SOYBEAN INSECT MANAGEMENT

Controlling damaging populations of insects is always a production issue in Midsouth soybeans. The decision to apply control measures is usually based on "thresholds", which is the number of insects of a particular species that have reached the level that is estimated to reduce yield. Thresholds for triggering insect control measures are the best tool available at the present time.

Generally, two methods are used for counting insects in a crop—sweep nets and drop cloths. The drop cloth is the most accurate method to sample for soybean insect pests, but both methods give objective measures to generate estimates that can be used to determine levels related to thresholds. In narrow-row soybeans, the sweep net is the preferred method of sampling.

University of Tennessee Extension has developed Online Insect Scouting Videos that can be viewed to learn how to properly scout and sample for insect pests in soybeans, as well as identify the different pests that will be collected in samples.

- Using a Sweep Net shows how to properly collect a sample for evaluating insects that are present in the soybean canopy. This video also provides tips for sample scheduling and using thresholds to determine when to apply insecticides to control individual insect species.
- Common Insect Pests in Tennessee Soybean presents a summary of how to identify the major insect pests of soybeans. This video is an excellent supplement to the Soybean Insect Identification Guide published by Mississippi State University Extension.

Click here for a comprehensive soybean scouting guide on this website. This reference provides guidance on scouting practices, details about the myriad insects that infest soybeans, and information that will help identify and treat insect-related problems that occur in Midsouth soybean fields.

Insect species that can cause economic damage to soybeans in the Midsouth are grouped into two classes—stem feeders and foliage feeders. Those that should be accounted for are listed in Table 1. Their treatment thresholds and recommended classes of insecticides to use for needed control are included [see Miss. Insect Control Guide for Soybeans for more detail]. Click here to access insect guides from other Midsouth states. The Univ. of Tenn. has compiled an interactive guide that can be used to access details about common soybean insect pests.

To provide information that producers and consultants can use in making treatment decisions, Dr. Angus Catchot, former Extension Entomologist at Miss. State Univ., developed a webcast that contains the specifics about if, when, and how the various insect species should be managed. Dr. Catchot's presentation entitled Soybean insect pest management and thresholds in the Midsouth Region contains research-based recommendations for economic thresholds that should be used to make control decisions for most of the common insect species encountered each year in Midsouth soybean fields. He also discusses cultural practices such as planting date that can be manipulated to limit insect infestations and their subsequent damage.

It is possible that published thresholds do not equally represent all soybean production environments. Thus, research that will produce insect control guidance that is specific for major cropping systems [e.g. dryland vs. irrigated, early- vs. late-planted] should be used if available, or developed as needed.

An example is the different thresholds that likely should be used for dryland vs. irrigated soybean because these two production systems have different yield potentials, and subsequently, different economic potentials. Support for this approach is past research [Lambert and Heatherly, Crop Sci. 31:1625-1628 (1991) & Crop Sci. 35:1657-1660 (1995)] that shows that 1) soybean looper larval weight is decreased and their developmental period is increased by plants growing on drier soils, and 2) yield reduction resulting from looper infestation is greater for irrigated than for nonirrigated soybeans.

Another example is shown in results from research that was conducted in Missouri in 2011 and 2012 to determine if adding an insecticide to a fungicide applied to dryland soybean is of value. Reports from this research were published in an article entitled "Value of an Insecticide Added to a Fungicide for Soybean During Drought" on Mar. 4, 2016 in Crop, Forage, and Turfgrass Management. A summary of the results from this research can be found here. Basically, the conclusion from this research is that the

IPM approach for insect management in dryland soybean, which includes scouting to monitor insect pest populations in order to prevent unnecessary expense as well as to prevent a reduction in beneficial insect numbers, should be used, especially in dryland soybean.

In many cases, simultaneous infestations of several foliage-feeding species will occur in a given field. When this situation exists, control measures should be applied when any combination of these insects meets or exceeds the treatment threshold.

Dr. Kelley Tilmon, State Extension Specialist in the Dept. of Entomology at The Ohio State Univ., has posted a webcast titled Late(er) Season Insect Pests in Soybean on PMN's Focus on Soybean website. Dr. Tilmon discusses how late-season insect damage can affect the plant's physiology and seed yield. Midsouth soybean producers should pay particular attention to the slides and narrative related to stink bugs; e.g. their appearance and pictures of damage they can cause. Midsouth soybean producers are reminded to consult MSU-ES thresholds for determination of when to apply control treatments for all soybean insects. Naturally occurring diseases [fungal, bacterial, and viral] and beneficial predators and parasites are important in the control of soybean insects, and can often keep insect pests from reaching treatable levels.

- The presence of diseased insect larvae indicates that a population of harmful insects is being controlled naturally, so insecticide applications should be withheld for a short period to determine if the disease will effectively control the population.
- Some early-season applications of insecticides to soybeans can significantly reduce predators and parasites. Thus, regular scouting of soybean fields to determine levels of both harmful and beneficial insects is important to protect the beneficials so that their full benefit will be realized.
- Accurate scouting to determine the presence of both harmful and beneficial insects in a soybean crop is a proven method for determining the timing of an insecticide application as well as what insecticide to apply. However, scouting after an insecticide application may be just as important to ensure that the applied insecticide actually controlled the targeted pest.

It is important to remember that insecticides with different modes of action as defined by the Insecticide Resistance Action Committee [IRAC] should be rotated to prevent or delay the development of insect resistance to a class of insecticide chemistry. See Table 2 for the IRAC code for insecticides used for soybean insect management.

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Table 1. Major* insect pests of soybeans, their treatment thresholds [drop cloth sampling], and classes of insecticides that can be used for control. Three-cornered alfalfa hopper [TCAH] is a stem feeder–the other insects are classed as foliage or pod feeders. See Miss. Insect Control Guide for detailed information and drop cloth/sweep net thresholds.

Insect	Thresholds	Insecticide Classes^
TCAH**	Plants <10 in. tall, check for stand reduction; plants >10 in. tall, treat when have 100 hoppers per 25 sweeps. End treatment at R6.	OP, P, P+D, P+CN
Bean leaf beetle (**BLB**)	Apply insecticide if beetles are present and defoliation[#] reaches 35% before bloom; after bloom, treat when defoliation reaches 20% or if 50% of plants have pod feeding prior to R6. End treatment at R6 + 7 days.	C, OP, P, P+D, P+CN
Velvetbean caterpillar (**VBC**), Green Cloverworm (**GCW**)	Before R1, apply insecticide when have 8 or more worms ½ in. long or longer per ft. of row, or 35% defoliation; after R1, treat when have 4 or more worms ½ in. long or longer per ft. of row, or 20% defoliation.	C, D, IGR, OP, OX, P, SPN, P+CN, IGR+SPN, P+D
Soybean looper (**SL**)	Before R1, apply insecticide when have 8 or more worms ½ in. long or longer per ft. of row, or 35% defoliation; after R1, treat when have 4 or more worms ½ in. long or longer per ft. of row, or 20% defoliation.	D, IGR, OX, SPN, D+P, IGR + SPN
For a complex of **VBC**, **GCW**, and **SL**, use a threshold of 300 caterpillars/100 sweeps before R1, and 150/100 sweeps after R1. Count each **SL** twice when using a sweep net to sample. End treatment for all three species at R6 + 7 days (R6.5).		
Corn earworm	Before R1, treat at 35% defoliation; After R1, treat when have 1-1.5 worms per ft. of row (drop cloth sampling, which is preferred. See dynamic thresholds in **Miss. Insect Control Guide**).	C, D, OX, SPN, IGR+SPN, P+D, Heligen
Beet armyworm	Before R1, treat at 35% defoliation; After R1, treat at 20% defoliation—and worms ½ in. or longer present in both cases. Usually controlled by beneficial insects and diseases. End treatment at R6 + 7 days.	D, IGR, OX, SPN, IGR+SPN, P+D
Fall armyworm	Before R1, treat if plant population being reduced below minimum level/treat at 35% defoliation; After R1, treat at 20% defoliation.	D, IGR, OP, OX, P, SPN, IGR+SPN, P+D,
Stink bugs (southern green, green, brown)	One bug (nymphs larger than 1/4 in.) per ft. of row (drop cloth) or 9 bugs per 25 sweeps before R6. After R6, 20 bugs/25 sweeps. End treatment at R6 + 7 days.	OP, P, P+D (Green & Southern Green), P+CN
Redbanded stink bug	Treat when numbers reach 2 bugs/6 ft. of row. Between R6.5 and R7, treat when populations reach or exceed 10 bugs per 25 sweeps. Terminate treatment at R7unless environmental conditions that will promote poor seed quality exist.	OP, P, CN, P+CN,

***** Tarnished plant bugs, thrips, potato leaf hopper, and dectes stem borer rarely cause economic damage in soybeans.
******Research results indicate no apparent benefit from treatment during reproductive development.
^See **Miss. Insect Control Guide** for relative ratings of control provided by specific insecticides in each class for each insect species. Rotate insecticide chemistries for resistance management and always be aware of the class of insecticide used at each application. C = Carbamate; CN = Chloro-nicotinyl; D = Diamide; IGR = Insect Growth Regulator; OP = Organophosphate; OX = Oxadiazine; P = Pyrethroid; SPN = Spinosyn.
[#]In all cases, defoliation estimates should be based on whole plant average; i.e., average % in top, middle, and bottom of plant. (*****, [#] Mississippi Crop Situation blog, June 19, 2015).

Table 2. Insecticide class and insecticides in each class that can be used for effective insect resistance management in soybeans. IRAC MOA code for each class of insecticides is shown.

Insecticide class	Insecticides*
Carbamate (C)	Sevin (carbaryl), Lannate (methomyl)—**IRAC Code 1A**
Organophosphate (OP)	Orthene (acephate), Dimethoate (dimethoate)—**IRAC code 1B**
Pyrethroid (P)	Baythroid XL (beta-cyfluthrin), Brigade and Discipline (bifenthrin), Asana XL (esfenvalerate), Declare (gamma-cyhalothrin), Karate Z (lambda-cyhalothrin), Ambush and Pounce (permethrin), Mustang Maxx and Respect (zeta-cypermethrin), Hero (Zeta-cypermethrin + Bifenthrin)—**IRAC code 3A**
Chloro-nicotinyl (CN)	Belay (clothianidin), Gaucho (Imidacloprid), Cruiser (Thiamethoxam)—**IRAC code 4A**
Spinosyn (SPN)	Blackhawk (spinosad), Radiant SC (spinetoram)—**IRAC code 5**
Insect Growth Regulator (IGR)	Dimilin 2L (diflubenzuron), Diamond (novaluron), Intrepid 2F (methoxyfenozide)—**IRAC codes 15, 15, and 18, respectively**
Oxadiazine (OX)	Steward (indoxacarb)—**IRAC code 22A**
Diamide (D)	Prevathon and Vantocor (chlorantraniliprole)—**IRAC Code 28**
Biological	Heligen (pathogenic virus specifically for corn earworm)— **IRAC Code 31**
P + CN	Brigadier (bifenthrin + imidacloprid), Endigo ZC (lambda cyhalothrin + thiamethoxam), Leverage 360 (beta-cyfluthrin + imidacloprid)—**IRAC codes 3A + 4A**
P + D	Besiege (lambda-cyhalothrin + chlorantraniliprole), Elevest (bifenthrin + chlorantraniliprole)—**IRAC codes 3A + 28**
IGR + SPN	Intrepid Edge (methoxyfenozide + spinetoram)—**IRAC codes 5 + 18**

***See the Miss. Insect Control Guide for application guidelines, restrictions specific to and performance ratings for each insecticide, and restricted use/entry interval designations.**
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