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SOYBEAN YIELD LOSS TO INSECTS IN THE MIDSOUTHERN U.S.

Survey-based soybean yield losses to insects are estimated annually in U.S. soybean-producing states. These estimates are collected through informal communication with university faculty and extension personnel, private crop consultants, and/or industry personnel who are actively involved in soybean production in each state. Production losses are based on estimates of yield in the absence of insects.

Acreage, production, and price data are from NASS. Results from and details about each year's survey are provided in annual issues of the Midsouth Entomologist. Summary results from this survey for the 2013-2024 period in indicated midsouthern U.S. states are shown in **Tables 1 and 2**.

Economic losses attributed to insects (yield lost to insects + insect management costs) during the 2013-2024 period in the midsouthern U.S. states (calculated using the commodity prices shown in **Table 1**) were highest in 2022 (Tenn. data not available in 2022).

During the 2013-2019 and 2023-2024 periods, Arkansas had the largest percentage yield loss to insects of the shown states. Mississippi had the largest percentage yield loss to insects in the 2020-2022 period. Insect control costs/acre were the highest for Arkansas and Mississippi in all years of the 2013-2023 period. Louisiana had the highest costs/acre in 2024. Tennessee had the lowest economic loss/acre (yield loss + control costs) to insects in all years that data were available for that state (**Table 1**).

In Mississippi during the 2013-2024 period, annual yield losses to insects ranged from 2.77% (2014) to 7.70% (2022). Economic losses attributed to insects (yield lost to insects + insect management costs) ranged from $46.45/acre in 2014 to $108.42/acre in 2022 (**Table 1**).

In the 2013-2024 growing seasons, the most damaging insect pests in each state are shown in **Table 2**.

- In Arkansas, corn earworm and stink bugs were prominent damaging insects in all years. Armyworm complex and bean leaf beetle were prominent in 2013-2018, and damage from soybean looper was prominent in 2013 and 2016-2024. Redbanded stinkbug was the dominant stinkbug only in 2017.
- In Louisiana, damage from soybean looper and stink bugs was prominent in all years. Corn earworm was not prominent in any year from 2013-2022. Damage caused by either green clover worm, velvetbean caterpillar, or both was prominent in all years from 2013-2024. Redbanded stinkbug was the dominant stinkbug from 2017-2024.
- In Mississippi, damage caused by corn earworm and soybean looper was prominent in all years. Stink bug damage was prominent in all years, especially in 2017-2024. Redbanded stinkbug was the dominant stinkbug in 2017, 2020, 2022, and 2023. Either green cloverworm, velvetbean caterpillar, saltmarsh caterpillar, or all three caused significant damage in all years except 2024.
- In Tennessee (no available data for 2022), stink bugs and green clover worm were prominent damaging species in all years. Corn earworm was a major damaging insect only in 2020, and soybean looper was not prominent in any year. The green stinkbug was the dominant stinkbug in years with major stinkbug damage. Dectes stem borer was the major insect pest in 2018, and kudzu bug had a significant impact in 2020, 2021, and 2023-2024.

The above estimates and summary points lead to the following important tenets for insect management in the midsouthern U.S. soybean crop.

- Insects pose a constant threat to soybean production in the region, and cause significant economic losses each year.
- Each Midsouth state had consistently prominent species across the shown survey years. However, each state also had varied pests that were problematic in a given year and required management to prevent yield losses to those insects in those specific years.
- The redbanded stinkbug was prominent in Louisiana and Mississippi in 2017 and subsequent years, and thus warrants special attention in future soybean crops in these states. Stink bugs in general had a major impact in all states.
- The consistent presence of several of the damaging insect species across all years underlines the importance of resistance management when control measures are selected each year. Thus, insecticidal chemistries should be rotated when targeting pests such as corn earworm and the lepidopteran foliage feeders that cause damage every year.
- Click here for additional information about insect management in Midsouth soybeans, and here to access insect management guides from the various states.

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Table 1. Soybean yield loss to insects, costs associated with insect management, and total costs associated with yield losses and treatments for indicated states, 2013-2024. Acreage, production, and price data are from NASS (shown in reference list). Yield lost to insect damage and cost data for insect management are from issues of Midsouth Entomologist (Tenn. data not available in 2022).

State-year	Harvested acres	Loss to insects*		Price**	Loss	Insect cont. cost^	Total loss
	(1,000 acres)	*(%)*	*(1,000 bu.)*	*($/bu.)*	*----------($1,000)----------*		*($/acre)*
Ark. 2013	3,240	5.52	8,234	13.10	107,865	72,200	55.58
La. 2013	1,120	2.54	1,416	13.40	18,974	54,233	65.36
Miss. 2013	1,990	3.54	3,359	13.20	44,339	73,910	59.42
Tenn. 2013	1,550	1.79	1,314	13.00	17,082	19,115	23.35
Total	7,900		14,323		188,260	219,458	
Ark. 2014	3,210	6.83	11,766	10.70	125,896	96,476	69.27
La. 2014	1,405	2.59	2,129	11.00	23,419	55,242	55.99
Miss. 2014	2,200	2.77	3,259	11.10	36,175	66,019	46.45
Tenn. 2014	1,610	2.05	1,550	10.60	16,430	19,406	22.26
Total	8,425		18,704		201,920	237,143	
Ark. 2015	3,170	5.37	8,815	9.46	83,302	88,959	54.34
La. 2015	1,390	3.43	2,024	9.74	19,802	68,855	63.56
Miss. 2015	2,270	3.76	4,080	9.72	40,188	88,946	56.88
Tenn. 2015	1,720	1.82	1,467	9.29	13,643	17,412	18.05
Total	8,555		16,393		156,935	264,172	
Ark. 2016	3,100	6.04	9,366	9.85	92,255	65,678	50.95
La. 2016	1,190	4.13	2,486	9.95	24,736	73,260	82.34
Miss. 2016	2,020	4.85	4,942	9.95	49,173	96,537	72.13
Tenn. 2016	1,630	1.72	1,284	9.75	12,519	15,685	17.30
Total	7,940		18,078		178,683	251,160	
Ark. 2017	3,500	8.78	17,181	9.75	167,515	181,892	99.83
La. 2017	1,250	4.37	3,085	9.70	29,924	77,676	86.08
Miss. 2017	2,170	5.11	6,193	9.80	60,691	112,416	79.77
Tenn. 2017	1,660	2.57	2,189	9.70	21,233	15,239	21.97
Total	8,580		28,648		308,011	387,233	
Ark. 2018	3,240	7.98	14,329	9.00	128,961	121,384	77.27
La. 2018	1,200	3.55	2,297	9.05	20,788	60,268	67.55
Miss. 2018	2,190	4.86	6,097	9.25	56,397	66,834	56.27
Tenn. 2018	1,670	2.83	2,237	8.80	19,686	19,423	23.42
Total	8,300		24,960		225,832	267,909	
Ark. 2019	2,610	6.02	8,192	9.00	73,729	99,439	66.35
La. 2019	860	3.95	1,698	8.75	14,854	47,385	72.37
Miss. 2019	1,630	5.92	5,128	8.90	45,643	63,824	67.16
Tenn. 2019	1,370	1.85	1,214	9.05	10,984	21,286	23.55
Total	6,470		16,232		145,210	231,934	
Ark. 2020	2,780	6.05	8,951	11.10	99,356	106,440	74.03
La. 2020	1,020	4.11	2,317	10.30	23,865	50,145	72.56
Miss. 2020	2,060	6.44	7,657	10.70	81,930	85,017	81.04
Tenn. 2020	1,620	2.77	2,308	11.40	26,311	27,849	33.43
Total	7,480		21,233		231,462	271,451	

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State-year	Harvested acres	Loss to insects*		Price**	Loss	Insect cont. cost^	Total loss
	(1,000 acres)	*(%)*	*(1,000 bu.)*	*($/bu.)*	*----------($1,000)----------*		*($/acre)*
Ark. 2021	3,010	5.96	9,729	12.70	123,558	122,789	81.84
La. 2021	1,060	3.65	2,088	12.60	26,309	50,504	72.46
Miss. 2021	2,180	7.24	9,188	12.70	116,688	94,381	96.82
Tenn. 2021	1,520	3.58	2,822	12.70	35,839	26,131	40.77
Total	7,770		23,827		302,394	293,805	
Ark. 2022	3,150	7.34	12,975	14.40	186,844	166,529	112.18
La. 2022	1,210	3.48	2,050	13.60	27,886	66,717	78.18
Miss. 2022	2,290	7.70	10,316	13.90	143,395	104,878	108.42
Total#	6,650		25,342		358,125	338,124	
Ark. 2023	2,950	6.34	10,783	12.80	138,026	120,522	87.64
La. 2023	980	2.86	1,154	13.30	15,350	38,618	55.10
Miss. 2023	2,130	5.31	6,689	13.20	88,294	57,109	68.26
Tenn. 2023	1,570	2.48	2,936	12.60	25,656	24,444	31.91
Total	7,630		21,562		267,326	240,693	
Ark. 2024	3,020	5.90	9,800	10.20	99,960	127,957	75.47
La. 2024	1,060	3.32	1,830	10.30	18,849	63,494	77.68
Miss. 2024	2,270	4.33	5,504	10.50	57,792	57,090	50.61
Tenn. 2024	1,800	2.57	1,943	10.20	19,819	39,798	33.12
Total	8,150		19,077		196,420	288,339	

*Percentage data from Midsouth Entomologist. Yield loss data calculated as follows: Each state's actual production [from NASS] divided by [100 - % loss] = potential production without insects. Potential production - actual production = yield lost to insects based on estimated % yield loss.
**Marketing year average price from NASS.
^Seed treatments, foliar insecticides, and scouting costs.
#Tenn. Data not available in 2022.

Table 2. Insects* causing majority of insect-related soybean yield loss in indicated states, 2013-2024 (Tenn. data not available in 2022).		
State	**Insect pest and (%) yield loss attributed to each indicated pest**	**% of (total %)****
2013		
Ark.	AWC (0.70), BLB (0.50), CEW (2.60), SL (0.50), SB (0.85)	93 (5.52)
La.	GCW (0.37), SL (0.83), SB (1.00), TCAH (0.25)	96 (2.54)
Miss.	CEW (0.97), GCW (0.46), SL (0.90), SB (0.53), VBC (0.28)	89 (3.54)
Tenn.	DSB (0.26), GCW (0.18), SL (0.15), SB (0.73), TCAH (0.20)	85 (1.79)
2014		
Ark.	AWC (2.25), BLB (1.00), CEW (2.10), DSB (0.75), SB (0.50)	97 (6.83)
La.	GCW (0.50), SL (0.57), SB (1.00), TCAH (0.25), VBC (0.21)	98 (2.59)
Miss.	AWC (0.12), CEW (0.59), GCW (0.47), SL (0.51), SB (0.44), VBC (0.24)	86 (2.77)
Tenn.	AWC (0.09), BLB (0.10), CEW (0.09), DSB (0.26), GCW (0.28), SB (0.95)	86 (2.05)
2015		
Ark.	AWC (1.29), BLB (1.00), CEW (2.27), SB (0.50)	94 (5.37)
La.	GCW (0.50), SL (1.00), SB (1.50), TCAH (0.25)	95 (3.43)
Miss.	BLB (0.15), CEW (0.46), GCW (0.49), SL (1.04), SB (0.64), VBC (0.49)	87 (3.76)
Tenn.	BLB (0.09), DSB (0.23), GCW (0.26), SB (0.96)	85 (1.82)
2016		
Ark.	AWC (0.87), BLB (1.00), CEW (2.44), SB (1.00), SL (0.56)	97 (6.04)
La.	GCW (0.50), SL (1.25), SB (1.75), VBC (0.30), TCAH (0.25)	98 (4.13)
Miss.	BLB (0.18), CEW (1.02), GCW (0.60), SL (1.24), SB (0.55), VBC (0.62)	87 (4.85)
Tenn.	BLB (0.20), DSB (0.23), GCW (0.26), SB (0.47), TCAH (0.20)	79 (1.72)
2017		
Ark.	AWC (0.89), BLB (1.00), CEW (2.90), SB (3.00), SL (0.67)	96 (8.78)
La.	CEW (0.20), GCW (0.50), SL (1.25), SB (1.75), VBC (0.41)	94 (4.37)
Miss.	CEW (0.72), GCW (0.42), SL (0.62), SB (2.28), VBC (0.45)	88 (5.11)
Tenn.	CEW (0.23), GCW (0.27), KB (0.22), SB (0.40), Other (mainly slugs, 0.88)	78 (2.57)
2018		
Ark.	AWC (0.88), BLB (1.00), CEW (3.66), SL (0.34), SB (1.75)	96 (7.98)
La.	CEW (0.19), GCW (0.34), SL (0.84), SB (1.75), VBC (0.28)	96 (3.55)
Miss.	CEW (0.59), GCW (0.39), SL (0.44), SB (2.36), VBC (0.51)	88 (4.86)
Tenn.	BLB (0.20), CEW (0.18), DSB (0.99), GCW (0.30), SLUGS (0.32), SB (0.50), TCAH (0.20)	95 (2.83)
2019		
Ark.	CEW (3.45), SL (.33), SB (2.00)	96 (6.02)
La.	AWC (0.20), GCW (0.50), SL (1.25), SB (1.50), VBC (0.30)	95 (3.95)
Miss.	CEW (1.23), GCW (0.41), SL (0.60), SB (2.45), VBC (0.60)	89 (5.92)
Tenn.	BLB (0.20), CEW (0.39), DSB (0.24), GCW (0.10), KB (0.18), SB (0.50), TCAH (0.10)	92 (1.85)
2020		
Ark.	CEW (3.48), SL (0.33), SB (2.00)	96 (6.05)
La.	CEW (0.16), GCW (0.17), SL (1.25), SB (1.85), VBC (0.50)	96 (4.11)
Miss.	CEW (1.40), GCL (0.45), SL (0.98), SB (2.38), VBC (0.68)	91 (6.44)
Tenn.	BLB (0.50), CEW (0.84), GCW (0.20), KB (0.30), SB (0.50)	84 (2.77)

Table 2. Insects* causing majority of insect-related soybean yield loss in indicated states, 2013-2024 (Tenn. data not available in 2022).

State	Insect pest and (%) yield loss attributed to each indicated pest	% of (total %)**
2021		
Ark.	AWC (0.20), CEW (2.80), SL (0.38), SB (2.30)	95 (5.96)
La.	SL (1.05), SB (1.75), VBC (0.38)	87 (3.65)
Miss.	CEW (1.75), GCW (0.23), SMC (0.38), SL (1.13), SB (2.38), VBC (0.75)	91 (7.24)
Tenn.	AWC (0.85), BLB (0.30), CEW (0.27), GCW (0.40), KB (0.48), SB (0.60), TCAH (0.20)	87 (3.58)
2022^		
Ark.	CEW (3.40), SL (0.85), SB (2.60)	93 (7.34)
La.	SL (0.99), SB (1.75), VBC (0.35)	89 (3.48)
Miss.	CEW (2.63), GCW (0.20), SL (1.20), SB (2.85)	89 (7.70)
2023		
Ark.	CEW (2.64), SL (0.65), SB (2.70)	94 (6.34)
La.	CEW (0.24), SL (0.88), SB (1.30), VBC (0.35)	97 (2.86)
Miss.	CEW (1.75), SL (0.75), SB (1.88), VBC (0.30)	88 (5.31)
Tenn.	BLB (0.30), CEW (0.25), GCW (0.36), KB (0.40), SB (0.60), TCAH (0.20)	85 (2.48)
2024		
Ark.	CEW (1.86), SL (1.05), SB (2.70)	95 (5.90)
La.	CEW (0.24), SL (0.94), SB (1.30), VBC (0.54)	91 (3.32)
Miss.	CEW (1.40), SL (0.60), SB (1.76)	87 (4.33)
Tenn.	BLB (0.30), CEW (0.20), GCW (0.40), KB (0.45), SB (0.50), TCAH (0.20)	80 (2.57)

*AWC = Armyworm Complex, BLB = Bean Leaf Beetle, CEW = Corn Earworm, DSB = Dectes Stem Borer, GCW = Green Clover Worm, KB = Kudzu Bug, LCB = Lesser Cornstalk Borer, SMC = Saltmarsh Caterpillar, SL = Soybean Looper, SM = Spider Mites, SB = Stink Bugs, TCAH = ThreeCornered Alfalfa Hopper, VBC = Velvetbean Caterpillar.
**First number is percentage of total yield loss attributed to listed insects. Number in parentheses is estimated percentage of total yield lost to all insects.
^Tenn. data not available in 2022.