Management of Soybean Insect Pests, 01-2023
Annual Report

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RATIONALE/JUSTIFICATION FOR RESEARCH:

Up to date non-biased information is critical for making any agricultural management decision, including insect management decisions. As production practices change, the impact of pests can change also. An example of this is greater risk from early season/soil insects as a result of reduced tillage and increased plant residue from the previous crop, native winter vegetation, and/or cover crops. Also, uncommon and unexpected insect pest issues can occur. For example, redbanded stink bug infestations were much more widespread during 2017 and 2022, and soybean looper during 2022. As a result, many studies were conducted with regard to management, damage potential, and treatment thresholds. Also, many current management tools are under reregistration review. It is possible that some of the older insecticides, which growers rely on, may have uses either restricted or revoked in the near future. With a limited number of insecticides already, this would make insect management in soybeans, and all crops more challenging. Insecticide resistance can be a major issue for insect management, and new insecticides are not being brought to market regularly anymore. "Routine" studies to evaluate current insecticides, along with reports from growers and consultants provide the first indications of pending insecticide resistance issues. Current market conditions have reduced profit margins considerably. The most informed and economical insect management decision is always important, but may be even more important when profit margins are small. To keep information current, studies must be regularly conducted to evaluate management strategies and tools and to provide information on unexpected insect issues.

Objectives:

To provide up to date information on insect management strategies/tools for soybean insect pests.

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During 2023 experiments were conducted to evaluate the performance of selected insecticides against a range of soybean insect pests including, seedling/soil insects (corn rootworm, wireworm, pea leaf weevil), bean leaf beetle, soybean looper, and stink bugs (including redbanded stink bug).

Two experiments were conducted to evaluate the performance of at-planting insecticides against seedling/soil pests. In the first trial, selected insecticide seed treatments and seed

treatment packages were evaluated. At 23 DAE all of the insecticide seed treatments resulted in greater plant population than Evergol Energy Soybean (Fungicide Only) (Table 1). No differences in yield were observed. In the second experiment, there were no differences among treatments for plant density or yield (Table 2).

Six experiments were conducted to evaluate the performance of selected insecticides against bean leaf beetle infesting soybeans. Meaningful data were collected from two. In the other four trials, insect infestations declined after insecticide applications were made and no differences among treatments were observed. At 4, 6, and 8 DAT all of the insecticides reduced bean leaf beetle densities compared to the non-treated (Table 3). At 4 DAT Sevin, Sniper, and Sniper plus Acephate resulted in fewer beetles than Acephate alone. At 6 DAT all of the insecticides reduced bean leaf beetle densities compared to the non-treated. Also, Acephate plus Sniper and Sevin reduced bean leaf beetle densities compared to Warrior. At 8 DAT Sevin and Sniper plus Acephate resulted in fewer beetles than Acephate alone. At 13 DAT only Sniper plus Acephate reduced bean leaf beetle densities compared to the non-treated control. In the second trial, all of the insecticides reduced bean leaf beetle densities compared to the non-treated control at all sample dates (Table 4).

Four experiments were conducted to evaluate the performance of selected insecticides against corn earworm. However, populations crashed between trial initiation and the first sample date. Data were successfully collected from three soybean looper trials. Soybean looper populations crashed between trial initiation and the first sample date. However, subsequent infestations occurred ca. 14 DAT. In the first experiment, all of the insecticides, except Besiege and Intrepid Edge, reduced looper numbers compared to the non-treated at 17 DAT (Table 5). At 21 DAT all of the insecticides, except Besiege, reduce looper densities compared to the non-treated. In the second experiment all of the insecticides reduced looper densities compared to the non-treated at 17 and 21 DAT, except Intrepid Edge at 4 oz. at 17 DAT and Intrepid Edge (both rates) at 21 DAT. (Table 6). Denim (12 oz/acre) resulted in fewer loopers compared to any of the other insecticides at 17 DAT. In the third trial, all of the insecticides, except Intrepid and Intrepid Edge at 17 DAT and Besiege and Intrepid at 21 DAT, reduced looper densities compared to the non-treated (Table 7). Steward plus Diamond (both rates) resulted in fewer soybean loopers compared to the other insecticides at both sample dates.

Thirteen experiments were attempted against stink bugs. In several trials populations declined after trial initiation, and in others soybeans matured prematurely due to drought and high heat conditions. Green, southern green, brown, and redbanded stink bugs were observed. In two trials redbanded stink bug was the most prevalent species. In the first trial, all of the insecticides, except Plinazolin at 1.03 oz at 4 DAT, reduced redbanded stink bugs compared to the non-treated (Table 8). In the second trial, Only Sniper and Sniper plus Acephate reduced redbanded stink bugs compared to the non-treated at 4 DAT (Table 9). At 6 and 13 DAT all of the insecticides, except Sevin at 6 DAT, reduced stink bug densities compared to the non-treated. At 13 DAT Sniper plus Acephate resulted in fewer redbanded stink bugs compared to Acephate, Warrior, or Sevin.

During mid Dec., temperature data loggers were deployed along the edge of a wooded area adjacent to fields at the Delta Research & Extension Center, Stoneville, MS, and at a location on Burdett Rd South of Leland, MS. At each location one data logger was placed ca. 24 in. above the soil surface on a wooden survey stake. Another was placed under ca. 3 in. of leaf litter. These sensors recorded temperature every hour. During the cold weather event from 14 Jan to 23 Jan the lowest air temperature recorded was 7.1 and 7.2°F at DREC and Burdett Rd, respectively (Figures 1 and 2). While the lowest temperature observed under leaf litter was 32

and 31.8°F at DREC and Burdett Rd, respectively. Also, temperatures under leaf litter were below 35°F for 16 hrs. (consecutive) at the Burdett Rd location, and for 65 hrs. (≤21 hrs. consecutive) at DREC. The lethal time (exposure time) to kill 50% of redbanded stink bugs is 53 hrs. at 32°F (Bastola and Davis 2018). These observations indicate that overwintering survival of redbanded stink bug in the Central Delta and locations further South is possible following the cold weather event during Jan 2024. Surveys of spring host plants will be conducted to confirm.

Reference

Bastola, A., and J. A. Davis. 2018. Cold tolerance and supercooling capacity of the redbanded stink bug (Hemiptera: Pentatomidae). Environ. Entomol. 47:133-139.

Table 1. Impact of selected soybean seed treatment packages on stand establishment and yield.

Treatment	Rate fl oz/cwt	Insecticide component	Plants per acre 23 DAE[e]	Yield bu/acre
Evergol Energy Soybean	1.0	-	69,587c	33.7
Evergol Energy Soybean + Poncho/Votivo	1.0 + 3.28	Poncho[a]	94,743ab	39.9
CruiserMaxx APX	3.2	Cruiser[b]	97,847a	43.4
CruiserMaxx APX + Avicta	3.2 3.0	Cruiser[b]	92,620ab	41.4
Intego Suite	3.37	Nipsit[a]	97,357a	42.3
Evergol Energy Soybean + Gaucho	1.0 + 2.5	Gaucho[c]	99,154a	45.6
Evergol Energy Soybean + Poncho/Votivo + Gaucho	1.0 3.28 2.5	Poncho[a] + Gaucho[c]	83,309b	43.0
Vibrance Trio + Fortenza	1.55 1.084	Fortenza[d]	86,379ab	38.8
CruiserMaxx APX + Fortenza	3.2 1.084	Cruiser[b] + Fortenza[d]	100,134a	41.4
P>F			<0.01	0.37

Means within columns followed by a common letter are not significantly different (FPLSD, *P*=0.05).
[a]Active ingredient – Clothianidin, Class - Neonicotinoid.
[b]Active ingredient – Thiamethoxam, Class - Neonicotinoid.
[c]Active ingredient – Imidacloprid, Class - Neonicotinoid.
[d]Active ingredient – Cyantraniliprole, Class - Diamide.
[e]DAE=Days after emergence.

Table 2. Impact of selected insecticide seed treatments on stand establishment and yield.

Treatment	Rate	Plants/acre 23 DAE[h]	Yield (bu/acre)
Non-Treated	-	63,216	43.6
Gaucho 5FS[a]	2.5[e]	73,181	40.5
Poncho 5FS[b]	0.11[f]	75,631	43.3
Dermacor 5.21FS[c]	0.0057[f]	69,587	41.6
Fortenza 5.21FS[d]	0.0057[f]	74,161	48.1
Brigade 2EC	3.9[g]	67,627	46.0
P>F		0.19	0.63

Means within columns followed by a common letter are not significantly different (FPLSD, *P*=0.05). All seed received a fungicide seed treatment.
[a]Active ingredient – Imidacloprid, Class - Neonicotinoid.
[b]Active ingredient – Clothianidin, Class - Neonicotinoid.
[c]Active ingredient – Chlorantraniliprole, Class - Diamide.
[d]Active ingredient – Cyantraniliprole, Class - Diamide.
[e]fl oz/cwt seed. Seed treatment application.
[f]mg AI/seed. Seed treatment application.
[g]fl oz/acre. In-furrow spray application.
[h]DAE=Days after emergence.

Table 3. Performance of selected insecticides against bean leaf beetle infesting soybeans, I.

	Rate/acre	Bean Leaf Beetle / 25 Sweeps			
Treatment	(fl oz product)	4 DAT[f]	6 DAT	8 DAT	13 DAT
Acephate 90S[a]	0.75[e]	26.4b	29.1bc	17.7b	13.1abc
Warrior 2.08CS[b]	1.6	15.3bc	29.7b	14.5bc	24.1a
Sevin 4F[c]	24.0	6.4cd	10.4bc	2.9c	13.9ab
Sniper 2EC[d]	5.12	8.5cd	19.6bc	5.5bc	11.0bc
Acephate 90S[a] + Sniper 2EC[d]	0.5[e] + 5.12	3.9d	5.9c	2.8c	7.0c
Non-Treated	-	50.3a	70.9a	45.7a	16.1ab
P>F		<0.01	<0.01	<0.01	0.02

Means within columns followed by a common letter are not significantly different (FPLSD, *P*=0.05).
[a]Active ingredients – Acephate, Class – Organophosphate.
[b]Active ingredient – λ Cyhalothrin, Class – Pyrethroid.
[c]Active ingredient – Carbaryl, Class – Carbamate.
[d]Active ingredients – Bifenthrin, Class – Pyrethroid.
[e]lb (wt) AI per acre.
[f]DAT=Days after treatment.

Table 4. Performance of selected insecticides against bean leaf beetle infesting soybeans, II.

	Rate/acre	Bean Leaf Beetle / 25 Sweeps			
Treatment	(fl oz product)	4 DAT[e]	6 DAT	8 DAT	13 DAT
Plinazolin 400DC[a]	1.03	5.0bc	3.3b	3.9b	2.3b
Plinazolin 400DC[a]	1.54	6.2b	3.4b	2.1b	2.8b
Acephate 90S[b] + Sniper 2EC[c]	0.5[d] + 5.12	2.9c	3.2b	2.4b	1.6b
Non-Treated	-	23.9a	28.2a	21.4a	8.9a
P>F		<0.01	0.03	<0.01	0.01

Means within columns followed by a common letter are not significantly different (FPLSD, *P*=0.05).
[a]Active ingredients – Isocycloseram.
[b]Active ingredients – Acephate, Class – Organophosphate.
[c]Active ingredients – Bifenthrin, Class – Pyrethroid.
[d]lb (wt) AI per acre.
[e]DAT=Days after treatment.

Table 5. Evaluation of selected insecticides against soybean looper, I.

	Rate/acre	Soybean Looper / 25 Sweeps	
Treatment	(fl oz product)	17 DAT[f]	21 DAT
Elevest 2.22SC[a]	9.6	2.4bc	7.8bc
Elevest 2.22SC[a]	6.8	2.8bc	5.9bcd
Besiege 1.252SC[b]	10.0	6.9ab	8.5ab
Steward 1.25EC[c]	8.0	1.7c	2.1d
Steward 1.25EC[c]	6.0	1.2c	3.3bcd
Intrepid Edge 3SC[d]	5.0	4.7abc	5.1bcd
Denim 0.16EC[e]	8.0	2.4bc	3.0cd
Non-Treated	-	12.4a	18.7a
P>F		0.04	<0.01

Means within columns followed by a common letter are not significantly different (FPLSD, *P*=0.05).
[a]Active ingredients – Bifenthrin plus Chlorantraniliprole, Classes – Pyrethroid and Diamide.
[b]Active ingredients – λ Cyhalothrin plus Chlorantraniliprole, Classes – Pyrethroid and Diamide.
[c]Active ingredient – Indoxacarb, Class – Oxydiazine.
[d]Active ingredients – Spinetoram plus Methoxyfenozide, Classes – Spinosyn and Dicacylhydrazine IGR.
[e]Active ingredient – Emamectin Benzoate, Class - Avermectin.
[f]DAT=Days after treatment.

Table 6. Evaluation of selected insecticides against soybean looper, II.

	Rate/acre	Soybean Looper / 25 Sweeps	
Treatment	(fl oz product)	17 DAT[d]	21 DAT
Intrepid Edge 3SC[a]	4.0	7.6ab	4.8abc
Intrepid Edge 3SC[a]	5.0	5.4b	10.7ab
Besiege 1.252SC[b]	8.0	3.8bc	3.1c
Denim 0.16EC[c]	8.0	2.1c	3.9bc
Denim 0.16EC[c]	12.0	0.2d	2.3c
Non-Treated	-	11.7a	11.9a
P>F		<0.01	0.03

Means within columns followed by a common letter are not significantly different (FPLSD, *P*=0.05).
[a]Active ingredients – Spinetoram plus Methoxyfenozide, Classes – Spinosyn and Dicacylhydrazine IGR.
[b]Active ingredients – λ Cyhalothrin plus Chlorantraniliprole, Classes – Pyrethroid and Diamide.
[c]Active ingredient – Emamectin Benzoate, Class - Avermectin.
[d]DAT=Days after treatment.

Table 7. Evaluation of selected insecticides against soybean looper, III.

Treatment	Rate/acre (fl oz product)	Soybean Looper / 25 Sweeps 17 DAT[h]	21 DAT
Steward 1.25EC[a] + Diamond 0.83EC[b]	8.2 + 3.2	0.73d	0.7d
Steward 1.25EC[a] + Diamond 0.83EC[b]	11.3 + 4.5	0.32d	0.6d
Elevest 2.22SC[c]	6.8	6.0bc	9.4bc
Besiege 1.252SC[d]	10.0	5.5c	13.1ab
Intrepid 2F[e]	6.0	14.6ab	12.9ab
Intrepid Edge 3SC[f]	5.0	7.0abc	6.2c
Prevathon 0.43SC[g]	20.0	6.1bc	8.6bc
Non-Treated	-	16.9a	18.0a
P>F		<0.01	<0.01

Means within columns followed by a common letter are not significantly different (FPLSD, *P*=0.05).
[a]Active ingredient – Indoxacarb, Class – Oxydiazine.
[b]Active ingredient – novaluron, Class – Benzoylurea, Insect Growth Regulator.
[c]Active ingredients – Bifenthrin plus Chlorantraniliprole, Classes – Pyrethroid and Diamide.
[d]Active ingredients – λ Cyhalothrin plus Chlorantraniliprole, Classes – Pyrethroid and Diamide.
[e]Active ingredients – Methoxyfenozide, Class – Dicacylhydrazine, IGR.
[f]Active ingredients – Spinetoram plus Methoxyfenozide, Classes – Spinosyn and Dicacylhydrazine IGR.
[g]Active ingredients – Chlorantraniliprole, Class – Diamide.
[h]DAT=Days after treatment.

Table 8. Performance of selected insecticides against redbanded stink bug infesting soybeans, I.

Treatment	Rate/acre (fl oz product)	Redbanded Stink Bugs / 25 Sweeps[f] 4 DAT[e]	6 DAT	13 DAT
Plinazolin 400DC[a]	1.03	2.4ab	5.3a	5.2b
Plinazolin 400DC[a]	1.54	1.2b	2.2b	4.7b
Acephate 90S[b] + Sniper 2EC[c]	0.5 [d] + 5.12	0.8b	1.8b	6.4b
Non-Treated	-	7.6a	9.9a	23.3a
P>F		0.03	<0.01	<0.01

Means within columns followed by a common letter are not significantly different (FPLSD, *P*=0.05).
[a]Active ingredients – Isocycloseram.
[b]Active ingredients – Acephate, Class – Organophosphate.
[c]Active ingredients – Bifenthrin, Class – Pyrethroid.
[d]lb (wt) AI per acre.
[e]DAT=Days after treatment.
[f]Adults plus nymphs.

Table 9. Performance of selected insecticides against redbanded stink bug infesting soybeans, II.

Treatment	Rate/acre (fl oz product)	Redbanded Stink Bugs / 25 Sweeps[g]		
		4 DAT[f]	6 DAT	13 DAT
Acephate 90S[a]	0.75[e]	3.4ab	1.5c	13.0b
Warrior 2.08CS[b]	1.6	3.0ab	4.5bc	12.2b
Sevin 4F[c]	24.0	2.5ab	7.8ab	14.3b
Sniper 2EC[d]	5.12	1.1bc	4.8bc	7.7bc
Acephate 90S[a] + Sniper 2EC[d]	0.5[e] + 5.12	0.0c	0.8c	5.0c
Non-Treated	-	2.2a	10.5a	32.9a
P>F		<0.01	<0.01	<0.01

Means within columns followed by a common letter are not significantly different (FPLSD, *P*=0.05).
[a]Active ingredients – Acephate, Class – Organophosphate.
[b]Active ingredient – λ Cyhalothrin, Class – Pyrethroid.
[c]Active ingredient – Carbaryl, Class – Carbamate.
[d]Active ingredients – Bifenthrin, Class – Pyrethroid.
[e]lb (wt) AI per acre.
[f]DAT=Days after treatment.
[g]Adults plus nymphs.

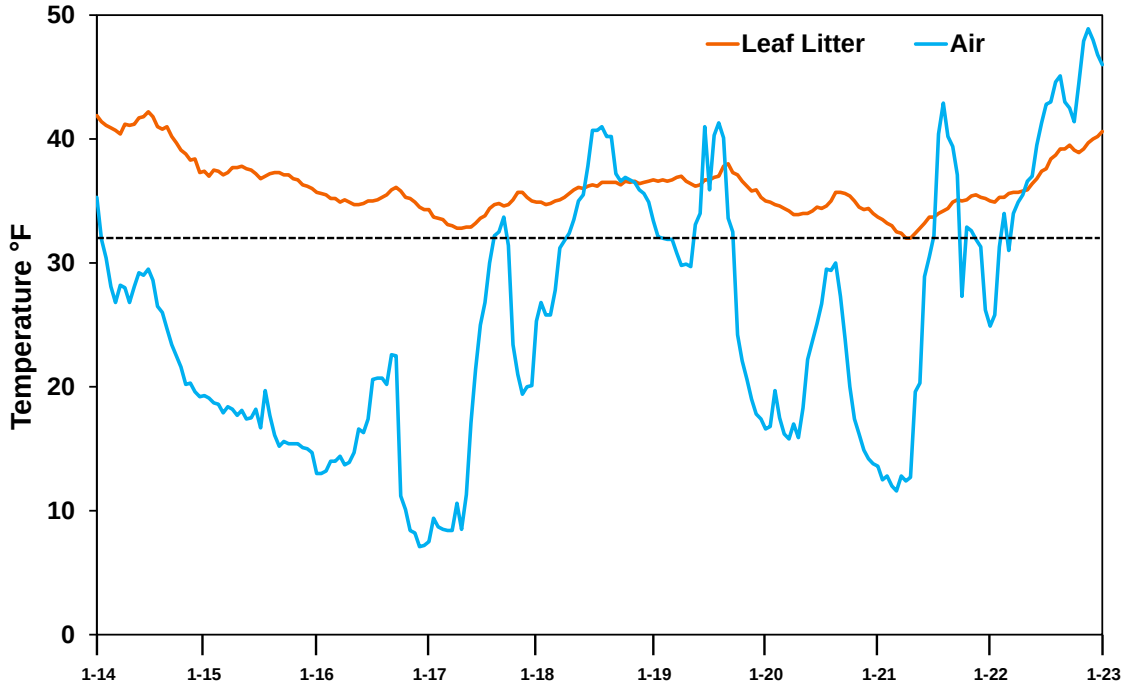

Figure 1. Hourly air temperature and temperature under ca. 3 inches of leaf litter during 14 Jan through 23 Jan 2024, Delta Research and Extension Center, Stoneville, MS. Dashed line represents 32°F.

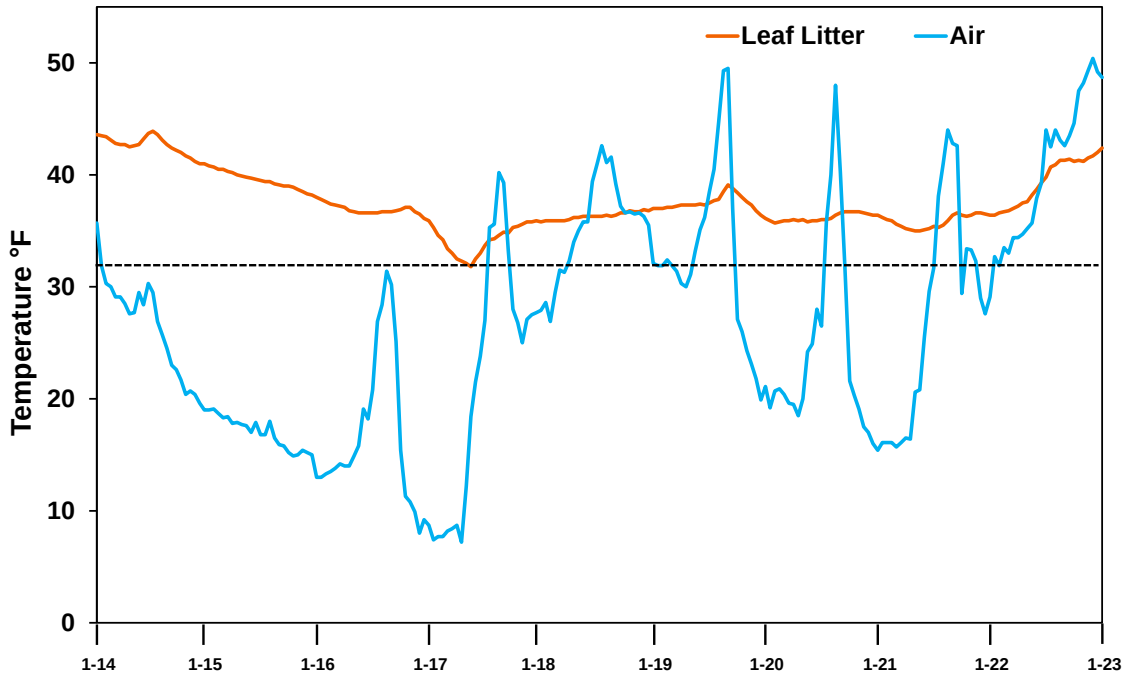

Figure 2. Hourly air temperature and temperature under ca. 3 inches of leaf litter during 14 Jan through 23 Jan 2024, Burdett Rd, South of Leland, MS. Dashed line represents 32°F.