95	27.73
Soybeans	80.86	85.67	81.02	79.57	78.35	81.09
Corn following Corn	46.49	47.73	35.19	36.92	34.41	40.15
Corn following Soybeans	59.98	61.62	49.52	51.72	49.70	54.51
Switchgrass	25.34	25.34	25.34	25.34	25.34	25.34
Hybrid Poplars	-5.56	-5.56	-5.56	-5.56	-5.56	-5.56
Government Support						
Deficiency Payments				nsidered plant		
Wheat	31.13	32.70	39.61	41.49	43.14	37.61
Soybeans	0.00	0.00	0.00	0.00	0.00	0.00
Corn	58.43	53.49	61.70	55.47	53.15	56.45
Cost Share Assistance						
Switchgrass (Total)	23.58	23.58	23.58	23.58	23.58	23.58
75% of Establishment	15.49	15.49	15.49	15.49	15.49	15.49
50% of Management	8.09	8.09	8.09	8.09	8.09	8.09
Hybrid Poplars (Total)	34.43	34.43	34.43	34.43	34.43	34.43
75% of Establishment	26.34	26.34	26.34	26.34	26.34	26.34
50% of Management	8.09	8.09	8.09	8.09	8.09	8.09
Net Returns Over Variable (Costs, With G	overnment Pr	ograms			
				nsidered plan		
Wheat	67.07	65.81	64.29	62.40	60.19	63.95
Soybeans	80.86	85.67	81.02	79.57	78.35	81.09
Corn following Corn	101.43	97.64	94.25	89.62	84.98	93.58
Corn following Soybeans	113.91	110.49	107.51	103.31	99.13	106.87
Switchgrass	48.92	48.92	48.92	48.92	48.92	48.92
Hybrid Poplars	28.87	28.87	28.87	28.87	28.87	28.87

Table A7: 20% Probability of Flooding, High Yield, High Price for Louisa County

	1995	1996	1997	1998	1999	Average
Yield Per Harvested Acre, No	Governmen	t Programs				
	44.2	115	bushels per 44.7	r acre 44.9	45.2	44.7
Wheat		44.5 39.6	39.8	40.0	40.2	39.8
Soybeans	39.4			123.6	124.2	122.9
Corn	121.7	122.3	122.9	123.0	124.2	122.9
Baseline Crop Prices, No Gov	ernment Pro	grams				
	3.12	3.07	rs per bushel 2.87	2.82	2.77	2.93
Wheat	5.60	5.78	5.69	5.68	5.69	5.69
Soybeans	2.15	2.20	2.11	2.18	2.20	2.17
Corn Biomass	50.00	50.00	50.00	50.00	50.00	50.00
Variable Costs of Production	, No Governi	nent Program d	is, No Tax Iollars per pla	nted acre		
Wheat	72.4	74.4	76.8	79.4	82.3	77.07
Sovbeans	95.5	97.3	100.0	102.2	104.5	99.90
Corn following Corn	162.5	167.3	172.6	178.3	184.3	173.00
Corn following Soybeans	149.0	153.4	158.3	163.5	169.0	158.64
Harvested Net Returns Over	Variable Cos	sts, No Govern	iment Progra	ams		
	-	do	ollars per harv	ested acre		
Wheat	65.40	62.17	51.67	47.36	43.01	53.92
Soybeans	124.94	131.42	126.26	125.01	124.08	126.3
Corn following Corn	98.73	101.49	87.14	90.72	89.08	93.40
Corn following Soybeans	112.22	115.38	101.47	105.52	104.37	107.79
Net Returns Over Variable C	losts, No Gov	ernment Prog	rams			
		dollars per p	lanted and co	nsidered plan	ted acre	
Wheat	37.83	34.85	25.97	22.01	17.95	27.73
Soybeans	80.86	85.67	81.02	79.57	78.35	81.09
Corn following Corn	46.49	47.73	35.19	36.92	34.41	40.15
Corn following Soybeans	59.98	61.62	49.52	51.72	49.70	54.51
Switchgrass	72.85	72.85	72.85	72.85	72.85	72.85
Hybrid Poplars	37.63	37.63	37.63	37.63	37.63	37.60
Government Support						
Deficiency Payments		dollars per p	lanted and co	nsidered plan		
Wheat	31.13	32.70	39.61	41.49	43.14	37.61
Soybeans	0.00	0.00	0.00	0.00	0.00	0.00
Corn	58.43	53.49	61.70	55.47	53.15	56.43
Cost Share Assistance						
Switchgrass (Total)	23.58	23.58	23.58	23.58	23.58	23.58
75% of Establishment	15.49	15.49	15.49	15.49	15.49	15.49
50% of Management	8.09	8.09	8.09	8.09	8.09	8.09
Hybrid Poplars (Total)	34.43	34.43	34.43	34.43	34.43	34.43
75% of Establishment	26.34	26.34	26.34	26.34	26.34	26.34
50% of Management	8.09	8.09	8.09	8.09	8.09	8.09
Net Returns Over Variable C		overnment D.	agrams			
Net Returns Over variable C	.vsis, with G	dollars per p	lanted and co	nsidered plan	ted acre	
Wheat	67.07	65.81	64.29	62.40	60.19	63.9:
Sovbeans	80.86	85.67	81.02	79.57	78.35	81.09
Corn following Corn	101.43	97.64	94.25	89.62	84.98	93.58
Corn following Soybeans	113.91	110.49	107.51	103.31	99.13	106.8
Switchgrass	96.43	96.43	96.43	96.43	96.43	96.43
Hybrid Poplars	72.06	72.06	72.06	72.06	72.06	72.06

Table A8: 50% Probability of Flooding, Average Yield, Average Price for Louisa County

	1995	1996	1997	1998	1999	Average
Yield Per Harvested Acre, No	Government	Programs				
***	44.2	44.5	bushels pe: 44.7	r acre 44.9	45.2	44.7
Wheat	39.4	39.6	39.8	40.0	40.2	39.8
Soybeans				123.6	124.2	122.9
Corn	121.7	122.3	122.9	123.0	124.2	122.9
Baseline Crop Prices, No Gov	ernment Pro	grams	rs per bushel	or metric ton		
Wheat	3.12	3.07	2.87	2.82	2.77	2.93
	5.60	5.78	5.69	5.68	5.69	5.69
Soybeans	2.15	2.20	2.11	2.18	2.20	2.17
Corn		40.00	40.00	40.00	40.00	40.00
Biomass	40.00	40.00	40.00	40.00	40.00	40.00
Variable Costs of Production,	No Governm			ntod sora		
***	72.45		lollars per pla 76.82	79.39	82.27	77.07
Wheat	72.45	74.41	70.82 99.96	102.18	104.55	99.90
Soybeans	95.48	97.34		102.18	184.28	173.00
Corn following Corn	162.50	167.32	172.61			
Corn following Soybeans	149.01	153.43	158.28	163.50	168.98	158.64
Harvested Net Returns Over	Variable Cos					
	ć 7 . 10		ollars per harv		42.01	52.00
Wheat	65.40	62.17	51.67	47.36	43.01	53.92
Soybeans	124.94	131.42	126.26	125.01	124.08	126.34
Corn following Corn	98.73	101.49	87.14	90.72	89.08	93.43
Corn following Soybeans	112.22	115.38	101.47	105.52	104.37	107.79
Net Returns Over Variable C	osts, No Gove					
				nsidered plan		
Wheat	-3.52	-6.12	-12.57	-16.01	-19.63	-11.57
Soybeans	14.73	17.04	13.15	11.42	9.77	13.22
Corn following Corn	-31.88	-32.91	-42.74	-43.79	-47.60	-39.78
Corn following Soybeans	-18.39	-19.02	-28.41	-28.99	-32.30	-25.42
Switchgrass	5.88	5.88	5.88	5.88	5.88	5.88
Hybrid Poplars	-17.21	-17.21	-17.21	-17.21	-17.21	-17.21
Government Support						
Deficiency Payments		dollars per p	lanted and co	nsidered plan	ted acre	
Wheat	31.13	32.70	39.61	41.49	43.14	37.61
Soybeans	0.00	0.00	0.00	0.00	0.00	0.00
Corn	58.43	53.49	61.70	55.47	53.15	56.45
Cost Share Assistance						
Switchgrass (Total)	33.20	33.20	33.20	33.20	33.20	33.20
75% of Establishment	25.11	25.11	25.11	25.11	25.11	25.11
50% of Management	8.09	8.09	8.09	8.09	8.09	8.09
Hybrid Poplars (Total)	41.56	41.56	41.56	41.56	41.56	41.56
75% of Establishment	33.47	33.47	33.47	33.47	33.47	33.47
50% of Management	8.09	8.09	8.09	8.09	8.09	8.09
Net Returns Over Variable C						
Net Returns Over variable C		dollars per p	lanted and co	nsidered plan		
Wheat	27.79	26.89	27.67	26.28	24.49	26.62
Sovbeans	14.73	17.04	13.15	11.42	9.77	13.22
Corn following Corn	28.94	23.04	22.17	14.97	9.12	19.65
		35.89	35.42	28.66	23.27	32.93
	41.42	33.67	22.42	20.00	20.00	~ · · · ·
Corn following Soybeans Switchgrass	39.08	39.08	39.08	39.08	39.08	39.08

Table A9: 50% Probability of Flooding, High Yield, High Price for Louisa County

	1995	1996	1997	1998	1999	Average
Yield Per Harvested Acre, No	Governmen	t Programs				
•••	44.5	115	bushels per 44.7	r acre 44.9	45.2	44.7
Wheat	44.2	44.5			40.2	39.8
Soybeans	39.4	39.6	39.8	40.0	124.2	122.9
Corn	121.7	122.3	122.9	123.6	124.2	122.9
Baseline Crop Prices, No Gov	ernment Pro	ograms	1	an motale tan		
	3.12	3 07	rs per bushel 2.87	or metric ton 2.82	2.77	2.93
Wheat		5.78	5.69	5.68	5.69	5.69
Soybeans	5.60	2.20	2.11	2.18	2.20	2.11
Corn	2.15				50.00	50.00
Biomass	50.00	50.00	50.00	50.00	30.00	ν.Οτ.
Variable Costs of Production	No Govern	ment Program	is, No Tax	ntad aara		
	72.4		dollars per pla 76.8	79.4	82.3	77.03
Wheat	72.4	74.4		102.2	04.3 104.5	99.90
Soybeans	95.5	97.3	100.0			
Corn following Corn	162.5	167.3	172.6	178.3	184.3	173.0
Corn following Soybeans	149.0	153.4	158.3	163.5	169.0	158.6-
Harvested Net Returns Over	Variable Co	sts, No Goveri	nment Progra	ams		
	(5.40	62.17	ollars per harv 51.67	47.36	43.01	53.93
Wheat	65.40	-				126.3
Soybeans	124.94	131.42	126.26	125.01	124.08	
Corn following Corn	98.73	101.49	87.14	90.72	89.08	93.4.
Corn following Soybeans	112.22	115.38	101.47	105.52	104.37	107.79
Net Returns Over Variable C	osts, No Gov	ernment Prog	grams			
	2.52		lanted and co	nsidered plant -16.01	-19.63	-11.53
Wheat	-3.52	-6.12			9.77	13.22
Soybeans	14.73	17.04	13.15	11.42	-47.60	-39.7
Corn following Corn	-31.88	-32.91	-42.74	-43.79 -29.00	-32.30	-39.7
Corn following Soybeans	-18.39	-19.02	-28.41	-28.99		-23.4. 44.6
Switchgrass	44.65	44.65	44.65	44.65	44.65	
Hybrid Poplars	24.49	24.49	24.49	24.49	24.49	24.4
Government Support						
Deficiency Payments				nsidered plan		27.6
Wheat	31.13	32.70	39.61	41.49	43.14	37.6
Soybeans	0.00	0.00	0.00	0.00	0.00	0.0
Corn	58.43	53.49	61.70	55.47	53.15	56.4
Cost Share Assistance					20.00	22.2
Switchgrass (Total)	33.20	33.20	33.20	33.20	33.20	33.2
75% of Establishment	25.11	25.11	25.11	25.11	25.11	25.1
50% of Management	8.09	8.09	8.09	8.09	8.09	8.0
Hybrid Poplars (Total)	41.56	41.56	41.56	41.56	41.56	41.5
75% of Establishment	33.47	33.47	33.47	33.47	33.47	33.4
50% of Management	8.09	8.09	8.09	8.09	8.09	8.0
Net Returns Over Variable C	Costs, With C	Government Pi	rograms			
		dollars per p	planted and co	nsidered plan		20.0
Wheat	27.79	26.89	27.67	26.28	24.49	26.6
Soybeans	14.73	17.04	13.15	11.42	9.77	13.2
Corn following Corn	28.94	23.04	22.17	14.97	9.12	19.6
Corn following Soybeans	41.42	35.89	35.42	28.66	23.27	32.9
Switchgrass	77.85	77.85	77.85	77.85	77.85	77.8
Hybrid Poplars	66.05	66.05	66.05	66.05	66.05	66.0

Table A10: 100% Probability of Flooding, Average Yield, Average Price for Louisa County

	1995	1996	1997	1998	1999	Average
Yield Per Harvested Acre, No	Governmen	t Programs				
33/1	44.2	44.5	bushels pe 44.7	44.9	45.2	44.7
Wheat	39.4	39.6	39.8	40.0	40.2	39.8
Soybeans Corn	121.7	122.3	122.9	123.6	124.2	122.9
Corn	121.7	122.3	122.7	123.0	,	
Baseline Crop Prices, No Gov	ernment Pro	ograms doll	ars per bushel	or metric ton		
Wheat	3.12	3.07	2.87	2.82	2.77	2.93
Soybeans	5.60	5.78	5.69	5.68	5.69	5.69
Corn	2.15	2.20	2.11	2.18	2.20	2.17
Biomass	40.00	40.00	40.00	40.00	40.00	40.00
Variable Costs of Production	. No Governi	ment Prograi	ms, No Tax			
	•	.,	dollars per pla	anted acre		
Wheat	72.45	74.41	76.82	79.39	82.27	77.07
Sovbeans	95.48	97.34	99.96	102.18	104.55	99.90
Corn following Corn	162.50	167.32	172.61	178.30	184.28	173.00
Corn following Soybeans	149.01	153.43	158.28	163.50	168.98	158.64
Harvested Net Returns Over	Variable Co	sts, No Govei	rnment Progr	ams		
			dollars per har		42.01	52.02
Wheat	65.40	62.17	51.67	47.36	43.01	53.92
Soybeans	124.94	131.42	126.26	125.01	124.08	126.34
Corn following Corn	98.73	101.49	87.14	90.72	89.08	93.43
Corn following Soybeans	112.22	115.38	101.47	105.52	104.37	107.79
Net Returns Over Variable C	Costs, No Gov	ernment Pro	grams			
	72.45	dollars per -74.41	planted and co	nsidered plan -79,39	-82.27	-77.07
Wheat	-72.45		-70.82 -99.96	-102.18	-104.55	-99.90
Soybeans	-95.48	-97.34		-102.18	-184.28	-173.00
Corn following Corn	-162.50	-167.32	-172.61	-176.50	-168.98	-158.64
Corn following Soybeans	-149.01	-153.43	-158.28	-105.50	-106.43	-106.43
Switchgrass	-106.43	-106.43	-106.43		-26.82	~26.82
Hybrid Poplars	-26.82	-26.82	-26.82	-26.82	-20.82	~20.02
Government Support				., , ,	. 1	
Deficiency Payments			planted and co			377.71
Wheat	31.13	32.70	39.61	41.49	43.14	37.61
Soybeans	0.00	0.00	0.00	0.00	0.00	0.00
Corn	58.43	53.49	61.70	55.47	53.15	56.45
Cost Share Assistance				2-22	25.22	75 77
Switchgrass (Total)	75.77	75.77	75.77	75.77	75.77	75.77
75% of Establishment	67.68	67.68	67.68	67.68	67.68	67.68
50% of Management	8.09	8.09	8.09	8.09	8.09	8.09
Hybrid Poplars (Total)	47.54	47.54	47.54	47.54	47.54	47.54
75% of Establishment	39.45	39.45	39.45	39.45	39.45	39.45
50% of Management	8.09	8.09	8.09	8.09	8.09	8.09
Net Returns Over Variable (Costs, With C	Government I	Programs	.,	. 1	
	3= 40	•	planted and co			25.60
Wheat	-37.69	-37.99	-33.37	-33.93	-35.02	-35.60
Soybeans	-95.48	-97.34	-99.96	-102.18	-104.55	-99,90
Corn following Corn	-91.88	-101.28	-97.97	-109.45	-117.30	-103.58
Corn following Soybeans	-79.40	-88.43	-84.71	-95.76	-103.15	-90.29
Switchgrass	-30.66	-30.66	-30.66	-30.66	-30.66	-30.66
Hybrid Poplars	20.72	20.72	20.72	20.72	20.72	20.72

Table A11: 100% Probability of Flooding, High Yield, High Price for Louisa County

	1995	1996	1997	1998	1999	Average
Yield Per Harvested Acre, No	Governmen	t Programs	, , ,			
NO	41.2	44.5	bushels pe 44.7	r acre 44.9	45.2	44.5
Wheat	44.2		39.8	40.0	40.2	39.8
Soybeans	39.4	39.6		123.6	124.2	122.9
Corn	121.7	122.3	122.9	123.0	124.2	122.7
Baseline Crop Prices, No Go	vernment Pro	grams	ana man harabal	or matria tan		
	2 12	3.07	ars per bushel 2.87	2.82	2.77	2.93
Wheat	3.12 5.60	5.78	5.69	5.68	5.69	5.69
Soybeans	2.15	2.20	2.11	2.18	2.20	2.1
Corn		50.00	50.00	50.00	50.00	50.00
Biomass	50.00	30.00	30.00	50.00	50.00	50,00
Variable Costs of Production	, No Governt	nent Progran	is, No Tax	antod acre		
Wheat	72.4	74.4	dollars per pla 76.8	79.4	82.3	77.0
	95.5	97.3	100.0	102.2	104.5	99.90
Soybeans Corn following Corn	93.3 162.5	167.3	172.6	178.3	184.3	173.00
Corn following Corn		157.3	172.6	176.5	169.0	158.6
Corn following Soybeans	149.0	133.4	128.3	105.2	107.0	120.0
Harvested Net Returns Over	Variable Cos		nment Progr ollars per har			
	(£ 10	62.17	51.67	47.36	43.01	53.9
Wheat	65.40					126.3
Soybeans	124.94	131.42	126.26	125.01	124.08 89.08	93.4
Corn following Corn	98.73	101.49	87.14	90.72		
Corn following Soybeans	112.22	115.38	101.47	105.52	104.37	107.7
Net Returns Over Variable (Costs, No Gov	ernment Pro	grams		4.3	
	72.45	dollars per p	lanted and co -76.82	nsidered plar -79.39	-82.27	-77.0
Wheat	-72.45 -95.48	-74.41 -97.34	-70.82 - 99.96	-102.18	-104.55	-99.9
Soybeans			-99.90 -172.61	-102.18	-184.28	-173.0
Corn following Corn	-162.50	-167.32	-172.01	-178.50	-168.98	-158.6
Corn following Soybeans	-149.01	-153.43		-105.50	-106.43	-106.4
Switchgrass	-106.43	-106.43	-106.43			
Hybrid Poplars	13.40	13.40	13.40	13.40	13.40	13.4
Government Support						
Deficiency Payments			lanted and co			27.7
Wheat	31.13	32.70	39.61	41.49	43.14	37.6
Soybeans	0.00	0.00	0.00	0.00	0.00	0.0
Corn	58.43	53.49	61.70	55.47	53.15	56.4
Cost Share Assistance					9.5.00	2.7
Switchgrass (Total)	75.77	75.77	75.77	75.77	75.77	75.7
75% of Establishment	67.68	67.68	67.68	67.68	67.68	67.6
50% of Management	8.09	8.09	8.09	8.09	8.09	8.0
Hybrid Poplars (Total)	47.54	47.54	47.54	47.54	47.54	47.5
75% of Establishment	39.45	39.45	39.45	39.45	39.45	39.4
50% of Management	8.09	8.09	8.09	8.09	8.09	8.0
Net Returns Over Variable (Costs, With G	overnment P	rograms			
	25 (0		planted and co	-		25.6
Wheat	-37.69	-37.99	-33.37	-33.93	-35.02	-35.6
Soybeans	-95.48	-97.34	-99.96	-102.18	-104.55	-99.9
Corn following Corn	-91.88	-101.28	-97.97	-109.45	-117.30	-103.5
Corn following Soybeans	-79.40	-88.43	-84.71	-95.76	-103.15	-90.2
Switchgrass	-30.66	-30.66	-30.66	-30.66	-30.66	-30.6
Hybrid Poplars	60.94	60.94	60.94	60.94	60.94	60.9

APPENDIX B. SALINE COUNTY RESULTS

Table B1: Average Net Returns by Crop and Levee Type for Saline County, Excluding Levee Costs

	Wheat	Soybeans	Corn	Switchgrass	Hybrid Poplars
0% Probability of Flooding		do	llars per acre		
With Government Support					
Average Yield, Average Price	87.02	113.96	115.23	54.67	31.25
High Yield, High Price	87.02	113.96	115.23	107.16	75.29
No Government Support					
Average Yield, Average Price	53.85	113.96	87.27	37.22	0.55
High Yield, High Price	53.85	113.96	87.27	89.71	44,59
10% Probability of Flooding					
With Government Support					
Average Yield, Average Price	74.44	94.65	92.80	52.18	31.25
High Yield, High Price	74.44	94.65	92.80	102 58	75.29
No Government Support					
Average Yield, Average Price	40.61	94.65	63.02	31.78	0.55
High Yield, High Price	40.61	94.65	63.02	82.18	44.59
20% Probability of Flooding					
With Government Support					
Average Yield, Average Price	61.85	75.33	70.37	48.92	28.87
High Yield, High Price	61.85	75.33	70.37	96.43	72.06
No Government Support					
Average Yield, Average Price	27.36	75.33	38.77	25.34	-5.56
High Yield, High Price	27.36	75.33	38.77	72.85	37 63
50% Probability of Flooding					
With Government Support					2.4.25
Average Yield, Average Price	24.10	17.40	3.08	39.08	24.35
High Yield, High Price	24.10	17.40	3.08	77.85	66.05
No Government Support				- 00	
Average Yield, Average Price	-12.38	17.40	-33.97	5.88	-17.21
High Yield, High Price	-12.38	17.40	-33.97	44.65	24.49
100% Probability of Flooding					
With Government Support					
Average Yield, Average Price	-38.82	-79.16	-109.07	-30.66	20.72
High Yield, High Price No Government Support	-38.82	-79.16	-109.07	-30.66	60.94
Average Yield, Average Price	-78.62	-79.16	-155.21	-106.43	-26.82
High Yield, High Price	-78.62	-79.16	-155.21	-106.43	13.40
right fleta, right flice	-76.02	77.10	100.51		

Table B2: No Flooding, Average Yield, Average Price for Saline County

	1995	1996	1997	1998	1999	Average
					*///	
Yield Per Harvested Acre, No	Government	Programs	bushels pe	r acre		
Wheat	44.3	44.6	44.8	45.1	45.3	44.8
Soybeans	33.8	33.9	34.0	34.1	34.2	34.0
Corn	103.6	104.3	105.0	105.7	106.3	105.0
Baseline Crop Prices, No Gov	ernment Pro					
	2.02			or metric ton	2 12	2.07
Wheat	2.92	2.88	2.92	2.93	3.13	2.96
Soybeans	5.58	5.77	5.67	5.67	5.68	5.67
Corn	2.28	2.35	2.25	2.32	2.35	2.31
Biomass	40.00	40.00	40.00	40.00	40.00	40.00
Variable Costs of Production	, No Governn			mtad ooma		
Wheat	73.22	75.57	lollars per pla 78.44	81.38	84.48	78.62
Wheat Soybeans	75.22 76.54	77.60	79.07	80.57	82.00	79.16
Corn	146.45	150.22	155.03	159.86	164.49	155.21
Harvested Net Returns Over	Variable Cos	ts, No Govern	ıment Progr.	ams		
			ollars per harv			
Wheat	56.12	52.85	52.34	50.71	57.25	53.85
Soybeans	112.27	118.21	113.90	112.96	112.44	113.96
Corn	89.72	94.82	81.14	85.26	85.42	87.27
Net Returns Over Variable C	osts, No Gove	ernment Prog	grams			
	76.10			nsidered plan		52.05
Wheat	56.12	52.85	52.34	50.71 112.96	57.25	53.85
Soybeans	112.27	118.21	113.90 81.14	85.26	112.44 85.42	113.96 87.27
Corn	89.72 37.22	94.82 37.22	37.22	37.22	37.22	37.22
Switchgrass	37.22 0.55	0.55	0.55	0.55	0.55	0.55
Hybrid Poplars	0.33	0.55	0.55	0.55	().55	0.5.7
Government Support						
Deficiency Payments	27.10			nsidered plan		25.07
Wheat	37.10	38.47	37.10	36.76	29.89	35.86
Soybeans	0.00	0.00	0.00 39.20	0.00 33.72	0.00 31.36	0.00 34.50
Corn	36.85	31.36	39.20	33.72	31.30	34.30
Cost Share Assistance	17.45	17.45	17.45	17.45	17.45	17.45
Switchgrass (Total) 75% of Establishment	9.36	9.36	9.36	9.36	9.36	9.36
50% of Management	8.09	8.09	8.09	8.09	8.09	8.09
Hybrid Poplars (Total)	30.70	30.70	30.70	30.70	30.70	30.70
75% of Establishment	22.61	22.61	22.61	22.61	22.61	22.61
50% of Management	8.09	8.09	8.09	8.09	8.09	8.09
Net Returns Over Variable C	osts. With G	overnment Pr	ngrams			
THE RECUIRS OVER VARIABLE C	osts, min Ot			nsidered plan	ted acre	
Wheat	90.41	88.68	86.82	84.93	84.27	87.02
Sovbeans	112.27	118.21	113.90	112.96	112.44	113.96
Corn	119.84	119.07	114.26	112.58	110.38	115.23
Switchgrass	54.67	54.67	54.67	54.67	54.67	54.67
Hybrid Poplars	31.25	31.25	31.25	31.25	31.25	31.25

Table B3: No Flooding, High Yield, High Price for Saline County

	1995	1996	1997	1998	1999	Average
Yield Per Harvested Acre, No	Government	Programs				
		44.2	bushels pe		15.2	11.0
Wheat	44.3	44.6	44.8	45.1	45.3	44.8 34.0
Soybeans	33.8	33.9	34.0	34.1	34.2	34.0 105.0
Corn	103.6	104.3	105.0	105.7	106.3	105.0
Baseline Crop Prices, No Gov	ernment Prog	grams	rs per bushel	or matria tan		
33/l A	2.92	2.88	2.92	2.93	3.13	2.96
Wheat	5.58	5.77	5.67	5.67	5.68	5.67
Soybeans	2.28	2.35	2.25	2.32	2.35	2.31
Corn Biomass	50.00	50.00	50.00	50.00	50.00	50,00
Variable Costs of Production.	No Covernm	ant Program	e No Tay			
Variable Costs of Production.	, No Governii		ls, No Tax Iollars per pla	nted acre		
Wheat	73.22	75.57	78,44	81.38	84.48	78.62
Soybeans	76.54	77.60	79.07	80.57	82.00	79.16
Corn	146.45	150.22	155.03	159.86	164.49	155.21
Harvested Net Returns Over	Variable Cos	ts. No Goveri	iment Progr	ams		
That vested i vet rectains over			ollars per harv			
Wheat	56.12	52.85	52.34	50.71	57.25	53.85
Soybeans	112.27	118.21	113.90	112.96	112.44	113.96
Corn	89.72	94.82	81.14	85.26	85.42	87.27
Net Returns Over Variable C	osts, No Gove	ernment Prog	rams			
		dollars per p	lanted and co	nsidered plan		
Wheat	56.12	52.85	52.34	50.71	57.25	53.85
Soybeans	112.27	118.21	113.90	112.96	112.44	113.96
Corn	89.72	94.82	81.14	85.26	85.42	87.27
Switchgrass	89.71	89.71	89.71	89.71	89.71	89.71
Hybrid Poplars	44.59	44.59	44.59	44.59	44.59	44.59
Government Support						
Deficiency Payments				nsidered plan		2504
Wheat	37.10	38.47	37.10	36.76	29.89	35.86
Soybeans	0.00	0.00	0.00	0.00	0.00	0.00
Corn	36.85	31.36	39.20	33.72	31.36	34.50
Cost Share Assistance	17.15	17.45	17.45	17.45	17.45	17.45
Switchgrass (Total)	17.45	17.45	17.45 9.36	9.36	9.36	9.36
75% of Establishment	9.36	9.36	9.36 8.09	9.30 8.09	8.09	9.30 8.09
50% of Management	8.09 30.70	8.09	30.70	30.70	30.70	30.70
Hybrid Poplars (Total)		30.70 22.61	22.61	22.61	22.61	22.61
75% of Establishment 50% of Management	22.61 8.09	8.09	8.09	8.09	8.09	8.09
Net Returns Over Variable C	osts, With Go			nsidered plan	ted acre	
Wheat	90.41	88.68	86.82	84.93	84.27	87.02
Soybeans	112.27	118.21	113.90	112.96	112.44	113.96
Corn	119.84	119.07	114.26	112.58	110.38	115.23
Switchgrass	107.16	107.16	107.16	107.16	107.16	107.16
Hybrid Poplars	75.29	75.29	75.29	75.29	75.29	75.29

Table B4: 10% Probability of Flooding, Average Yield, Average Price for Saline County

<u></u>	1995	1996	1997	1998	1999	Average
Yield Per Harvested Acre, No	Government	Programs				
			bushels per		15.2	116
Wheat	44.3	44.6	44.8	45.1	45.3	44.8
Soybeans	33.8	33.9	34.0	34.1	34.2	34.0
Corn	103.6	104.3	105.0	105.7	106.3	105.0
Baseline Crop Prices, No Gov	ernment Prog	grams	rs per bushel	or matria ton		
***	2.92	2.88	2.92	2.93	3.13	2.96
Wheat	5.58	5.77	5.67	5.67	5.68	5.67
Soybeans	2.28	2.35	2.25	2.32	2.35	2.3
Corn Biomass	40.00	40.00	40.00	40.00	40.00	40.00
Variable Costs of Production,	No Covernm	iant Program	is No Tay			
variable Costs of Production,	No Governii	ient i iogian	lollars per pla	nted acre		
Wheat	73.22	75.57	78.44	81.38	84.48	78.63
Soybeans	76.54	77.60	79.07	80.57	82.00	79.10
Corn	146.45	150.22	155.03	159.86	164.49	155 2
Harvested Net Returns Over	Variable Cos	ts, No Govern	nment Progra	ams		
That vested , tet returns 5		de	ollars per harv	ested acre		
Wheat	56.12	52.85	52.34	50.71	57.25	53.8:
Soybeans	112.27	118.21	113.90	112.96	112.44	113.90
Corn	89.72	94.82	81.14	85.26	85.42	87.2
Net Returns Over Variable C	osts, No Gove	ernment Prog	grams			
				nsidered plan		40
Wheat	43.18	40.01	39.26	37.50	43.07	40.6
Soybeans	93.39	98.63	94.61	93.61	92.99	94.6
Corn	66.10	70.32	57.52	60.75	60.43	63.03
Switchgrass	31.78	31.78	31.78	31.78	31.78	31.7
Hybrid Poplars	0.55	0.55	0.55	0.55	0.55	0.5
Government Support						
Deficiency Payments				nsidered plan		2 - 0
Wheat	37.10	38.47	37.10	36.76	29.89	35.80
Soybeans	0.00	0.00	0.00	0.00	0.00	0.00
Corn	36.85	31.36	39.20	33.72	31.36	34.5
Cost Share Assistance	20.40	20.40	20.40	20.40	20.10	20.10
Switchgrass (Total)	20.40	20.40	20.40	20.40	20.40	20.40
75% of Establishment	12.31	12.31	12.31	12.31	12.31	12.3
50% of Management	8.09	8.09	8.09	8.09	8.09	8.0
Hybrid Poplars (Total)	30.70	30.70	30.70	30.70	30.70	30.70
75% of Establishment 50% of Management	22.61 8.09	22.61 8.09	22.61 8.09	22.61 8.09	22.61 8.09	22.6 8.0
50 % of Management	0.07	0.07	8.07	0.07	0.07	0.0
Net Returns Over Variable C	osts, With G			nsidered plan	ted acre	
Wheat	78.12	76.48	74.40	72.38	70.81	74.4
Soybeans	93.39	98.63	94.61	93.61	92.99	94.6:
Corn	98.00	96.41	92.41	89.91	87.26	92.8
Switchgrass	52.18	52.18	52.18	52.18	52.18	52.1
U IT TENTELLE MOD	22.10	22,10	31.25	31.25	31.25	31.2

Table B5: 10% Probability of Flooding, High Yield, High Price for Saline County

	1995	1996	1997	1998	1999	Average
Yield Per Harvested Acre, No	Governmen	t Programs				
	41.2	44.6	bushels per 44.8	r acre 45.1	45.3	44.8
Wheat	44.3		34.0	34.1	34.2	34.0
Soybeans	33.8 103.6	33.9 104.3	105.0	105.7	106.3	105.0
Corn	103.0	104.3	105.0	105.7	100.5	105.0
Baseline Crop Prices, No Gov	ernment Pro	grams	rs per bushel	or matric ton		
	2.92	2.88	2.92	2.93	3.13	2.96
Wheat	5.58	5.77	5.67	5.67	5.68	5.61
Soybeans	2.28	2.35	2.25	2.32	2.35	2.3
Corn Biomass	2.26 50.00	50.00	50.00	50.00	50.00	50.00
		. D	NI TE.			
Variable Costs of Production	, No Governr	nent Progran	i s, No Tax Iollars per pla	nted acre		
Wheat	73.22	75.57	78.44	81.38	84.48	78.62
Soybeans	76.54	77.60	79.07	80.57	82.00	79.10
Corn	146.45	150.22	155.03	159.86	164.49	155.2
Harvested Net Returns Over	Variable Cos	sts, No Gover	nment Progr	ams		
		d	ollars per harv	ested acre		
Wheat	56.12	52.85	52.34	50.71	57.25	53.8
Soybeans	112.27	118.21	113.90	112.96	112.44	113.9
Corn	89.72	94.82	81.14	85.26	85.42	87.21
Net Returns Over Variable C	osts, No Gov	ernment Pro	grams			
				nsidered plan		10.7
Wheat	43.18	40.01	39.26	37.50	43.07	40.6
Soybeans	93.39	98.63	94.61	93.61	92.99	94.6
Corn	66.10	70.32	57.52	60.75	60.43	63.0
Switchgrass	82.18	82.18	82.18	82.18	82.18	82.1
Hybrid Poplars	44.59	44.59	44.59	44.59	44.59	44.5
Government Support						
Deficiency Payments				nsidered plan		25.0
Wheat	37.10	38.47	37.10	36.76	29.89	35.8
Soybeans	0.00	0.00	0.00	0.00	0.00	0.0
Corn	36.85	31.36	39.20	33.72	31.36	34.5
Cost Share Assistance		20.10	20.40	20.40	20.40	20.4
Switchgrass (Total)	20.40	20.40	20.40	20.40	20.40	20.4
75% of Establishment	12.31	12.31	12.31	12.31	12.31	12.3
50% of Management	8.09	8.09	8.09	8.09	8.09	8.0
Hybrid Poplars (Total)	30.70	30.70	30.70	30.70	30.70	30.7
75% of Establishment	22.61	22.61	22.61	22.61	22.61	22.6
50% of Management	8.09	8.09	8.09	8.09	8.09	8.0
Net Returns Over Variable C	Costs, With G	overnment P	rograms		tud c = ::	
	70.12			nsidered plan 72.38	ted acre 70.81	74.4
Wheat	78.12	76.48	74.40			74.4 94.6
Soybeans	93.39	98.63	94.61	93.61	92.99	
Corn	98.00	96.41	92.41	89.91	87.26	92.8
Switchgrass	102.58	102.58	102.58	102.58	102.58	102.5
Hybrid Poplars	75.29	75.29	75.29	75.29	75.29	75.2

Table B6: 20% Probability of Flooding, Average Yield, Average Price for Saline County

	1995	1996	1997	1998	1999	Average
Yield Per Harvested Acre, No	Government	Programs				
	44.3	44.6	bushels pe 44.8	r acre 45.1	45.3	44.8
Wheat	33.8	33.9	34.0	34.1	34.2	34.0
Soybeans Corn	103.6	104.3	105.0	105.7	106.3	105.0
Corn	103.0	104.5	105.0	102.7	100.5	1 1/2
Baseline Crop Prices, No Gov	ernment Pro		ırs per bushel	or metric ton		
Wheat	2.92	2.88	2.92	2.93	3.13	2.96
Soybeans	5.58	5.77	5.67	5.67	5.68	5.67
Corn	2.28	2.35	2.25	2.32	2.35	2.31
Biomass	40.00	40.00	40.00	40.00	40.00	40.00
Variable Costs of Production,	No Governn	ient Progran	ıs, No Tax			
variable costs of Frontections			dollars per pla	nted acre		
Wheat	73.22	75.57	78.44	81.38	84.48	78.62
Soybeans	76.54	77.60	79.07	80.57	82.00	79.16
Corn	146.45	150.22	155.03	159.86	164.49	155.21
Harvested Net Returns Over	Variable Cos	ts, No Gover	nment Progr	ams		
		de	ollars per harv	ested acre		
Wheat	56.12	52.85	52.34	50.71	57.25	53.85
Soybeans	112.27	118.21	113.90	112.96	112.44	113.96
Corn	89.72	94.82	81.14	85.26	85.42	87.27
Net Returns Over Variable C	osts, No Gov					
			lanted and co			27.27
Wheat	30.25	27.16	26.18	24.29	28.90	27.36 75.33
Soybeans	74.51	79.05	75.31	74.26 36.23	73.55 35.44	73.33 38.77
Corn	42.48	45.81 25.34	33.90 25.34	25.34	25.34	25.34
Switchgrass	25.34			-5.56	-5.56	-5.56
Hybrid Poplars	-5.56	-5.56	-5.56	-3.30	-5.50	-5.50
Government Support		1 11	1 4 1 1			
Deficiency Payments	27.10	38.47	lanted and co 37.10	nsidered pian 36.76	29.89	35.86
Wheat	37.10 0.00	0.00	0.00	0.00	0.00	0.00
Soybeans	36.85	31.36	39.20	33.72	31.36	34.50
Corn	30.63	31.30	39.20	55.72	51.50	37.270
Cost Share Assistance	23.58	23.58	23.58	23.58	23.58	23.58
Switchgrass (Total) 75% of Establishment	15.49	15.49	15.49	15.49	15.49	15.49
50% of Management	8.09	8.09	8.09	8.09	8.09	8.09
Hybrid Poplars (Total)	34.43	34.43	34.43	34.43	34.43	34.43
75% of Establishment	26.34	26.34	26.34	26.34	26.34	26.34
50% of Management	8.09	8.09	8.09	8.09	8.09	8.09
Net Returns Over Variable C	osts With C	overnment D	rograms			
THE RECUITIS OVER YATIADIE C.	0505, 771111 (5)		lanted and co	nsidered plan	ted acre	
Wheat	65.84	64.28	61.97	59.84	57.34	61.85
Soybeans	74.51	79.05	75.31	74.26	73.55	75.33
Corn	76.15	73.74	70.57	67.23	64.14	70.37
Switchgrass	48.92	48.92	48.92	48.92	48.92	48.92
Hybrid Poplars	28.87	28.87	28.87	28.87	28.87	28.87

Table B7: 20% Probability of Flooding, High Yield, High Price for Saline County

	1995	1996	1997	1998	1999	Average
Yield Per Harvested Acre, No	Government	Programs				
			bushels pe		1.7.2	1.1.1
Wheat	44.3	44.6	44.8	45.1	45.3	44.8
Soybeans	33.8	33.9	34.0	34.1	34.2 106.3	34.0 105.0
Corn	103.6	104.3	105.0	105.7	100.5	105.0
Baseline Crop Prices, No Gov	ernment Prog			an na stais tan		
	2.02		irs per bushel	2.93	3.13	2.96
Wheat	2.92 5.58	2.88	2.92 5.67	2.93 5.67	5.68	5.67
Soybeans		5.77 2.35	2.25	2.32	2.35	2.31
Corn	2.28			50.00	50.00	50.00
Biomass	50.00	50.00	50.00	30.00	30.00	50.170
Variable Costs of Production	, No Governn	ient Program	is, No Tax	ntad aara		
***	72.22		lollars per pla 78.44	81.38	84.48	78.62
Wheat	73.22 76.54	75.57 77.60	78.44 79.07	80.57	82.00	76.02 79.1 <i>6</i>
Soybeans Corn	76.54 146.45	150.22	155.03	159.86	164.49	155.21
Harvested Net Returns Over	Variable Cos	ts, No Govern do	nment Progra ollars per harv	ams rested acre		
Wheat	56.12	52.85	52.34	50.71	57.25	53.85
Soybeans	112.27	118.21	113.90	112.96	112.44	113.96
Corn	89.72	94.82	81.14	85.26	85.42	87.27
Net Returns Over Variable C	osts. No Gove	ernment Pros	rams			
Act Returns Over variable o	05.0, 00	dollars per p	lanted and co	nsidered plan	ted acre	
Wheat	30.25	27.16	26.18	24.29	28.90	27.36
Soybeans	74.51	79.05	75.31	74.26	73.55	75.33
Corn	42.48	45.81	33.90	36.23	35.44	38.77
Switchgrass	72.85	72.85	72.85	72.85	72.85	72.85
Hybrid Poplars	37.63	37.63	37.63	37.63	37.63	37.63
Government Support						
Deficiency Payments		dollars per p	lanted and co	nsidered plan		
Wheat	37.10	38.47	37.10	36.76	29.89	35.80
Soybeans	0.00	0.00	0.00	0.00	0.00	0.00
Corn	36.85	31.36	39.20	33.72	31.36	34.50
Cost Share Assistance						
Switchgrass (Total)	23.58	23.58	23.58	23.58	23.58	23.58
75% of Establishment	15.49	15.49	15.49	15.49	15.49	15.49
50% of Management	8.09	8.09	8.09	8.09	8.09	8.09
Hybrid Poplars (Total)	34.43	34.43	34.43	34.43	34.43	34.43
75% of Establishment	26.34	26.34	26.34	26.34	26.34	26.34
50% of Management	8.09	8.09	8.09	8.09	8.09	8.09
Net Returns Over Variable C	osts, With Go	overnment Pi	ograms			
				nsidered plan		
Wheat	65.84	64.28	61.97	59.84	57.34	61.85
Soybeans	74.51	79.05	75.31	74.26	73.55	75.33
Corn	76.15	73.74	70.57	67.23	64.14	70.37
Switchgrass	96.43	96.43	96.43	96.43	96.43	96.43
Hybrid Poplars	72.06	72.06	72.06	72.06	72.06	72.06

Table B8: 50% Probability of Flooding, Average Yield, Average Price for Saline County

	1995	1996	1997	1998	1999	Average
Yield Per Harvested Acre, No	Government	t Programs				
			bushels pe		2	
Wheat	44.3	44.6	44.8	45.1	45.3	44.8
Soybeans	33.8	33.9	34.0	34.1	34.2	34.0
Corn	103.6	104.3	105.0	105.7	106.3	105.0
Baseline Crop Prices, No Gov	ernment Pro		na man kuahul	ou motuio ton		
Wheat	2.92	2.88	2.92	or metric ton 2.93	3.13	2.96
Wheat Soybeans	5.58	5.77	5.67	5.67	5.68	5.67
-	2.28	2.35	2.25	2.32	2.35	2.31
Corn Biomass	40.00	40.00	40.00	40.00	40.00	40.00
Variable Couts of Duadwation	No Covern	sont Puoguan	os No Tov			
Variable Costs of Production	, No Governa		is, No Tax Iollars per pla	nted acre		
Wheat	73.22	75.57	78.44	81.38	84.48	78.62
Soybeans	76.54	77.60	79.07	80.57	82.00	79.16
Corn	146.45	150.22	155.03	159.85	164.49	155.21
Harvested Net Returns Over	Variable Cos	ts. No Gover	ıment Progr	ams		
marvested recorded by over	,		ollars per harv			
Wheat	56.12	52.85	52.34	50.71	57.25	53.85
Soybeans	112.27	118.21	113.90	112.96	112.44	113.96
Corn	89.72	94.82	81.14	85.26	85.42	87.27
Net Returns Over Variable C	osts, No Gove	ernment Prog	grams			
		dollars per p	lanted and co	nsidered plan		
Wheat	-8.55	-11.36	-13.05	-15.33	-13.62	-12.38
Soybeans	17.87	20.30	17.42	16.20	15.22	17.40
Corn	-28.37	-27.70	-36.95	-37.30	-39.53	-33.97
Switchgrass	5.88	5.88	5.88	5.88	5.88	5.88
Hybrid Poplars	-17.21	-17.21	-17.21	-17.21	-17.21	-17.21
Government Support						
Deficiency Payments				nsidered plan		
Wheat	37.10	38.47	37.10	36.76	29.89	35.86
Soybeans	0.00	0.00	0.00	0.00	0.00	0.00
Corn	36.85	31.36	39.20	33.72	31.36	34.50
Cost Share Assistance						
Switchgrass (Total)	33.20	33.20	33.20	33.20	33.20	33.20
75% of Establishment	25.11	25.11	25.11	25.11	25.11	25.11
50% of Management	8.09	8.09	8.09	8.09	8.09	8.09
Hybrid Poplars (Total)	41.56	41.56	41.56	41.56	41.56	41.56
75% of Establishment	33.47	33.47	33.47	33.47	33.47	33.47
50% of Management	8.09	8.09	8.09	8.09	8.09	8.09
Net Returns Over Variable C	Costs, With Go				. 1	
33.9	20.00			nsidered plan		24.10
Wheat	28.98	27.68	24.70	22.19	16.95	24.10
Soybeans	17.87	20.30	17.42	16.20	15.22	17.40
Corn	10.61	5.74	5.03	-0.79	-5.21	3.08
Switchgrass	39.08	39.08	39.08	39.08	39.08	39.08
Hybrid Poplars	24.35	24.35	24.35	24.35	24.35	24.35

Table B9: 50% Probability of Flooding, High Yield, High Price for Saline County

	1995	1996	1997	1998	1999	Average
Yield Per Harvested Acre, No	Government	t Programs				
Wheat	44.3	44.6	bushels pe 44.8	r acre 45.1	45.3	44.8
Wheat Soybeans	33.8	33.9	34.0	34.1	34.2	34.0
Corn	33.8 103.6	104.3	105.0	105.7	106.3	105.0
Corn	103.0	104.5	105.0	103.7	(70.5	105.0
Baseline Crop Prices, No Gov	ernment Pro		ırs per bushel	an matria tan		
Wheat	2.92	2.88	2.92	2.93	3.13	2,96
Soybeans	5.58	5.77	5.67	5.67	5.68	5.67
Corn	2.28	2.35	2.25	2.32	2.35	2.31
Biomass	50.00	50.00	50.00	50.00	50.00	50.00
Variable Costs of Production	No Covernm	ant Program	ie No Tov			
variable Costs of Froduction.	, No Governii		is, No Tax Iollars per pla	nted acre		
Wheat	73.22	75.57	78.44	81.38	84.48	78.62
Sovbeans	76.54	77.60	79.07	80.57	82.00	79.16
Corn	146.45	150.22	155.03	159.86	164.49	155.21
Harvested Net Returns Over	Variable Cos	ts. No Goveri	nment Progra	ams		
			ollars per harv			
Wheat	56.12	52.85	52.34	50.71	57.25	53.85
Soybeans	112.27	118.21	113.90	112.96	112.44	113.96
Corn	89.72	94.82	81.14	85.26	85.42	87.27
Net Returns Over Variable C	osts, No Gove	ernment Prog	grams			
				nsidered plant		
Wheat	-8.55	-11.36	-13.05	-15.33	-13.62	-12.38
Soybeans	17.87	20.30	17.42	16.20	15.22	17.40
Corn	-28.37	-27.70	-36.95	-37.30	-39.53	-33.97
Switchgrass	44.65	44.65	44.65	44.65	44.65	44.65
Hybrid Poplars	24.49	24.49	24.49	24.49	24.49	24.49
Government Support						
Deficiency Payments				nsidered plant		
Wheat	37.10	38.47	37.10	36.76	29.89	35.86
Soybeans	0.00	0.00	0.00	0.00	0.00	0.00
Corn	36.85	31.36	39.20	33.72	31.36	34.50
Cost Share Assistance	22.20	22.20	22.00	22.20	22.20	22.24
Switchgrass (Total)	33.20	33.20	33.20	33.20	33.20	33.20
75% of Establishment	25.11	25.11	25.11	25.11	25.11	25.11
50% of Management	8.09	8.09	8.09	8.09	8.09	8.09
Hybrid Poplars (Total)	41.56	41.56	41.56	41.56	41.56	41.56
75% of Establishment 50% of Management	33.47 8.09	33.47 8.09	33.47 8.09	33.47 8.09	33.47 8.09	33.47 8.09
50 % of Management	0.09	0.09	0.09	0.07	0.07	0.07
Net Returns Over Variable C	osts, With Go			1 1 1	1	
When	20.00			nsidered plant		24.10
Wheat	28.98	27.68	24.70	22.19	16.95	24.10
Soybeans	17.87	20.30	17.42	16.20	15.22	17.40
Corn Switchgrass	10.61 77.85	5.74 77.85	5.03 77.85	-0.79	-5.21	3.08
Hybrid Poplars	66.05	66.05	77.83 66.05	77.85 66.05	77.85 66.05	77.85 66.05
rryoriu ropiars	00.03	00.03	00.03	00.05	00.00	00.03

Table B10: 100% Probability of Flooding, Average Yield, Average Price for Saline County

	1995	1996	1997	1998	1999	Average
Yield Per Harvested Acre, N	o Governmen	t Programs				
			bushels pe		45.0	4.4.0
Wheat	44.3	44.6	44.8	45.1	45.3	44.8
Soybeans	33.8	33.9	34.0	34.1	34.2	34.()
Corn	103.6	104.3	105.0	105.7	106.3	105.0
Baseline Crop Prices, No Go	vernment Pro			au uzatula tau		
**/	2.92	2.88	ars per busner 2.92	or metric ton 2.93	3.13	2,96
Wheat	5.58	2.00 5.77	2.92 5.67	5.67	5.68	5.67
Soybeans	2.28	2.35	2.25	2.32	2.35	2.31
Corn Biomass	2.28 40.00	40.00	40.00	40.00	40.00	40.00
Variable Costs of Production	ı, No Governi	ment Progran	ns, No Tax dollars per pla	anted acre		
Wheat	73.22	75.57	78.44	81.38	84.48	78.62
Soybeans	76.54	77.60	79.07	80.57	82.00	79.16
Corn	146.45	150.22	155.03	159.86	164.49	155.21
Harvested Net Returns Over	Variable Co	sts, No Gover	nment Progi	ams		
			ollars per har			
Wheat	56.12	52.85	52.34	50.71	57.25	53.85
Soybeans	112.27	118.21	113.90	112.96	112.44	113.96
Corn	89.72	94.82	81.14	85.26	85.42	87.27
Net Returns Over Variable (Costs, No Gov	ernment Pro	grams			
				nsidered plar	ited acre	
Wheat	-73.22	-75.57	-78.44	-81.38	-84.48	-78.62
Soybeans	-76.54	-77.60	-79.07	-80.57	-82.00	-79.16
Corn	-146.45	-150.22	-155.03	-159.86	-164.49	-155.21
Switchgrass	-106.43	-106.43	-106.43	-106.43	-106.43	-106,43
Hybrid Poplars	-26.82	-26.82	-26.82	-26.82	-26.82	-26.82
Government Support						
Deficiency Payments				nsidered plar		
Wheat	37.10	38.47	37.10	36.76	29.89	35.86
Soybeans	0.00	0.00	0.00	0.00	0.00	0.00
Corn	36.85	31.36	39.20	33.72	31.36	34.50
Cost Share Assistance						
Switchgrass (Total)	75.77	75.77	75.77	75.77	75.77	75.77
75% of Establishment	67.68	67.68	67.68	67.68	67.68	67.68
50% of Management	8.09	8.09	8.09	8.09	8.09	8.09
Hybrid Poplars (Total)	47.54	47.54	47.54	47.54	47.54	47.54
75% of Establishment	39.45	39.45	39.45	39.45	39.45	39.45
50% of Management	8.09	8.09	8.09	8.09	8.09	8.09
Net Returns Over Variable (Costs, With G				. 1	
	22.16	, .		onsidered plar		20.02
Wheat	-32.46	-33.32	-37.42	-40.56	-50.37	-38.82
Soybeans	-76.54	-77.60	-79.07	-80.57	-82.00	-79.16
Corn	-98.61	-107.59	-104.20	-114.15	-120.79	-109.07
Switchgrass	-30.66	-30.66	-30.66	-30.66	-30.66	-30.66
Hybrid Poplars	20.72	20.72	20.72	20.72	20.72	20.72

Table B11: 100% Probability of Flooding, High Yield, High Price for Saline County

	1995	1996	1997	1998	1999	Average
Yield Per Harvested Acre, No	Governmen	t Programs				
		9	bushels pe	er acre		
Wheat	44.3	44.6	44.8	45.1	45.3	44.8
Soybeans	33.8	33.9	34.0	34.1	34.2	34.0
Corn	103.6	104.3	105.0	105.7	106.3	105.0
Baseline Crop Prices, No Gov	ernment Pro					
N.7.	2.02			or metric tor 2.93		2.96
Wheat	2.92	2.88	2.92 5.67	2.93 5.67	3.13 5.68	2.90 5.67
Soybeans	5.58	5.77	2.25	2.32	2.35	2.31
Corn	2.28	2.35			2.33 50.00	2.31 50.00
Biomass	50.00	50.00	50.00	50.00	30.00	30.00
Variable Costs of Production	, No Governi		ns, No Tax dollars per pl	anted acre		
Wheat	73.22	75.57	78.44	81.38	84.48	78.62
Soybeans	76.54	77.60	79.07	80.57	82.00	79.16
Corn	146.45	150.22	155.03	159.86	164.49	155.21
Harvested Net Returns Over	Variable Cos	sts, No Gover	nment Progi	rams		
			ollars per har			
Wheat	56.12	52.85	52.34	50.71	57.25	53.85
Soybeans	112.27	118.21	113.90	112.96	112.44	113.96
Corn	89.72	94.82	81.14	85.26	85.42	87.27
Net Returns Over Variable C	osts, No Gov					
				onsidered plar		
Wheat	-73.22	-75.57	-78.44	-81.38	-84.48	-78.62
Soybeans	-76.54	-77.60	-79.07	-80.57	-82.00	-79.16
Corn	-146.45	-150.22	-155.03	-159.86	-164.49	-155.21
Switchgrass	-106.43	-106.43	-106.43	-106.43	-106.43	-106.43
Hybrid Poplars	13.40	13.40	13.40	13.40	13.40	13.40
Government Support						
Deficiency Payments				onsidered plar		270
Wheat	37.10	38.47	37.10	36.76	29.89	35.86
Soybeans	0.00	0.00	0.00	0.00	0.00	(),()
Corn	36.85	31.36	39.20	33.72	31.36	34.50
Cost Share Assistance		2.22	a - aa	2. 22	7. 77	2- 22
Switchgrass (Total)	75.77	75.77	75.77	75.77	75.77	75.77
75% of Establishment	67.68	67.68	67.68	67.68	67.68	67.68
50% of Management	8.09	8.09	8.09	8.09	8.09	8.09
Hybrid Poplars (Total)	47.54	47.54	47.54	47.54	47.54	47.54
75% of Establishment 50% of Management	39.45 8.09	39.45 8.09	39.45 8.09	39.45 8.09	39.45 8.09	39.45 8.09
-						
Net Returns Over Variable C	osts, With G			onsidered plar	nted acre	
Wheat	-32.46	-33.32	-37.42	-40.56	-50.37	-38.82
Soybeans	-76.54	-77.60	-79.07	-80.57	-82.00	-79.16
Corn	-98.61	-107.59	-104.20	-114.15	-120.79	-109.07
Switchgrass	-30.66	-30.66	-30.66	-30.66	-30.66	-30.66
Hybrid Poplars	60.94	60.94	60.94	60.94	60.94	60.94

APPENDIX C. ADDITIONAL DATA

Typical Establishment and Standing Year Budgets For Switchgrass

Table C1: Establishment Year Budget for Switchgrass

No Flooding, Average Yield, Average Price, No Subsidies

ACTIVITY	\$/ACRE
Site Preparation	\$11.01
Seed and Planting	\$37.31
Fertilizer (P&K)	\$28.27
Herbicide (Atrazine & 2,4-D	9) \$6.95
	Total Cost \$83.54

 Table C2: Standing Year Budget for Switchgrass

No Flooding, Average Yield, Average Price, No Subsidies

ACTIVITY		\$/ACRE
Fertilizer (N P K)		\$53.54
Annual Management		\$16.19
Harvest Cost		\$18.07
Transportation		\$18.69
	Total Cost	\$106.49
INCOME		\$161.80
	Net Return	\$55.31

Typical Establishment and Standing Year Budgets For Short Rotation Woody Crops

Table C3: Establishment Year Budget for SRWCNo Flooding, Average Yield, Average Price, No Subsidies

ACTIVITY		\$/ACRE
Site Preparation		\$50.18
Planting		\$276.41
Herbicide		\$48.97
	Total Cost	\$375.56

Table C4: Harvest Year Budget for SRWCNo Flooding, Average Yield. Average Price, No Subsidies

ACTIVITY		S/ACRE
Annual Management		\$16.19
Harvest & Transportation		\$450.54
	Total Cost	\$466.73
INCOME		\$1,618.75
	Net Return	\$1,152.02

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