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ABSTRACT

ECONOMIC IMPACT OF CANCELLING  
PESTICIDE X USE ON SOYBEANS

by

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The yield reduction and increase in cost of production due to the cancellation of pesticide X is estimated to result in a 8.39 per cent increase in the price of soybeans. A single product (soybeans) supply-demand model was used to estimate the impact of cancellation. The net impact upon producers is estimated to be a reduction of profits of \$106.8 million. The Lake States and the Corn Belt realize an increase in profits while other regions suffer losses. The reduction in consumer welfare is estimated at approximately \$1.2 billion for domestic and foreign consumers (\$3.55 per capita for U.S. consumers). The implications of the major simplifying assumptions used in the model are discussed briefly.

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## ECONOMIC IMPACT OF CANCELLING PESTICIDE X USE ON SOYBEANS

The short term economic impact of the cancellation of pesticide X has been evaluated at the producer and consumer level by projecting 1981 soybean production and price. The methodology used and the assumptions made in estimating the impact are discussed below. The detailed calculations are presented in the Appendix tables.

### Technological Impact of Cancellation

The 1976 acres treated and expected changes in production costs and yields due to cancellation were provided by Aspelin and Swanson (1981). The 1978 total variable costs (TVC) per acre are reported by state by W.D. McArthur (1980). Where cost of production was not available the regional average was used. Normal yields were based upon the 1976-80 average yield. Yields on the acreage affected by cancellation (treated acres) were estimated by reducing normal yields by the same percentage as those reported for 1976 by Aspelin and Swanson. See Appendix Table 1 for details.

### Reduction In Supply

A reduction in supply due to cancellation has been estimated by predicting the reduction in treated acreage due to the reduced yields and increased costs. Detailed calculations are reported for all states in Appendix Tables 2-5.

Fryar and Hoskin (1981) provide regional estimates of the impact that changes in per acre yields and changes in variable costs will have upon the acreage of soybeans planted by region. Since state estimates were not available the percentage acreage response by region was assumed to apply to

each of the states within that region. (The regions defined by Fryar and Hoskin differ from those used here.) The percentage decrease in acreage planted due to the decrease in yields was determined by multiplying the percentage change in yield times the impact multiplier for a yield change expressed as a percentage change in acreage for a 1 percent yield change. The decrease in acreage was determined by multiplying normal planted acres treated times the percentage change in acreage due to the reduction in yields. Similar calculations were followed for estimating the reduction in acreage due to the increase in per acre total variable costs. The use of the yield and TVC impact multipliers is illustrated for representative states in Table 1.

#### Market Equilibrium

The previous section outlined the procedure for determining the quantity of soybeans that would be supplied after producers adjust to the reduction in yields and increases in TVC/acre due to the pesticide cancellation. The equilibrium prior to cancellation is represented in Figure 1 where the demand schedule D intersects with the supply schedule,  $S_B$  and  $P_B$  and  $Q_B$  represent the market equilibrium price and quantity of soybeans.

The shift in supply due to cancellation is represented in Figure 1 by the supply schedule  $S_A$ . If no adjustment in the market price takes place after cancellation, producers would be willing to supply the quantity  $Q_A$  but consumers would be interested in purchasing the quantity  $Q_B$  at that price ( $P_B$ ). As a result, consumers will bid up the price to  $P_E$  where producers are willing to supply the quantity  $Q_E$  which is the amount consumers are willing to buy at that price.

Producers in this analysis are assumed to respond to a higher soybean price by increasing soybean acreage only (no attempt is made to account for

Table 1. Acreage and Production Response Due to Reduction in Yields and Increases in Costs with Constant Product Price, Representative States.

		Great Plains Nebraska	Corn Belt Illinois	Appalachia N. Carolina
(1)	% Decrease in Yield	35.0	12.12	27.27
	X	X	X	X
(2)	% Change in Acreage Due to 1% Change in Yield	.651	.444	.516
	=	=	=	=
(3)	% Decrease in Treated Acres Due to Change in Yield/100	22.8/100	5.4/100	14.1/100
	X	X	X	X
(4)	Acres Treated (1000 A)	410.02	3376.88	963.50
	=	=	=	=
(5)	Decrease in Acres Due to Change in Yield (1000 A)	93.4	181.7	135.6
(4)-(5) =				
(6)	Treated Acreage (1000 A) After Adjustment for Change in Yield	316.62	3195.18	827.90
	X	X	X	X
(7)	Increase in TVC/Acre	\$5.54	\$0.23	\$1.61
	X	X	X	X
(8)	% Acreage Response to \$1 Change in TVC/Acre/100	.262/100	.161/100	.315/100
	=	=	=	=
(9)	Decrease in Acres (1000 A) Due to Change in TVC/Acre	4.59	1.28	4.22
(6)-(9) =				
(10)	Treated Acreage (1000 A) W/O Pesticide (Constant Product Price)	312.03	3193.90	823.68
	X	X	X	X
(11)	Yield on Treated Acres After Cancellation (bu/A)	19.92	31.01	15.08
	=	=	=	=
(12)	Production (1000 bu) on Treated Acres W/O Pesticide (Constant Product Price)	6215.64	99042.84	12421.09

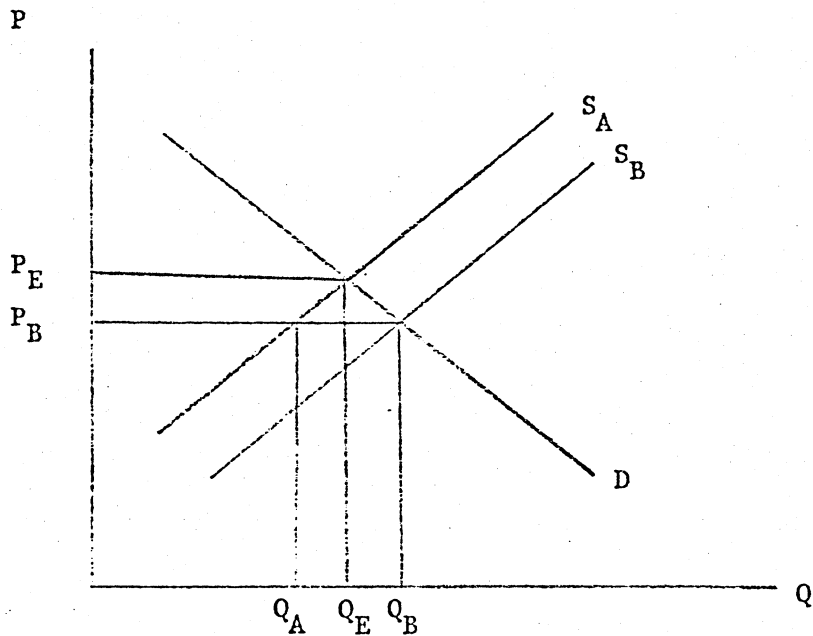


Figure 1. Illustration of Determination of Market Equilibrium Following a Supply Shift Due to Reduced Yield and Increased TVC/acre.

possible response by increasing yields). Fryar and Hoskin (1981) provide regional estimates of the soybean acreage response to a \$1 change in the price of soybeans. Their multipliers have been converted to acreage response for a one per cent change in price based upon the 1976-80 average price received. With constant yields, a one per cent increase in acreage will result in a one per cent increase in production.

A new equilibrium price and quantity can be calculated by setting the equilibrium quantity supplied equal to the equilibrium quantity demanded and solving for the percentage change in price required to establish a new equilibrium. The new equilibrium quantity supplied is the quantity supplied after cancellation,  $Q_A$ , plus the increase in production due to the price increase. The increase in production due to the price increase is equal to  $Q_A$  times the percentage increase in production due to a one per cent price increase, times the percentage increase in price. The new equilibrium quantity demanded is the original quantity demanded,  $Q_B$ , minus the decrease in quantity

demanded due to the price increase. The decrease in quantity demanded due to the price increase is equal to  $Q_B$  times the percentage decrease in quantity demanded due to a one per cent price increase, times the percentage increase in price. These calculations are represented in equation form as follows:

Equilibrium quantity supplied = Equilibrium quantity demanded

$$Q_A + Q_A (\% \Delta Q^S / \% \Delta P) \times \% \Delta P = Q_B + Q_B (\% \Delta Q^D / \% \Delta P) \times \% \Delta P$$

where

$\% \Delta Q^S / \% \Delta P$  = the percentage change in quantity supplied for a one per cent change in price and

$\% \Delta Q^D / \% \Delta P$  = the percentage change in quantity demanded for a one per cent change in price.

Solving for the percentage change in price required to attain a new equilibrium results in

$$\% \Delta P = \frac{Q_B - Q_A}{(\% \Delta Q^S / \% \Delta P) Q_A + (\% \Delta Q^D / \% \Delta P) Q_B}$$

This formula was used to determine the percentage change in price required to reach a new market equilibrium where the supply response was calculated by state. An 8.39 percentage increase in price was estimated to be required to reach equilibrium after cancellation. The calculations for determining the after cancellation equilibrium production are illustrated in Table 2. Details by state are provided in Appendix Tables 6 and 7.

Table 2. Illustration of Determination of After Cancellation Equilibrium Production for Representative States.

	<u>Great Plains</u> Nebraska	<u>Corn Belt</u> Illinois	<u>Appalachia</u> N. Carolina
(1) Untreated Acres (1000 A)	1166.98	6090.12	963.50
+	+	+	+
(2) % Price Increase Due to Cancellation	8.39	8.39	8.39
X	X	X	X
(3) % Production (Acreage) Increase from 1% Price Increase/100	.712/100	.476/100	.556/100
X	X	X	X
(4) Untreated Acres (1000 A)	1166.98	6090.12	963.50
=	=	=	=
(5) Equilibrium Untreated Acres (1000 A)	1236.69	6333.34	1008.45
X	X	X	X
(6) Normal Yield (bu/A)	30.64	35.29	20.73
=	=	=	=
(7) Equilibrium Production (1000 bu) Untreated Acres	37892.23	223503.58	20905.08
(8) Treated Acres (1000 A) W/O Pesticide (Constant Price)	312.03	3193.90	823.68
+	+	+	+
(9) % Price Increase Due to Cancellation	8.39	8.39	8.39
X	X	X	X
(10) % Production (Acreage) Increase from 1% Price Increase/100	.712/100	.476/100	.556/100
X	X	X	X
(11) Treated Acres (1000 A) W/O Pesticide (Constant Price)	312.03	3193.90	823.68
=	=	=	=
(12) Equilibrium Treated Acres (1000 A)	330.67	3321.45	862.10
X	X	X	X
(13) Yield after Cancellation (bu/A)	19.92	31.01	15.08
=	=	=	=
(14) Equilibrium Production (1000 bu) Treated Acres	6586.95	102998.16	13000.47



## Net Impact Upon Producers

With equilibrium acreage and production determined it is then possible to determine the effect of cancellation upon revenues and costs of the producers. The details of these calculations are presented in Appendix Tables 7-9. A summary table by region is presented in Table 3.

The net impact upon producers of cancellation is a reduction of profits of \$106.8 million. The Great Plains, Appalachia, Southeast and Delta all experience a decline in profits while the Lake States and Corn Belt realize an increase in profits. There is only one state in each of the Great Plains, Corn Belt and the Southeast that experience changes in profits that are opposite to the rest of the states in the respective regions. See Appendix Table 9.

## Consumer Impact

Cancellation of Pesticide X on U.S. soybeans is estimated to increase the U.S. market price \$0.67 per bushel (\$8.00 to \$8.67), causing consumers to cut their consumption of soybeans by 156.8 million bushels. Clearly, soybean consumers would be adversely impacted if a policy of cancelling the use of Pesticide X is implemented. The following sections discuss the magnitude and distribution of the loss in consumer welfare.

### Estimates of Consumer Welfare Loss

Fortunately there are two easily calculated, straight forward measures of consumer welfare change which bound the welfare loss experienced by consumers of a good whose price has risen. The first measure is Laspeyres Variation (LV) and is defined as the exact change in income required to allow the purchase of the original quantity of the good after the price has changed. In this case,  $LV = (\$8.67/bu. - \$8.00/bu.) (1,916.5 \text{ mil. bu.}) = \$1,286.4$

Table 3. Net Impact Upon Producers of Pesticide Cancellation

	GREAT PLAINS	LAKE STATES	CORN BELT	APPALACHIA	SOUTHEAST	DELTA	US
Normal Revenue	763.1	1409.7	8601.1	1341.0	993.8	2214.2	15323.0
Equilibrium Revenue Untreated Acres	655.2	1165.9	6681.4	713.1	556.5	1132.5	10904.6
Equilibrium Revenue Treated Acres	98.9	260.0	2317.7	505.5	347.3	817.1	4346.4
Change in Revenue	(9.0)	16.3	398.1	(122.5)	(89.9)	(264.7)	(71.7)
Normal TVC	193.7	349.7	2009.5	599.3	667.4	990.7	4810.3
Equilibrium TVC Untreated Acres	153.3	265.3	1441.8	295.5	340.2	467.5	2963.6
Equilibrium TVC Treated Acres	42.6	90.5	615.1	300.7	309.4	523.5	1881.8
Change in TVC	2.2	5.9	47.4	(3.1)	(17.8)	0.3	35.1
Change in Revenue - TVC	(11.2)	10.4	350.7	(119.5)	(72.2)	(265.0)	(106.8)

million. That is, if consumers purchased the same quantity of soybeans as they did before the cancellation but at the higher price, then an additional expense of \$1,286.4 mil would be incurred.

An alternative estimate is provided by the Paasche variation measure of consumer welfare change (PV) which is defined as the exact change in income required to allow the purchase of the subsequent quantity of the commodity when facing the initial price situation. In this case,  $PV = (\$8.67/bu. - \$8.00/bu.) (1,759.7 \text{ mil. bu.}) = \$1,181.1 \text{ million}$ . That is, if consumers could purchase the post-policy quantity of soybeans at the original price, a savings of \$1,181.1 mil. would occur.

The PV and LV measures of consumer welfare change provide a range in which the actual welfare loss will occur. Thus, cancelling Pesticide X on U.S. soybeans can be expected to impose a loss on consumers of U.S. soybeans of no less than \$1,181.1 mil. and no more than \$1,286.4 mil. A midpoint estimate of  $(1,181.1 + 1,286.4)/2 = \$1,233.8 \text{ million}$  will be used below.

#### Distributive Considerations

The loss in consumer welfare resulting from cancellation of Pesticide X can be made more comprehensible by changing the aggregate estimates to per capita figures. Approximately 63.5% of soybean consumption occurs domestically with the remaining sales occurring abroad. Of the total loss of \$1,233.8 million to consumers, \$783.5 million would be incurred by U.S. soybean consumers while the remaining \$450.3 million loss would be borne by foreign consumers. On a per capita basis, a consumer welfare loss of approximately \$3.55 would be incurred domestically upon cancellation based upon a 1979 U.S. population estimate of 220.4 million.

## Assumptions and Their Implications

Any analytical approach involves assumptions that help simplify the computations and reduce the empirical information required. In some cases the bias implied by the assumptions can be determined. The main assumption of the present analysis are discussed briefly below.

1. Producers are likely to adjust their inputs applied per acre in response to higher prices. The assumption that yields are not varied with soybean prices would be expected to result in an overestimate of the impact of cancellation upon producers and consumers.
2. The production of other crops would be expected to increase with the reduction in soybean acreage. If other crops are demand substitutes and supply substitutes, ignoring other crops results in an underestimate in the shift in supply and the increase in soybean price due to cancellation. However, if the production of other crops is increased consumers would gain from the larger quantities and lower prices of those crops and producers profits from the other crops would be affected as well. The effect of ignoring other crops in estimating producer and consumer welfare impact is therefore indeterminate without use of a more complex model.
3. The theoretically precise measures of consumer welfare change advocated by economists are compensating variation (CV) and equivalent variation (EV). Estimating these welfare measures requires additional information and incurs higher estimation costs. It suffices here to note that  $PV < EV < CV < LV$ .
4. The market shares for domestic and foreign consumption use could be expected to change slightly as soybean prices rose since domestic and foreign demand elasticities are slightly different. The effect of changing market shares, while small, would tend to increase domestic welfare losses and decrease foreign losses.

### References

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USDA/ESS, "Field Crops: Estimates by States, 1974-78, Acreage, Yield, Production:", Statistical Bulletin No. 646, December 1980.

USDA/ESS "Crop Production, 1980 Annual Summary , Acreage, Yield, Production", Cr Pr 2-1, January 1981.

USDA/ESS "Working Data For Demand Analysis", Table 8 - Consumer Price Index, Revision of March 1981.

APPENDIX Table 1. Short-run Cost and Yield Changes for Soybeans from Cancellation of Pesticide X.

REGION State	(1) ACRES TREATED AS PER CENT OF ACRES PLANTED	(2) INCREASE IN COST PER ACRE TREATED	(3) INCREASE IN COST PER ACRE TREATED	(4) NORMAL TVC PER ACRE	(5) TVC ON TREATED ACRES AFTER CANCELLATION	(6) DECREASE IN YIELD PER ACRE TREATED	(7) 1976 YIELD	(8) DECREASE IN YIELD AS A PER CENT OF 1976 YIELD (6)/(7)	(9) NORMAL YIELD PER PLANTED ACRE	(10) YIELD ON TREATED ACRES AFTER CANCELLATION
<u>a/</u>	<u>b/</u>	<u>b/</u>	<u>c/</u>	<u>d/</u>	(4)+(3)	<u>b/</u>	<u>e/</u>	<u>f/</u>	(9)-[(8)X(9)]	
	(%)	(1976 \$)	(1980 \$)	(1980 \$)	(1980 \$)	(bu/acre)	(bu/acre)	(%)	(bu/acre)	(bu/acre)
GREAT PLAINS										
N. Dakota	26.0	3.83	5.54	49.02	54.56	7	12.5	56.0	20.72	9.12
S. Dakota	26.0	3.83	5.54	49.02	54.56	7	17.0	41.12	27.71	16.32
Nebraska	26.0	3.83	5.54	45.87	51.41	7	20.0	35.0	30.64	19.92
Kansas	26.0	3.83	5.54	52.19	57.73	7	15.0	46.67	20.29	10.82
LAKE STATES										
Minnesota	26.0	3.83	5.54	57.57	63.11	7	22.0	31.8	31.64	21.58
Wisconsin	35.67	0.16	0.23	61.32	61.55	4	22.0	18.2	31.16	25.49
Michigan	35.67	0.16	0.23	65.06	65.29	4	20.5	19.5	27.24	21.93
CORN BELT										
Iowa	26.0	3.83	5.54	61.79	67.33	7	31.0	22.58	36.19	28.02
Illinois	35.67	0.16	0.23	63.02	63.25	4	33.0	12.12	35.29	31.01
Indiana	35.67	0.16	0.23	67.65	67.88	4	34.0	11.76	35.26	31.11
Missouri	26.0	3.83	5.54	61.27	66.81	7	20.0	35.0	27.16	17.65
Ohio	35.67	0.16	0.23	69.12	69.35	4	33.0	12.12	34.23	30.08
APPALACHIA										
Kentucky	53.85	3.36	4.86	79.96	84.82	7	27.0	25.92	27.89	20.66
Tennessee	53.85	3.36	4.86	82.75	87.61	7	22.5	31.0	22.17	15.30
Virginias	50.0	1.11	1.61	84.49	86.10	6	20.5	29.27	21.70	15.35
Maryland	50.0	1.11	1.61	84.49	86.10	6	25.0	24.0	26.94	20.47
N. Carolina	50.0	1.11	1.61	90.76	92.37	6	22.0	27.27	20.73	15.08
SOUTHEAST										
Alabama	53.85	3.36	4.86	109.94	114.80	7	24.0	29.16	20.42	14.47
Georgia	50.0	1.11	1.61	105.36	106.97	6	23.5	25.53	18.39	13.70
Florida	50.0	1.11	1.61	105.18	106.79	6	26.0	23.08	24.78	19.06
S. Carolina	50.0	1.11	1.61	100.24	101.85	6	18.0	33.33	19.05	12.70
DELTA										
Arkansas	53.85	3.36	4.86	78.65	83.51	7	19.0	36.84	21.75	13.74
Louisiana	53.85	3.36	4.86	88.31	93.17	7	28.0	25.0	24.28	18.25
Mississippi	53.85	3.36	4.86	77.13	81.99	7	22.0	31.82	21.48	14.65

a/ Minor soybean producing states omitted are Delaware, New Jersey, New York, Oklahoma, Pennsylvania, and Texas.

b/ Provided by Aspelin/Swanson letter dated April 28, 1981.

c/ Adjusted to 1980 dollars with CPI.

d/ Source is W.C. McArthur, "Soybean Production Practices and Costs in the United States", Research Report 360, The University of Georgia, College of Agriculture, October 1980. Prices adjusted to 1980 dollars using CPI.

e/ Source is USDA/ESS Statistical Bulletin 646 "FIELD CROPS" Estimates By States, 1974-1978", December, 1980.

f/ 1976-80 Production divided by 1976-80 Planted Acreage. Sources are USDA/ESS Annual Publications "CROP PRODUCTION" for 1976-80.

APPENDIX Table 2. Soybean Normal Acreage, Production, Price and Revenue Plus Acreage Treated and Not Treated

REGION State	(1) NORMAL PLANTED ACREAGE  a/ (1000 A)	(2) NORMAL YIELD PER PLANTED ACRE (Table 1) (bu/A)	(3) NORMAL PRODUCTION  (1)X(2) (1000 bu)	(4) NORMAL PRICE  b/ (1980 \$/bu)	(5) NORMAL REVENUE  (3)X(4) (1000 \$)	(6) PER CENT PLANTED ACRES TREATED (Table 1) (%)	(7) ACRES TREATED  (1)X(6) (1000 A)	(8) ACRES UNTREATED  (1)X(7) (1000 A)
GREAT PLAINS								
N. Dakota	198	20.72	4102.56	7.71	31630.74	26.0	51.48	146.52
S. Dakota	627	27.71	17374.17	7.36	127873.89	26.0	163.02	463.98
Nebraska	1577	30.64	48319.28	7.557	365148.80	26.0	410.02	1166.98
Kansas	1550	20.29	31449.5	7.583	238481.56	26.0	403.0	1147.0
	3952	25.63	101245.51	7.54	763134.99		1027.52	2924.48
LAKE STATES								
Minnesota	4683	31.64	148170.12	7.715	1143132.48	26.0	1217.58	3465.42
Wisconsin	285	31.16	8880.6	7.52	66782.11	35.67	101.66	183.34
Michigan	963	27.24	26232.12	7.616	199783.83	35.67	343.50	619.50
	5931	30.91	183282.84	7.69	1409698.42		1662.74	4268.26
CORN BELT								
Iowa	8033	36.19	290714.27	8.043	2338214.87	26.0	2088.58	5944.42
Illinois	9467	35.29	334090.43	8.143	2733861.99	35.67	3376.88	6090.12
Indiana	4367	35.26	153980.42	7.947	1223682.40	35.67	1557.71	2809.29
Missouri	5700	27.16	154812.00	7.895	1222240.74	26.0	1482.00	4218.00
Ohio	3933	34.23	134626.59	8.045	1083070.92	35.67	1402.90	2530.10
	31500	33.94	1068223.71	8.053	8601070.92		9908.07	21591.93
APPALACHIA								
Kentucky	1590	27.89	44345.10	8.25	365847.08	53.85	856.22	733.78
Tennessee	2627	22.17	58240.59	8.083	470758.69	53.85	1414.64	1212.36
Virginias	547	21.70	11869.90	8.068	95766.35	50.0	273.50	273.50
Maryland	398	26.94	10722.12	7.77	83310.87	50.0	199.00	199.00
N. Carolina	1927	20.73	39946.71	8.144	325326.01	50.0	963.50	963.50
	7088	23.33	165124.42	8.12	1341009.00		3706.86	3381.64
SOUTHEAST								
Alabama	2117	20.42	43229.14	7.92	342374.79	53.85	1140.00	977.00
Georgia	2117	18.39	38931.63	7.81	304056.03	50.0	1058.50	1058.50
Florida	452	24.78	11200.56	8.227	92147.01	50.0	226.00	226.00
S. Carolina	1637	19.05	31184.85	8.185	255248.00	50.0	818.50	818.50
	6323	19.71	124546.18	7.98	993825.82		3243.00	3080.00
DELTA								
Arkansas	4917	21.75	106944.75	8.18	874808.06	53.85	2647.80	2269.20
Louisiana	3317	24.28	80536.76	7.94	639461.87	53.85	1786.20	1530.80
Mississippi	4033	21.48	86628.84	8.08	699961.03	53.85	2171.77	1861.23
	12267	22.32	274110.35	8.08	2214230.96		6605.77	5661.23
US	67061	28.675	1916533.01	8.00	15322970.11	39.0	26153.96	40907.54

a/ 1978-80 average planted acreage from USDA/ESS Annual Publications "CROP PRODUCTION" for 1978-80.

b/ 1976-80 Value of Production in 1980 Dollars divided by 1976-80 Production from USDA/ESS Annual Publications "CROP PRODUCTION" and "FIELD CROPS, Production, Disposition and Value" for 1976-80.

APPENDIX Table 3 Treated Acreage Response Due to Reduction in Yields with Constant Product Price

REGION State	(1) DECREASE IN YIELD  (Table 1)  (%)	(2) ACREAGE RESPONSE DUE TO YIELD CHANGE <sup>a/</sup>  (%)	(3) DECREASE IN ACRES DUE TO CHANGE IN YIELD (1)X(2)  (%)	(4) ACRES TREATED  (Table 2)  (1000 A)	(5) DECREASE IN ACRES DUE TO CHANGE IN YIELD (3)X(4)  (1000 A)	(6) TREATED ACREAGE AFTER ADJUSTMENT FOR <sup>Δ</sup> YIELD (4)-(5)  (1000 A)
<b>GREAT PLAINS</b>						
N. Dakota	56.0	.651	36.5	51.48	18.8	32.68
S. Dakota	41.12	.651	27.8	163.02	43.6	119.42
Nebraska	35.0	.651	22.8	410.02	93.4	316.62
Kansas	46.67	.651	30.4	403.00	122.4	280.6
				<u>1027.52</u>	<u>278.2</u>	<u>749.32</u>
<b>LAKE STATES</b>						
Minnesota	31.8	.651	20.7	1217.58	252.1	965.48
Wisconsin	18.2	.823	15.0	101.66	15.2	86.46
Michigan	19.5	.444	8.7	343.5	29.7	313.8
				<u>1662.74</u>	<u>297.0</u>	<u>1365.74</u>
<b>CORN BELT</b>						
Iowa	22.58	.651	14.7	2088.58	307.0	1781.58
Illinois	12.12	.444	5.4	3376.88	181.7	3195.18
Indiana	11.76	.444	5.2	1557.71	81.3	1476.41
Missouri	35.0	.651	22.8	1482.00	337.7	1144.30
Ohio	12.12	.444	5.4	1402.9	75.5	1327.40
				<u>9908.07</u>	<u>983.2</u>	<u>8924.87</u>
<b>APPALACHIA</b>						
Kentucky	25.92	.280	7.3	856.22	62.1	794.12
Tennessee	31.0	.280	8.7	1414.64	122.8	1291.84
Virginias	29.27	.392	11.5	273.50	31.4	242.10
Maryland	24.0	.392	9.4	199.00	18.7	180.30
N. Carolina	27.27	.516	14.1	963.50	135.6	827.90
				<u>3706.86</u>	<u>370.6</u>	<u>3336.26</u>
<b>SOUTHEAST</b>						
Alabama	29.16	.516	15.0	1140.00	171.5	968.5
Georgia	25.53	.516	13.2	1058.50	139.4	919.1
Florida	23.08	.823	19.0	226.00	42.9	183.1
S. Carolina	33.33	.516	17.2	318.50	140.8	677.7
				<u>3243.00</u>	<u>494.6</u>	<u>2748.4</u>
<b>DELTA</b>						
Arkansas	36.84	.280	10.3	2647.80	273.1	2374.7
Louisiana	25.0	.280	7.0	1786.20	125.0	1661.2
Mississippi	31.82	.280	8.9	2171.77	193.5	1978.27
				<u>6605.77</u>	<u>591.6</u>	<u>6014.17</u>
US				<u>26153.96</u>	<u>3015.2</u>	<u>23138.76</u>

<sup>a/</sup> %  $\Delta$  Acres/%  $\Delta$  Yield = (  $\Delta$  Acres/  $\Delta$  Yield) times (Normal Yield/Normal Acres) where (  $\Delta$  Acres/  $\Delta$  Yield) is from "1981 REGIONAL SOYBEAN ACREAGE RESPONSE" by Ed Fryar and Roger Hoskin, USDA/ESS FATS and OILS OUTLOOK AND SITUATION, February 1981.



APPENDIX Table 4. Treated Acreage Response Due To Increase in Costs with Constant Product Price

REGION State	(1) TREATED ACREAGE AFTER ADJUSTMENT FOR Δ YIELD (Table 3)	(2) INCREASE IN TVC/ACRE  (Table 1)	(3) ACREAGE RESPONSE TO CHANGE IN TVC/ACRE  a/	(4) DECREASE IN ACRES DUE TO CHANGE IN TVC/ACRE  (2)X(3)	(5) DECREASE IN ACRES DUE TO CHANGE IN TVC/ACRE  (1)X(4)	(6) TREATED ACREAGE W/O PESTICIDE @ CONSTANT PRODUCT PRICE  (1)-(5)
	(1000 A)	(1980 \$)	(%)	(%)	(1000 A)	(1000 A)
<b>GREAT PLAINS</b>						
N. Dakota	32.68	5.54	.262	1.45	.47	32.21
S. Dakota	119.42	5.54	.262	1.45	1.73	117.69
Nebraska	316.62	5.54	.262	1.45	4.59	312.03
Kansas	280.6	5.54	.262	1.45	4.07	276.53
	<u>749.32</u>					<u>738.45</u>
<b>LAKE STATES</b>						
Minnesota	965.48	5.54	.262	1.45	14.00	951.48
Wisconsin	86.46	0.23	.410	.09	0.08	86.38
Michigan	313.8	0.23	.161	.04	0.13	313.67
	<u>1365.74</u>					<u>1351.54</u>
<b>CORN BELT</b>						
Iowa	1781.58	5.54	.262	1.45	25.83	1755.75
Illinois	3195.18	0.23	.161	.04	1.28	3193.90
Indiana	1476.41	0.23	.161	.04	0.59	1475.82
Missouri	1144.30	5.54	.262	1.45	16.59	1127.71
Ohio	1327.40	0.23	.161		0.53	1326.87
	<u>8924.87</u>					<u>8880.05</u>
<b>APPALACHIA</b>						
Kentucky	794.12	4.86	.134	.65	5.16	788.95
Tennessee	1291.84	4.86	.134	.65	8.40	1283.44
Virginias	242.10	1.61	.201	.32	0.77	241.33
Maryland	180.30	1.61	.201	.32	0.58	179.72
N. Carolina	827.90	1.61	.315	.51	4.22	823.68
	<u>3336.26</u>					<u>3317.13</u>
<b>SOUTHEAST</b>						
Alabama	968.50	4.86	.315	1.53	14.82	953.68
Georgia	919.10	1.61	.315	.51	4.68	914.41
Florida	183.10	1.61	.410	.66	1.21	181.89
S. Carolina	677.70	1.61	.315	.51	3.46	674.24
	<u>2748.40</u>					<u>2724.23</u>
<b>DELTA</b>						
Arkansas	2374.70	4.86	.134	.65	15.44	2359.26
Louisiana	1661.20	4.86	.134	.65	10.80	1650.40
Mississippi	1978.27	4.86	.134	.65	12.86	1965.41
	<u>6014.17</u>					<u>5975.08</u>
US	2313.76					22986.48

a/  $\% \Delta \text{ Acres}/\$1 \Delta \text{ TVC/Acre} = (\Delta \text{ Acres}/\$1 \Delta \text{ TVC/Acre})/\text{Normal Acres}$  where  $(\Delta \text{ Acres}/\$1 \Delta \text{ TVC/Acre})$  is from "1981 REGIONAL SOYBEAN ACREAGE RESPONSE" by Ed Fryar and Roger Hoskin in USDA/ESS FATS and OILS OUTLOOK AND SITUATION, February 1981.

APPENDIX Table 5. Production Without Pesticide with Constant Product Price

REGION State	(1) ACRES UNTREATED (Table 2) (1000 A)	(2) YIELD PER PLANTED ACRE (Table 2) (bu/A)	(3) NORMAL PRODUCTION UNTREATED ACREAGE (1)X(2) (1000 A)	(4) TREATED ACREAGE W/O PESTICIDE @ CONSTANT PRODUCT PRICE (Table 4) (1000 A)	(5) YIELD ON TREATED ACRES AFTER CANCELLATION (Table 1) (bu/A)	(6) PRODUCTION ON TREATED ACRES W/O PESTICIDE (4)X(5) (1000 bu)	(7) TOTAL PRODUCTION WITHOUT PESTICIDE (3)+(6) (1000 bu)	(8) DECREASE IN PRODUCTION W/O PESTICIDE @ CONSTANT PRODUCT PRICE a/ (1000 bu)	(9) ACREAGE RESPONSE FROM 1% PRICE CHANGE b/ (%)	(10) PRODUCTION RESPONSE FROM 1% PRICE CHANGE (7)X(9) (1000 bu)
<b>GREAT PLAINS</b>										
N. Dakota	146.52	20.72	3035.89	32.21	9.12	293.76	3329.65	772.91	.712	23.71
S. Dakota	463.98	27.71	12856.89	117.69	16.32	1920.70	14777.59	2596.58	.712	105.22
Nebraska	1166.98	30.64	35756.27	312.03	19.92	6215.64	41971.91	6347.37	.712	298.84
Kansas	1147.0	20.29	23272.63	276.53	10.82	2992.05	26264.68	5184.82	.712	187.00
	2924.48	25.63	74921.68	738.45		11422.15	86343.83	14901.68		614.77
<b>LAKE STATES</b>										
Minnesota	3465.42	31.64	109645.89	951.48	21.58	20532.94	130178.83	17991.29	.712	926.87
Wisconsin	183.34	31.16	5712.89	86.38	25.49	2201.83	7914.72	965.88	.722	57.14
Michigan	619.50	27.24	16875.12	313.67	21.93	6878.78	23753.90	2478.22	.476	113.07
	4268.26	30.91	132233.90	1351.54		29613.55	161847.45	21435.39		1097.09
<b>CORN BELT</b>										
Iowa	5944.42	36.19	215128.56	1755.75	28.02	49196.12	264324.68	26389.59	.712	1881.99
Illinois	6090.12	35.29	214920.37	3193.90	31.01	99042.84	313963.21	20127.22	.476	1494.46
Indiana	2809.29	35.26	99055.60	1475.82	31.11	45912.76	144968.36	9012.06	.476	690.05
Missouri	4218.00	27.16	114560.88	1127.71	17.65	19904.08	134464.96	20347.04	.712	957.39
Ohio	2530.10	34.23	86605.29	1326.86	30.08	39911.95	126517.24	8109.35	.476	602.22
	21591.10	33.94	730270.70	8880.05		253967.74	984238.44	83985.26		5626.12
<b>APPALACHIA</b>										
Kentucky	733.78	27.89	20465.26	788.95	20.66	16299.71	36764.97	7580.13	.268	98.53
Tennessee	1212.36	22.17	26878.03	1283.44	15.30	19636.63	46514.66	11725.93	.268	124.66
Virginias	273.50	21.70	5934.95	241.33	15.35	3704.42	9639.37	2230.53	.445	42.90
Maryland	199.00	26.94	5361.06	179.72	20.47	3678.87	9039.93	1682.19	.445	40.23
N. Carolina	963.50	20.73	19973.36	823.68	15.08	12421.09	32394.45	7552.26	.556	180.11
	3381.64	23.33	78612.67	3317.13		55740.72	134353.38	30771.04		486.43
<b>SOUTHEAST</b>										
Alabama	977.00	20.42	19950.25	953.68	14.47	13799.75	33750.00	9479.14	.556	187.65
Georgia	1058.50	18.39	19465.82	914.41	13.70	12527.42	31993.24	6938.39	.556	177.88
Florida	226.00	24.78	5600.28	181.89	19.06	3466.82	9067.10	2133.46	.722	65.46
S. Carolina	818.50	19.05	15592.43	674.24	12.70	8562.85	24155.28	7029.57	.556	134.30
	3080.00	19.71	60608.77	2724.23		38356.84	98965.62	25580.56		565.30
<b>DELTA</b>										
Arkansas	2269.20	21.75	49355.00	2359.26	13.74	32416.23	81771.23	25173.52	.268	219.15
Louisiana	1530.80	24.28	37167.71	1650.40	18.21	30053.78	67221.49	13315.27	.268	180.15
Mississippi	1861.23	21.48	39979.21	1965.41	14.65	28793.26	68772.47	17856.37	.268	184.31
	5661.23	22.32	126501.93	5975.08		91263.27	217765.19	56345.16		583.61
US	40907.54	28.675	1203149.64	22986.48		480364.27	1683513.91	233019.09		8973.31

a/ Column 3 of Table 2 minus Column 7 of Table 5.

b/  $\% \Delta \text{ Acres} / \% \Delta \text{ Price} = (\Delta \text{ Acres} / \Delta \text{ Price}) \text{ times } (\text{Normal Price} / \text{Normal Acres})$  where  $(\Delta \text{ Acres} / \Delta \text{ Price})$  is from "1981" REGIONAL SOYBEAN ACREAGE RESPONSE" by Ed Fryar and Roger Hoskin, in USDA/ESS FATS and OILS OUTLOOK AND SITUATION, February 1981.

APPENDIX Table 6. Equilibrium Revenue on Untreated Acres After Pesticide Cancellation

REGION State	(1) ACRES UNTREATED  (Table 2)  (1000 A)	(2) PRICE INCREASE DUE TO PESTICIDE CANCELLATION  (%)	(3) ACREAGE RESPONSE FROM 1% PRICE CHANGE (Table 5)  (%)	(4) EQUILIBRIUM UNTREATED ACRES  a/  (1000 A)	(5) NORMAL YIELD  (Table 1)  (b1/A)	(6) EQUILIBRIUM PRODUCTION ON UNTREATED ACRES  (4)X(5)  (1000 A)	(7) EQUILIBRIUM PRICE  b/  (\$/bu)	(8) EQUILIBRIUM REVENUE FROM UNTREATED ACRES ACRES (6)X(7)  (million \$)
<b>GREAT PLAINS</b>								
N. Dakota	146.52	8.39	.712	155.27	20.72	3217.25	8.36	26.89
S. Dakota	463.98	8.39	.712	521.07	27.71	14438.82	7.98	115.19
Nebraska	1166.98	8.39	.712	1236.69	30.64	37892.23	8.19	310.38
Kansas	1147.0	8.39	.712	1215.52	20.29	24622.86	8.22	202.71
	<u>2924.48</u>			<u>3128.55</u>	<u>25.63</u>	<u>80211.16</u>		<u>655.17</u>
<b>LAKE STATES</b>								
Minnesota	3465.42	8.39	.712	3672.43	31.64	116195.78	8.36	971.66
Wisconsin	183.34	8.39	.722	194.45	31.16	6058.94	8.15	49.39
Michigan	619.50	8.39	.476	644.24	27.24	17549.11	8.26	144.87
	<u>4268.26</u>			<u>4511.12</u>	<u>30.91</u>	<u>139803.83</u>		<u>1165.92</u>
<b>CORN BELT</b>								
Iowa	5944.42	8.39	.712	6299.52	36.19	227979.65	8.72	1987.48
Illinois	6090.12	8.39	.476	6333.34	35.29	223503.48	8.83	1982.38
Indiana	2809.29	8.39	.476	2921.48	35.26	103011.49	8.61	887.32
Missouri	4218.00	8.39	.712	4469.96	27.16	121404.38	8.56	1038.90
Ohio	2530.10	8.39	.476	2631.14	34.23	90064.03	8.72	785.36
	<u>21591.93</u>			<u>22655.44</u>	<u>33.94</u>	<u>765963.03</u>		<u>6681.44</u>
<b>APPALACHIA</b>								
Kentucky	733.78	8.39	.268	750.28	27.89	20925.29	8.94	187.12
Tennessee	1212.36	8.39	.268	1239.62	22.17	27482.38	8.76	240.78
Virginias	273.50	8.39	.445	283.71	21.70	6156.53	8.75	53.84
Maryland	199.00	8.39	.445	206.43	26.94	5561.22	8.42	46.84
N. Carolina	963.50	8.39	.556	1008.45	20.73	20905.08	8.83	184.54
	<u>3381.64</u>			<u>3488.49</u>	<u>23.33</u>	<u>81030.50</u>		<u>713.12</u>
<b>SOUTHEAST</b>								
Alabama	977.00	8.39	.556	1022.58	20.42	20880.99	8.58	179.25
Georgia	1058.50	8.39	.556	1107.88	18.39	20373.86	8.47	172.47
Florida	226.00	8.39	.722	239.69	24.78	5939.52	8.92	59.96
S. Carolina	818.50	8.39	.556	856.68	19.05	16319.79	8.87	144.78
	<u>3080.00</u>			<u>3226.83</u>	<u>19.71</u>	<u>63514.16</u>		<u>556.46</u>
<b>DELTA</b>								
Arkansas	2269.20	8.39	.268	2320.22	21.75	50464.86	8.87	447.44
Louisiana	1530.80	8.39	.268	1565.22	24.28	38003.55	8.61	327.06
Mississippi	1861.23	8.39	.268	1903.08	21.48	40878.16	8.76	358.01
	<u>5661.23</u>			<u>5788.52</u>	<u>22.32</u>	<u>129346.47</u>		<u>1132.51</u>
US	40907.54			42798.95	28.675	1259869.15		10904.62

a/ Untreated Acres plus Untreated Acres x Price Increase Due to Pesticide Cancellation x Acreage Response from 1% Price Change = Column 1 + Column 1 x Column 2 x Column 3.

b/ Column 4 of Table 2 (Normal Price) increased by (% price increase due to pesticide cancellation).

APPENDIX Table 7. Equilibrium Revenue on Treated Acres After Pesticide Cancellation.

REGION State	(1) TREATED ACRES W/O PESTICIDE & CONSTANT PRICE (Table 4)	(2) PRICE INCREASE DUE TO PESTICIDE CANCELLATION	(3) ACREAGE RESPONSE FROM 1% PRICE CHANGE (Table 5)	(4) EQUILIBRIUM TREATED ACRES a/	(5) YIELD ON TREATED ACRES AFTER CANCELLATION (Table 1)	(6) EQUILIBRIUM PRODUCTION ON TREATED ACRES (4)X(5)	(7) EQUILIBRIUM PRICE (Table 6)	(8) EQUILIBRIUM REVENUE FOR TREATED ACRES (6)X(7)
	(1000 A)	(%)	(%)	(1000 A)	(bu/A)	(1000 bu)	(\$/bu)	(million \$)
<b>GREAT PLAINS</b>								
N. Dakota	32.21	8.39	.712	34.13	9.12	311.27	8.36	2.60
S. Dakota	117.69	8.39	.712	124.72	16.32	2035.43	7.98	16.24
Nebraska	312.03	8.39	.712	330.67	19.92	6586.95	8.19	53.95
Kansas	276.53	8.39	.712	293.05	10.82	3170.80	8.22	26.06
	<u>738.45</u>			<u>782.57</u>		<u>12104.45</u>	<u>8.16</u>	<u>98.85</u>
<b>LAKE STATES</b>								
Minnesota	951.48	8.39	.712	1008.32	21.58	21759.55	8.36	181.91
Wisconsin	86.38	8.39	.722	91.61	25.49	2335.14	8.15	19.03
Michigan	313.67	8.39	.476	326.20	21.93	7153.57	8.26	59.09
	<u>1351.54</u>			<u>1426.13</u>		<u>31248.26</u>	<u>8.32</u>	<u>260.03</u>
<b>CORN BELT</b>								
Iowa	1755.75	8.39	.712	1860.63	28.02	52134.85	8.72	454.62
Illinois	3193.90	8.39	.476	3321.45	31.01	102998.16	8.83	909.47
Indiana	1475.82	8.39	.476	1534.76	31.11	47746.38	8.61	411.10
Missouri	1127.71	8.39	.712	1195.08	17.65	21093.16	8.56	180.56
Ohio	1326.87	8.39	.476	1379.86	30.08	41506.19	8.72	361.93
	<u>8880.05</u>			<u>9291.78</u>		<u>265478.74</u>	<u>8.73</u>	<u>2317.68</u>
<b>APPALACHIA</b>								
Kentucky	788.95	8.39	.268	806.69	20.66	16666.22	8.94	149.00
Tennessee	1283.44	8.39	.268	1313.00	15.30	20088.90	8.76	175.98
Virginias	241.33	8.39	.445	250.34	15.35	3842.72	8.75	33.62
Maryland	179.72	8.39	.445	186.43	20.47	3816.22	8.42	32.13
N. Carolina	823.68	8.39	.556	862.10	15.08	13000.47	8.83	114.79
	<u>3317.13</u>			<u>3418.56</u>		<u>57414.53</u>	<u>8.80</u>	<u>505.52</u>
<b>SOUTHEAST</b>								
Alabama	953.68	8.39	.556	998.17	14.47	14443.52	8.58	123.93
Georgia	914.41	8.39	.556	957.07	13.70	13111.86	8.47	111.06
Florida	181.89	8.39	.722	192.91	19.06	3676.86	8.92	32.80
S. Carolina	674.24	8.39	.556	705.69	12.70	8962.26	8.87	79.50
	<u>2724.23</u>			<u>2853.84</u>		<u>40194.50</u>	<u>8.64</u>	<u>347.29</u>
<b>DELTA</b>								
Arkansas	2359.26	8.39	.268	2412.31	13.74	33145.14	8.87	294.00
Louisiana	1650.40	8.39	.268	1687.51	18.25	30797.06	8.61	265.16
Mississippi	1965.41	8.39	.268	2009.60	14.65	29440.64	8.76	257.90
	<u>5975.08</u>			<u>6109.42</u>		<u>93382.84</u>	<u>8.74</u>	<u>817.06</u>
US	<u>22986.48</u>			<u>23882.3</u>		<u>499823.32</u>	<u>8.69</u>	<u>4346.43</u>

a/ Untreated Acres plus Untreated Acres x Price Increase Due to Pesticide Cancellation x Acreage Response from 1% Price Change = Column 1 + Column 1 x Column 2 x Column 3.

APPENDIX Table 8. Total Variable Costs Before and After Cancellation

REGION State	(1) NORMAL ACRES  (Table 2)	(2) NORMAL TVC/A  (Table 1)	(3) NORMAL TOTAL TVC  (1)X(2)	(4) EQUILIBRIUM UNTREATED ACRES  (Table 6)	(5) EQUILIBRIUM TVC ON UNTREATED ACRES  (2)X(4)	(6) EQUILIBRIUM TREATED ACRES  (Table 7)	(7) TVC/A ON TREATED ACRES AFTER CANCELLATION (Table 1)	(8) EQUILIBRIUM TVC ON TREATED ACRES  (6)X(7)
	(1000 A)	(\$/A)	(million \$)	(1000 A)	(million \$)	(1000 A)	(\$/A)	(million \$)
GREAT PLAINS								
N. Dakota	198	49.02	9.71	155.27	7.61	34.13	54.56	1.86
S. Dakota	627	49.02	30.74	521.07	25.54	124.72	54.56	6.80
Nebraska	1577	45.87	72.34	1236.69	56.73	330.67	51.41	17.00
Kansas	1550	52.19	80.89	1215.52	63.44	293.05	57.73	16.92
			193.68	3128.55	153.32	782.57		42.58
LAKE STATES								
Minnesota	4683	57.57	269.60	3672.43	211.42	1008.32	63.11	63.64
Wisconsin	285	61.32	17.48	194.45	11.92	91.61	61.55	5.60
Michigan	963	65.06	62.65	644.24	41.91	326.20	65.29	21.30
			349.73	4511.12	265.25	1426.13		90.54
CORN BELT								
Iowa	8033	61.79	469.36	6299.52	389.25	1860.63	67.33	125.28
Illinois	9467	63.02	596.61	6333.34	399.13	3321.45	63.25	210.08
Indiana	4367	67.65	295.43	2921.48	197.64	1534.76	67.88	104.18
Missouri	5700	61.27	349.24	4469.96	273.87	1195.08	66.81	79.84
Ohio	3933	69.12	271.85	2631.14	181.86	1379.86	69.35	95.69
			2009.49	22655.44	1441.75	9291.78		615.07
APPALACHIA								
Kentucky	1590	79.96	127.14	750.28	59.99	806.69	84.82	68.42
Tennessee	2627	82.75	217.38	1239.62	102.58	1313.00	87.61	115.03
Virginias	547	84.49	46.22	283.71	23.97	250.34	86.10	21.55
Maryland	398	84.49	33.63	206.43	17.44	186.43	86.10	16.05
N. Carolina	1927	90.76	174.89	1008.45	91.53	862.10	92.37	79.63
			599.26	3488.49	295.51	3418.56		300.68
SOUTHEAST								
Alabama	2117	109.94	232.74	1022.58	112.42	998.17	114.80	114.59
Georgia	2117	105.36	223.05	1107.88	116.73	957.07	106.97	102.38
Florida	452	105.18	47.54	239.69	25.21	192.91	106.79	20.60
S. Carolina	1637	100.24	164.09	856.68	85.87	705.69	101.85	71.87
			667.42	3226.83	340.23	2853.84		309.44
DELTA								
Arkansas	4917	78.65	386.72	2320.22	182.49	2412.31	83.51	201.45
Louisiana	3317	88.31	292.92	1565.22	138.22	1687.51	93.17	157.23
Mississippi	4033	77.13	311.07	1903.08	146.78	2009.60	81.99	164.77
			990.71	5788.52	467.49	6109.42		523.45
US			4810.29	42798.95	2963.55	23882.30		1881.76

APPENDIX Table 9. Net Impact Upon Producers of Pesticide Cancellation

REGION State	(1) NORMAL REVENUE  (Table 2)	(2) EQUILIBRIUM REVENUE UNTREATED ACRES Table 6)	(3) EQUILIBRIUM REVENUE TREATED ACRES (Table 7)	(4) CHANGE IN REVENUE  (2)+(3)-(1)	(5) NORMAL TVC  (Table 8)	(6) EQUILIBRIUM TVC UNTREATED ACRES (Table 8)	(7) EQUILIBRIUM TVC TREATED ACRES (Table 8)	(8) CHANGE IN TVC  (6)+(7)-(5)	(9) CHANGE IN REVENUE - TVC  (4)-(8)
----- MILLION DOLLARS -----									
GREAT PLAINS									
N. Dakota	31.6	26.9	2.6	(2.1)	9.7	7.6	1.9	(0.2)	(1.9)
S. Dakota	127.9	115.2	16.2	3.5	30.7	25.5	6.8	1.6	1.9
Nebraska	365.1	310.4	54.0	(0.7)	72.3	56.7	17.0	1.4	(2.1)
Kansas	238.5	202.7	26.1	(9.7)	80.9	63.4	16.9	(0.6)	(9.1)
	<u>763.1</u>	<u>655.2</u>	<u>98.9</u>	<u>(9.0)</u>	<u>193.7</u>	<u>153.3</u>	<u>42.6</u>	<u>2.2</u>	<u>(11.2)</u>
LAKE STATES									
Minnesota	1143.1	971.7	181.9	10.5	269.6	211.4	63.6	5.4	5.1
Wisconsin	66.8	49.4	19.0	1.6	17.5	11.9	5.6	0.0	1.6
Michigan	199.8	144.9	59.1	4.2	62.7	41.9	21.3	0.5	3.7
	<u>1409.7</u>	<u>1165.9</u>	<u>260.0</u>	<u>16.3</u>	<u>349.7</u>	<u>265.3</u>	<u>90.5</u>	<u>5.9</u>	<u>10.4</u>
CORN BELT									
Iowa	2338.2	1987.5	454.6	103.9	496.4	389.3	125.3	18.2	85.7
Illinois	2733.9	1982.4	909.5	158.0	596.6	399.1	210.1	12.6	145.4
Indiana	1223.7	887.3	411.1	74.7	295.4	197.6	104.2	6.4	68.3
Missouri	1222.2	1038.9	180.6	(2.7)	349.2	273.9	79.8	4.5	(7.2)
Ohio	1083.1	785.4	361.9	64.2	271.9	181.9	95.7	5.7	58.5
	<u>8601.1</u>	<u>6681.4</u>	<u>2317.7</u>	<u>398.1</u>	<u>2009.5</u>	<u>1441.8</u>	<u>615.1</u>	<u>47.4</u>	<u>350.7</u>
APPALACHIA									
Kentucky	365.8	187.1	149.0	(29.7)	127.1	60.0	68.4	1.3	(31.0)
Tennessee	470.8	240.8	176.0	(54.0)	217.4	102.6	115.0	0.2	(54.2)
Virginias	95.8	53.8	33.6	(8.4)	46.2	24.0	21.6	(0.6)	(7.8)
Maryland	83.3	46.8	32.1	(4.4)	33.6	17.4	16.1	(0.1)	(4.3)
N. Carolina	325.3	184.5	114.8	(26.0)	174.9	91.5	79.6	(3.8)	(22.2)
	<u>1341.0</u>	<u>713.1</u>	<u>505.5</u>	<u>(122.5)</u>	<u>599.3</u>	<u>295.5</u>	<u>300.7</u>	<u>(3.1)</u>	<u>(119.5)</u>
SOUTHEAST									
Alabama	342.4	179.3	123.9	(39.2)	232.7	112.4	114.6	(5.7)	(33.5)
Georgia	304.1	172.5	111.1	(20.5)	223.1	116.7	102.4	(4.0)	(16.5)
Florida	92.1	60.0	32.8	0.7	47.5	25.2	20.6	(1.7)	2.4
S. Carolina	255.2	144.8	79.5	(30.9)	164.1	85.9	71.9	(6.3)	(24.6)
	<u>993.8</u>	<u>556.5</u>	<u>347.3</u>	<u>(89.9)</u>	<u>667.4</u>	<u>340.2</u>	<u>309.4</u>	<u>(17.8)</u>	<u>(72.2)</u>
DELTA									
Arkansas	874.8	447.4	294.0	(133.4)	386.7	182.5	201.5	(2.7)	(130.7)
Louisiana	639.5	327.1	265.2	(47.2)	292.9	138.2	157.2	2.5	(49.7)
Mississippi	700.0	358.0	257.9	(84.1)	311.1	146.8	164.8	0.5	(84.6)
	<u>2214.2</u>	<u>1132.5</u>	<u>817.1</u>	<u>(264.7)</u>	<u>990.7</u>	<u>467.5</u>	<u>523.5</u>	<u>0.3</u>	<u>(265.0)</u>
US	15323.0	10904.6	4346.4	(71.7)	4810.3	2963.6	1881.8	35.1	(106.8)