

SOYBEAN YIELD LOSS TO INSECTS IN THE MIDSOUTHERN US

Survey-based soybean yield losses to insects are estimated annually in several U.S. states. These estimates are collected through informal telephone or written survey queries to crop consultants and extension personnel who actively scout soybean fields and assist growers in making insect control decisions. Production losses are based on estimates of yield in the absence of insects.

Acreage, production, and price data are from [NASS](#) (in Reference Items list). Results from and details about each year's survey are from the [Midsouth Entomologist](#).

Summary results from this survey for the 2013-2022 period in indicated midsouthern states are shown in **Tables 1 and 2**.

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

During the 2013-2019 period, 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 2013-2022 period. Tennessee had the lowest economic loss/acre (yield loss + control costs) to insects in all years that data were taken in that state (**Table 1**).

During the 2013-2022 period, annual yield losses to insects in Mississippi ranged from 2.77% (2014) to 7.70% (2022). In fact, percentage yield lost to insects steadily increased during the 10 years shown in Table 1. Economic losses attributed to insects (yield lost to insects + insect management costs) in Mississippi ranged from \$46.45/acre in 2014 to \$108.42/acre in 2022 (**Table 1**).

During the 2013-2022 period, economic losses to insect damage plus costs for applied control measures in Mississippi ranged from \$102.2 million in 2014 to \$248.3 million in 2022.

In the 2013-2022 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 soybean looper was prominent in 2013 and 2016-2022. Redbanded stinkbug (RBSB) was the dominant stinkbug only in 2017.

- In Louisiana, soybean looper and stink bugs were prominent in all years. Corn earworm was not prominent in any year from 2013-2022. Either green clover worm, velvetbean caterpillar, or both were prominent in all years from 2013-2022. Soybean looper was prominent in all years of the survey. RBSB was the dominant stinkbug from 2017-2022.
- In Mississippi, corn earworm and soybean looper were prominent in all years. Stink bugs were prominent in all years, especially in 2017-2022. RBSB was the dominant stinkbug in 2017, 2020, and 2022. Either green cloverworm, velvetbean caterpillar, saltmarsh caterpillar, or all three had a significant presence in all years.
- 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 of the 9 years. 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 an impact in 2020 and 2021.

The above estimates and summary points lead to the following important tenets for insect management in the Midsouth 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 10 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 RBSB was prominent in Louisiana and Mississippi in 2017 and subsequent years, and will warrant special attention in future soybean crops. 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 the same pests such as corn earworm and the lepidopteran foliage feeders year after 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, 2013-2022. Acreage, production, and price data from [NASS](#) (in Referenced Items list). Insect loss and cost data for insect management are from issues of [Midsouth Entomologist](#). [Tenn. data not available in 2022].

State-year	Harvested acres (1,000 acres)	Loss to insects* (%) (1,000 bu.)		Price** (\$/bu.)	Loss -----(\$1,000)-----	Insect cont. cost^	Total loss (\$/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 (1,000 acres)	Loss to insects* (%)	(1,000 bu.)	Price** (\$/bu.)	Loss -----(\$1,000)-----	Insect cont. cost^	Total loss (\$/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	

*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, 2013-2022. [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)



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State	Insect pest and (%) yield loss attributed to each indicated pest	% of (total %)**
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)
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)

*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.