

Soybean Insect Management

Jay W Chapin, Extension/Research Entomologist
Mike J. Sullivan, Research Entomologist

The keys to soybean insect management are:

1. Scouting fields during high-risk periods for your area.
2. Correctly identifying insect pests.
3. Using treatment thresholds to make spray decisions.
4. Using the safest, most economical and environmentally sound material and rate for the problem at hand.
5. Accurate calibration of equipment and proper application.

For more information on soybean insect identification and biology, ask your county Extension agent for EC 504, *Soybean Insects, Nematodes and Diseases*.

SCOUTING

Check soybeans weekly from July 25 to mid-September. If velvetbean caterpillars or stink bugs are a problem in your area (mainly the southern Coastal Plain), continue scouting until October 15 or until leaves shed. Place a high priority on checking fields in bloom from the last week of July through August. Corn earworm moths are attracted to blooming fields and will lay more eggs in open-canopied beans on high spots and lighter soil areas. From mid-August to mid-September, pay special attention to any fields near cotton because these areas often have the highest looper populations. Stink bugs can be difficult to scout for because they may not be found in all areas of a field. Stink bug damage can occur from pod set to when pods begin to yellow, but greatest injury occurs during early pod-fill.

The most important consideration for any field scouting program is to get a representative sample. If you can't scout all fields, at least sample representative varieties and planting dates each week. Don't treat all fields based on what is found in one variety or maturity group.

CONVENTIONAL ROW SPACING

Check in two different accessible areas of a field, such as opposite ends, or on a lighter and heavier soil type. In both areas move in 20 steps and take at least two beat samples. Take more samples if insect populations are borderline, that is, not clearly above or below the treatment threshold level. To take each sample, bend one row out of the way and place a 3-by-3-foot white cloth with dowel handles between the rows. Bend 3 feet of one row over the cloth and beat down vigorously on the soybeans 15 times. Move the

beans back; count and identify insects. Divide by three to get the number of pests per row foot. Shake the cloth off thoroughly before taking another sample.

NARROW ROW BEANS

The increasing popularity of drilled soybeans in South Carolina requires new insect scouting and treatment thresholds for use with narrow rows. There are two alternatives - using a standard beat cloth or pan sampler to estimate pest populations per row ft, or using a sweep net.

BEAT CLOTH or PAN SAMPLER

A conventional beat cloth can be used to sample narrow-row soybeans if adjacent rows are pushed aside. An effort has to be made not to disturb the sample row(s) prior to beating onto the cloth. The narrower the rows and the ranker the canopy growth, the more difficult (or impossible) this becomes.

A pan sampler can be made out of sheet metal and used as an alternative to the beat cloth in narrow row beans. A sampler 3 ft. wide by 2 ft. high, and with a 4" deep trough on the lower edge can be slipped vertically between narrow rows. When plants are beaten against the angled pan, dislodged insects accumulate in the trough, where they can be counted.

SWEEP NET SAMPLING

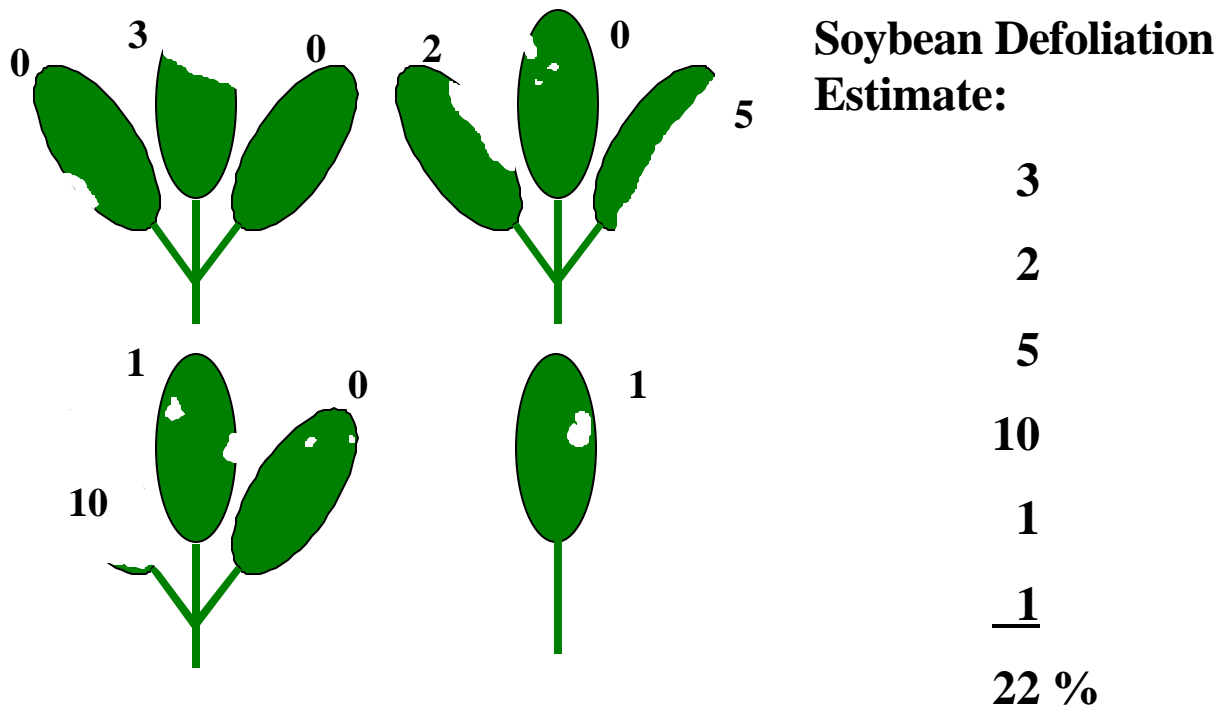
A sweep net is a more practical alternative for sampling insects in drilled soybeans. Use a 15-inch diameter heavy duty sweep net such that the upper edge of the net stays even with or slightly below the top of the canopy as you sweep it through the crop. Sweep forcefully with a back-and-forth motion as you walk through the field. Make one sweep with each stride. You actually make an elongated "figure 8" motion with the net; each pass covering two 38" rows or the equivalent width of narrow rows. Make 10 sweeps (each pass in either direction counts as a sweep); then count the number of insects in the net, being careful to sort through the leaves in the bottom of the net. Take a minimum of two sweep samples in each of two different areas of the field, or more until you are confident of your estimates. (Note: One source of sweep nets is Forestry Suppliers Inc., (800) 647-5368. Ask for the heavy duty 15-inch insect sweep net. Also be sure to order a replacement net.

TREATMENT THRESHOLDS:

DEFOLIATION

The general defoliation threshold for foliage-feeding pests or pest combinations is 30 percent leaf-area loss before bloom and 15 percent thereafter. There is a tendency to overestimate foliage loss, in part because insects often feed in the upper, more visible part of the canopy. In addition, there is a tendency for the eye to focus more on damaged

leaves. A technique to “calibrate” or check defoliation estimates is to remove a trifoliate leaf (three leaflets) from the top, middle, and lower part of the canopy without looking. Then take an extra leaflet from the middle canopy, for a total of ten leaflets. Look at each leaflet individually and assign a score of 0 to 10 to each based on an estimate of the portion of leaf area that is missing. For example, a score of 1 requires that at least 10% is missing; a 3 means that 30% is eaten; a 10 indicates that all or nearly all of the leaflet is gone. Add up the score total for all ten leaflets to arrive at a defoliation estimate. Calculate several such defoliation scores and compare the average to estimates made by simply scanning the canopy.



BEAT CLOTH OR PAN SAMPLER INSECT COUNTS

The thresholds in Table 1 (per row foot) and Table 2 (per 3-foot sample) can be used with the beat cloth or pan sampler method.

Table 1. Treatment thresholds (per row ft.) for soybean insects sampled with beat cloth or pan sampler.					
Pest	Row width (inches)				
	38	30	21	14	7
stink bug	1	0.8	0.5	0.3	0.2
corn earworm*	2	1.6	1.1	0.7	0.4
velvetbean caterpillar	4-6	4	2.7	1.8	0.9
soybean looper	6-8	5.5	3.8	2.6	1.3
*this is the pod-feeding threshold for corn earworm					

Table 2. Treatment thresholds (per 3-row ft.) for soybean insects sampled with beat cloth or pan sampler.					
Pest	Row width (inches)				
	38	30	21	14	7
stink bug	3	2.4	1.6	1.1	0.5
corn earworm*	6	4.7	3.3	2.2	1.1
velvetbean caterpillar	12-18	12	8.3	5.5	2.7
soybean looper	18-24	16	11.6	7.7	3.8
*this is the pod-feeding threshold for corn earworm					

SWEEP NET:

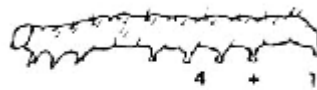
Sweep net thresholds in drilled soybeans are not as well-defined as those for beat samples. The following thresholds should be considered guidelines until more research is available. Use percent defoliation estimates as an additional treatment guideline for foliage feeders. Prior to bloom, up to 30 percent defoliation is acceptable without economic yield loss, but once blooming begins, the guideline drops to 15 percent defoliation.

Table 3. Treatment guidelines for soybean insects sampled with a sweep net		
Pest	Number per 10 sweeps	Comments
stink bug	1 - 2	
corn earworm	3 - 4	
velvetbean caterpillar	10 - 15	or 15% foliage loss
soybean looper	15	or 15% foliage loss
For other foliage feeders use a threshold of 30% defoliation before first bloom, 15% after first bloom.		

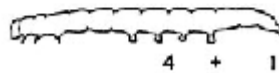
INSECT IDENTIFICATION

The four most common caterpillars found in soybean are the corn earworm, green cloverworm, velvetbean caterpillar, and soybean looper. Since color and size are quite variable, the field key on the right can be helpful in pointing out distinguishing characteristics.

FIELD KEY TO COMMON SOYBEAN CATERpillARS



CORN EARWORM
 4 + 1 pair prolegs
 Curls up in hand
 Black "warts" on body



VELVETBEAN CATERPILLAR
 4 + 1 pair prolegs
 Very active when handled



SOYBEAN LOOPER
 2 + 1 pair prolegs
 Fatter at tail end
 Looping movement



GREEN CLOVERWORM
 3 + 1 pair prolegs
 Not fatter at tail end
 Looping movement

Timing of major soybean pest infestations South Carolina

		corn earworm	
		looper	
		velvetbean caterpillar	
		stink bugs	
July	August	September	October

Corn Earworm. Corn earworms have many color variations, but the presence of dark warts and more body “hairs” helps to distinguish smaller larvae from other common soybean worms. Corn earworm also tends to curl up in a C-shape when handled. They have a 4 + 1 proleg pattern, unlike green cloverworms or loopers. The primary infestation period is from the last week of July to early September. Corn earworm is a pest throughout the state. Often called “podworm,” this insect feeds on foliage, blooms, pods and even terminal stems. Corn earworms and stink bugs are the most economically important pests of soybean because they feed directly on pods.



Corn earworm M. Shepard

Velvetbean Caterpillar - 4 + 1 pair prolegs (3 + 1 when small); very active when touched; light green to black; causes problems August 20 to late October; mainly found in southern Coastal Plain, especially Beaufort, Charleston, Colleton, Hampton and Jasper counties. This late-season pest is often mistakenly called “armyworm” because it seems to appear overnight in large numbers and can rapidly strip a field. The dark color of some specimens also causes confusion. If you see large numbers of very small green worms on the shake cloth late in the season, be on the alert for velvetbean caterpillar defoliation beginning in the top of the canopy.



Velvetbean caterpillar M. Shepard

Soybean Looper - 2 + 1 pair prolegs; looping movement; fatter at tail-end of body; usually causes problems August 15 to September 15, mainly in cotton production areas and southern coastal counties. The three pairs of thoracic (front) legs may be green or black. Leg color can change on the same insect as it ages and has no effect on insecticide tolerance. This pest prefers plants which are not drought-stressed. Damage usually starts in the middle of a lush canopy.



Soybean Looper M.. Shepard

Green Cloverworm - 3 + 1 pair prolegs; looping movement; not fatter at tail-end; July to September; seldom does significant damage by itself, statewide distribution. This insect is often misidentified as looper due to the looping motion of small larvae. This mistaken identity can be expensive. High rates of pyrethroids and other insecticides are often wasted on cloverworms misidentified as loopers.

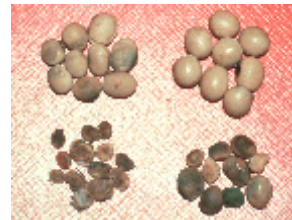


Green cloverworm

Stink Bugs - Green or brown shield-shaped insects as adults, immatures with same general shape, but no wings; mainly a September problem; mostly southern Coastal Plain. Stink bug damage is much less obvious than worm damage but usually more costly. Stink bug feeding causes shriveled seed with reduced germination and can cause small pods to abort.



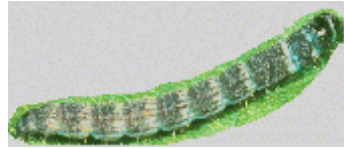
Southern green stink bug eggs, nymphs, adults



Stink bug damage to soybean seed

Lesser Cornstalk Borer - Green-blue or purple banded worm, up to three-quarters of an inch long; found at soil surface or tunneled into stem; body twitches vigorously when touched; builds a sand tube often found attached to the stem. This is a pest of drought stress, particularly on soils with a sandy surface. Burning and disking of wheat stubble prior to planting increases lesser cornstalk borer problems. Reduced tillage reduces lesser cornstalk borer damage.

This pest destroys soybean stands by girdling or tunneling into seedlings. The problem is usually misdiagnosed as poor germination or stand loss caused directly by drought stress. The preventative treatment listed under control can protect stands in high-risk situations.



Lesser cornstalk borer



Lesser cornstalk borer sand tube and stem damage

J. Chapin

CHEMICAL AND RATE SELECTION

See the latest version of the Ag. Chem. Handbook for pesticide recommendations.

<http://cufan.clemson.edu/pestmgmtguide/>

A rate range is usually given for pest control. Factors that influence the required rate are pest size, pest density, plant size, temperature and application method. The higher rates generally are needed for combinations of heavy populations, large worms, dense plant canopy, extreme temperatures (95 degrees F), and aerial application.

Use of broad-spectrum insecticides such as methyl parathion or Lannate can result in retreatment for late-season velvetbean caterpillar outbreaks. In areas with annual velvetbean caterpillar problems, growers should consider adding dimilin to corn earworm, stink bug, or boron treatments to prevent retreatment.