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Report

2008 Soybean Insect Losses for Mississippi and Tennessee

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Abstract Survey-based soybean insect losses provide a glimpse of current soybean management practices and allow one to see evolving trends. Continuing a survey begun in 2004 in Mississippi, the 2008 survey showed that seed treatments were used extensively for the first time and soybean acreage monitored by crop scouts continued to increase. Stink bugs (Hemiptera: Pentatomidae) remained the most important pest in Mississippi followed by soybean looper (Lepidoptera: Noctuidae), bean leaf beetle (Coleoptera: Chrysomelidae) and threecornered alfalfa hopper (Hemiptera: Membracidae). In the first year of published losses for Tennessee, economic costs in yield loss plus control costs were greatest for stink bugs, threecornered alfalfa hoppers and thrips (Thysanoptera: Thripidae).

Key Words: soybean, yield loss, pest management

Introduction

Mississippi soybean losses have been compiled annually since 2004 (Musser and Catchot 2008), providing an annual record of insect pressure and management decisions. This year's report also includes insect losses from Tennessee to provide a broader picture of soybean insect management in the Midsouth. These estimates are based on surveys of consultants and extension personnel, similar to those used to estimate insect losses in cotton (Williams 2006). While the costs and losses estimated for a pest in any given year are subjective, these losses provide an historical record of pest pressure and management practices and provide an estimate of the economic impact of the various soybean pests. We encourage entomologists in other states to begin estimating losses so that we may gain a better regional or national picture of the impact of insect pests on soybean production.

Materials and Methods

A survey was sent to crop consultants and extension personnel in the fall of the year. Surveyed people were those who actively scouted soybean fields and those who assisted growers in making soybean pest management decisions. These surveys were compiled and then combined with our own experience to

estimate the various fields in the table. Acreage, yield and price data were drawn from Agricultural Statistics Service publications (USDA NASS 2007). The estimates were placed in an Excel spreadsheet (Microsoft Office 2003, Microsoft Corp.) to make the various calculations. The actual formulas used in the spreadsheet are in Musser and Catchot (2008).

Results and Discussion

Soybean insect pest management intensity continued to increase in 2008 as measured by scouted acreage, use of seed treatments, and the application of foliar insecticides (Table 1). Seed treatment usage was widespread for the first time in 2008. There was no evidence of seed treatments replacing any foliar insecticides as the number of foliar applications was higher than in any of the previous years surveyed. Total losses plus cost was higher than other years even while percent yield loss was lower than in previous years. This was a function of the high value of soybeans, increased use of seed treatments and more foliar insecticide applications.

Table 1. Mississippi average soybean management and performance, 2004-2008.

Year	Acres (million)[1]	Yield (bu/ac)[2]	Price ($/bu)	% acres scouted	% acres with insect seed trt.	No. foliar insecticide applications	% yield loss to insects	$ loss + cost/ac
2004	1.67	37.5	6.20	10	0	0.89	8.09	25.46
2005	1.61	36.5	5.92	11	0	0.71	5.89	17.61
2006	1.67	26.0	6.23	15	0.01	1.04	6.12	19.12
2007	1.46	40.5	9.25	25	2	2.10	6.83	45.37
2008	2.01	38.0	9.00[3]	55	50	2.41	5.11	49.17

[1] 1 acre = 0.405 ha
[2] 1 bu/ac = 67.2 kg/ha
[3] estimate. Final price not available from NASS at submission time.

Table 2 compares the major pests in Mississippi and Tennessee in 2008. Stink bugs (Hemiptera: Pentatomidae), a complex of southern green (*Nezara viridula*), green (*Acrosternum hilare*), brown (*Euschistus servus*), red-shouldered (*Thyanta* spp.) and red-banded (*Piezadorus guildinii*) stink bugs were the major pests of soybeans in both states, infesting nearly every acre. Threecornered alfalfa hopper, *Spissistilus festinus* (Hemiptera: Membracidae), also caused substantial losses in both states. Soybean looper, *Pseudoplusia includens* (Lepidoptera: Noctuidae), and bean leaf beetle, *Ceratoma trifurcata* (Coleoptera: Chrysomelidae), were substantial pests in Mississippi, while thrips (Thysanoptera: Thripidae) were a more costly pest in Tennessee. Beyond the species listed in Table 2, yield losses and insecticide applications were relatively rare for all other pests in both states in 2008 (Appendices 1, 2).

Table 2. Losses and management of major soybean pests in Mississippi and Tennessee, 2008.

Pest	% acres treated with foliar insecticides		$ loss + cost/ac	
	MS	TN	MS	TN
Stink bug	62.2	53.3	14.85	13.64
Soybean looper	47.3	1.3	13.64	0.39
Bean leaf beetle	37.3	0.0	5.45	0.00
Threecornered alfalfa hopper	26.4	14.0	5.15	3.27
Corn earworm	12.4	0.4	2.22	1.99
Thrips	1.7	15.3	0.03	3.21

One factor that was not been broken out in these soybean losses is the impact of double-cropped soybeans following wheat. Double-cropped acreage accounted for approximately 27 and 41% of all soybean acres in Mississippi and Tennessee, respectively, in 2008. These acres tended to receive more

foliar applications for soybean looper, corn earworm and stink bugs and had lower yields than early-season soybeans.

Acknowledgements

These losses could not be calculated without the assistance of numerous crop consultants and extension personnel who willingly completed this survey each year. We also acknowledge Michael Williams who has compiled insect losses in cotton for many years and gave us the idea to start a similar program in soybeans.

References

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Williams, M. R. 2006. Cotton insect losses, http://www.msstate.edu/Entomology/Cotton.html.

Appendix 1. Mississippi soybean insect losses, 2008.

Pest	Acres Infested	% Acres Infested	Acres Treated	% Acres Treated	# of apps/acres treated	Cost of 1 Insecticide	% loss per acre infested	# of apps per total acre	cost/acre	Overall % reduction	bushel lost per pest	Loss + Cost	Loss + Cost/acre	% Total Loss + Cost
Armyworm complex	150,000	7.5%	9,500	0.5%	1	$8.50	0.30	0.005	$0.04	0.02%	18,020	$242,933	$0.12	0.3%
Banded Cucumber Beetle	350,000	17.4%	1,400	0.1%	1	$8.50	0.01	0.001	$0.01	0.00%	1,402	$24,514	$0.01	0.0%
Bean Leaf Beetle	1,500,000	74.6%	750,000	37.3%	1.1	$10.00	0.50	0.410	$4.10	0.37%	300,338	$10,953,046	$5.45	12.8%
Blister Beetle	1,100	0.1%	0	0.0%	0	$0.00	0.00	0.000	$0.00	0.00%	0	$0	$0.00	0.0%
Corn Earworm	650,000	32.3%	250,000	12.4%	1	$8.50	1.00	0.124	$1.06	0.32%	260,293	$4,467,640	$2.22	5.2%
Cutworms	15,000	0.7%	500	0.0%	1	$4.00	0.00	0.000	$0.00	0.00%	0	$2,000	$0.00	0.0%
Dectes Stem Borer	350,000	17.4%	0	0.0%	0	$0.00	0.00	0.000	$0.00	0.00%	0	$0	$0.00	0.0%
Garden Webworms	1,500	0.1%	0	0.0%	0	$0.00	0.00	0.000	$0.00	0.00%	0	$0	$0.00	0.0%
Grape Colaspis	45,000	2.2%	0	0.0%	0	$0.00	0.00	0.000	$0.00	0.00%	0	$0	$0.00	0.0%
Grasshopper	900,500	44.8%	25,000	1.2%	1	$6.00	0.10	0.012	$0.07	0.04%	36,061	$474,546	$0.24	0.6%
Green Cloverworm	1,500,000	74.6%	45,000	2.2%	1	$8.50	0.20	0.022	$0.19	0.15%	120,135	$1,463,719	$0.73	1.7%
Lesser Cornstalk Borer	1,500	0.1%	0	0.0%	0	$0.00	0.00	0.000	$0.00	0.00%	0	$0	$0.00	0.0%
Mexican Bean Beetle	0	0.0%	0	0.0%	0	$0.00	0.00	0.000	$0.00	0.00%	0	$0	$0.00	0.0%
Potato Leafhopper	400,000	19.9%	900	0.0%	1	$6.00	0.01	0.000	$0.00	0.00%	1,602	$19,816	$0.01	0.0%
Saltmarsh Caterpillar	51,000	2.5%	15,000	0.7%	1	$9.00	0.15	0.007	$0.07	0.00%	3,063	$162,571	$0.08	0.2%
Soybean Aphid	90,000	4.5%	0	0.0%	0	$0.00	0.00	0.000	$0.00	0.00%	0	$0	$0.00	0.0%
Soybean Looper	1,400,000	69.7%	950,000	47.3%	1.3	$13.00	2.25	0.614	$7.99	1.57%	1,261,422	$27,407,795	$13.64	31.9%
Spider Mites	19,000	0.9%	190	0.0%	1	$9.00	0.25	0.000	$0.00	0.00%	1,902	$18,829	$0.01	0.0%
Spotted Cucumber Beetle	425,000	21.1%	900	0.0%	1	$9.00	0.01	0.000	$0.00	0.00%	1,702	$23,417	$0.01	0.0%
Stink Bugs	2,000,000	99.5%	1,250,000	62.2%	1.5	$9.00	1.80	0.933	$8.40	1.79%	1,441,625	$29,849,622	$14.85	34.8%
Threecornered Alfalfa Hopper	1,800,000	89.6%	530,000	26.4%	1	$8.50	0.90	0.264	$2.24	0.81%	648,731	$10,343,580	$5.15	12.1%
Thrips	1,800,000	89.6%	35,000	1.7%	1	$6.50	0.01	0.017	$0.11	0.01%	7,208	$292,373	$0.15	0.3%
Velvetbean Caterpillar	90,000	4.5%	1,250	0.1%	1	$7.50	0.20	0.001	$0.00	0.01%	7,208	$74,248	$0.04	0.1%
								2.413	**$24.29**	**5.11%**	**4,110,713**	**$85,820,650**	**$42.70**	**100.0%**

SUMMARY DATA

Data Input

State	MS
Year	2008
Total Acres	2,010,000
Yield/acre	38
Price/Bushel	$9.00
% Acres Scouted	55
Scouting Fee/scouted acre	$4.50
% Acres Insect Seed Trt.	50
Seed Trt Cost/treated ac	$8.00

Yield & Management Results

Total Bushels Harvested	76,380,000
Total Bushels Lost to Insects	4,110,713
Percent Yield Loss	5.11%
Yield w/o Insects	40.05
Ave. # Spray Applications	2.413
Seed Treated Acres	1,005,000
Scouted Acres	1,105,500

Economic Results

	Total	Per Total Acre
Foliar Insecticides Costs	$48,824,235	$24.29
Seed Treatment Costs	$8,040,000	$4.00
Scouting Costs	$4,974,750	$2.48
Total Costs	$61,838,985	$30.77
Yield Lost to insects	$36,996,415	$18.41
Total Losses + Costs	$98,835,400	$49.17

Appendix 2. Tennessee soybean insect losses, 2008.

Pest	Acres Infested	% Acres Infested	Acres Treated	% Acres Treated	# of apps/acres treated	Cost of 1 Insecticide	% loss per acre infested	# of apps per total acre	cost/acre	Overall % reduction	bushel lost per pest	Loss + Cost	Loss + Cost/acre	% Total Loss + Cost
Armyworm complex	20,000	1.3%	2,000	0.1%	1	$8.50	0.50	0.001	$0.01	0.01%	3,240	$52,642	$0.04	0.1%
Banded Cucumber Beetle	0	0.0%	0	0.0%	0	$0.00	0.00	0.000	$0.00	0.00%	0	$0	$0.00	0.0%
Bean Leaf Beetle	1,500,000	100.0%	100	0.0%	1	$8.00	0.00	0.000	$0.00	0.00%	0	$800	$0.00	0.0%
Blister Beetle	200,000	13.3%	1,000	0.1%	1	$8.50	0.00	0.001	$0.01	0.00%	0	$8,500	$0.01	0.0%
Corn Earworm	75,000	5.0%	6,000	0.4%	1	$8.50	11.00	0.004	$0.03	0.55%	267,319	$2,991,506	$1.99	8.4%
Cutworms	2,500	0.2%	2,100	0.1%	1	$6.00	0.01	0.001	$0.01	0.00%	8	$12,689	$0.01	0.0%
Dectes Stem Borer	1,200,000	80.0%	8,000	0.5%	1	$8.50	0.10	0.005	$0.05	0.08%	38,883	$495,710	$0.33	1.4%
Garden Webworms	3,000	0.2%	0	0.0%	0	$0.00	0.00	0.000	$0.00	0.00%	0	$0	$0.00	0.0%
Grape Colaspis	40,000	2.7%	0	0.0%	0	$0.00	0.00	0.000	$0.00	0.00%	0	$0	$0.00	0.0%
Grasshopper	100,000	6.7%	5,000	0.3%	1	$7.00	0.10	0.003	$0.02	0.01%	3,240	$70,642	$0.05	0.2%
Green Cloverworm	1,500,000	100.0%	35,000	2.3%	1	$8.00	0.15	0.023	$0.19	0.15%	72,905	$1,081,956	$0.72	3.0%
Lesser Cornstalk Borer	2,000	0.1%	0	0.0%	0	$0.00	0.00	0.000	$0.00	0.00%	0	$0	$0.00	0.0%
Mexican Bean Beetle	2,000	0.1%	0	0.0%	0	$0.00	0.00	0.000	$0.00	0.00%	0	$0	$0.00	0.0%
Potato Leafhopper	50,000	3.3%	0	0.0%	0	$0.00	0.00	0.000	$0.00	0.00%	0	$0	$0.00	0.0%
Saltmarsh Caterpillar	10,000	0.7%	0	0.0%	0	$0.00	0.00	0.000	$0.00	0.00%	0	$0	$0.00	0.0%
Soybean Aphid	50,000	3.3%	0	0.0%	0	$0.00	0.00	0.000	$0.00	0.00%	0	$0	$0.00	0.0%
Soybean Looper	600,000	40.0%	20,000	1.3%	1	$11.00	0.17	0.013	$0.15	0.07%	33,050	$583,553	$0.39	1.6%
Spider Mites	70,000	4.7%	400	0.0%	1	$9.00	0.35	0.000	$0.00	0.02%	7,939	$90,924	$0.06	0.3%
Spotted Cucumber Beetle	750,000	50.0%	0	0.0%	0	$0.00	0.00	0.000	$0.00	0.00%	0	$0	$0.00	0.0%
Stink Bugs	1,500,000	100.0%	800,000	53.3%	1.2	$8.50	2.30	0.640	$5.44	2.30%	1,117,878	$20,456,661	$13.64	57.5%
Threecornered Alfalfa Hopper	1,500,000	100.0%	210,000	14.0%	1.1	$8.50	0.55	0.154	$1.31	0.55%	267,319	$4,904,006	$3.27	13.8%
Thrips	1,500,000	100.0%	230,000	15.3%	1	$7.00	0.60	0.153	$1.07	0.60%	291,620	$4,817,824	$3.21	13.5%
Velvetbean Caterpillar	0	0.0%	0	0.0%	0	$0.00	0.00	0.000	$0.00	0.00%	0	$0	$0.00	0.0%
								1.000	**$8.29**	**4.33%**	**2,103,401**	**$35,567,414**	**$23.71**	**100.0%**

SUMMARY DATA

Data Input

State	TN
Year	2008
Total Acres	1,500,000
Yield/acre	31
Price/Bushel	$11.00
% Acres Scouted	20
Scouting Fee/scouted acre	$6.00
% Acres Insect Seed Trt.	40
Seed Trt Cost/treated ac	$7.00

Yield & Management Results

Total Bushels Harvested	46,500,000
Total Bushels Lost to Insects	2,103,401
Percent Yield Loss	4.33%
Yield w/o Insects	32.40
Ave. # Spray Applications	1.000
Seed Treated Acres	600,000
Scouted Acres	300,000

Economic Results

	Total	Per Total Acre
Foliar Insecticides Costs	$12,430,000	$8.29
Seed Treatment Costs	$4,200,000	$2.80
Scouting Costs	$1,800,000	$1.20
Total Costs	$18,430,000	$12.29
Yield Lost to insects	$23,137,414	$15.42
Total Losses + Costs	$41,567,414	$27.71