

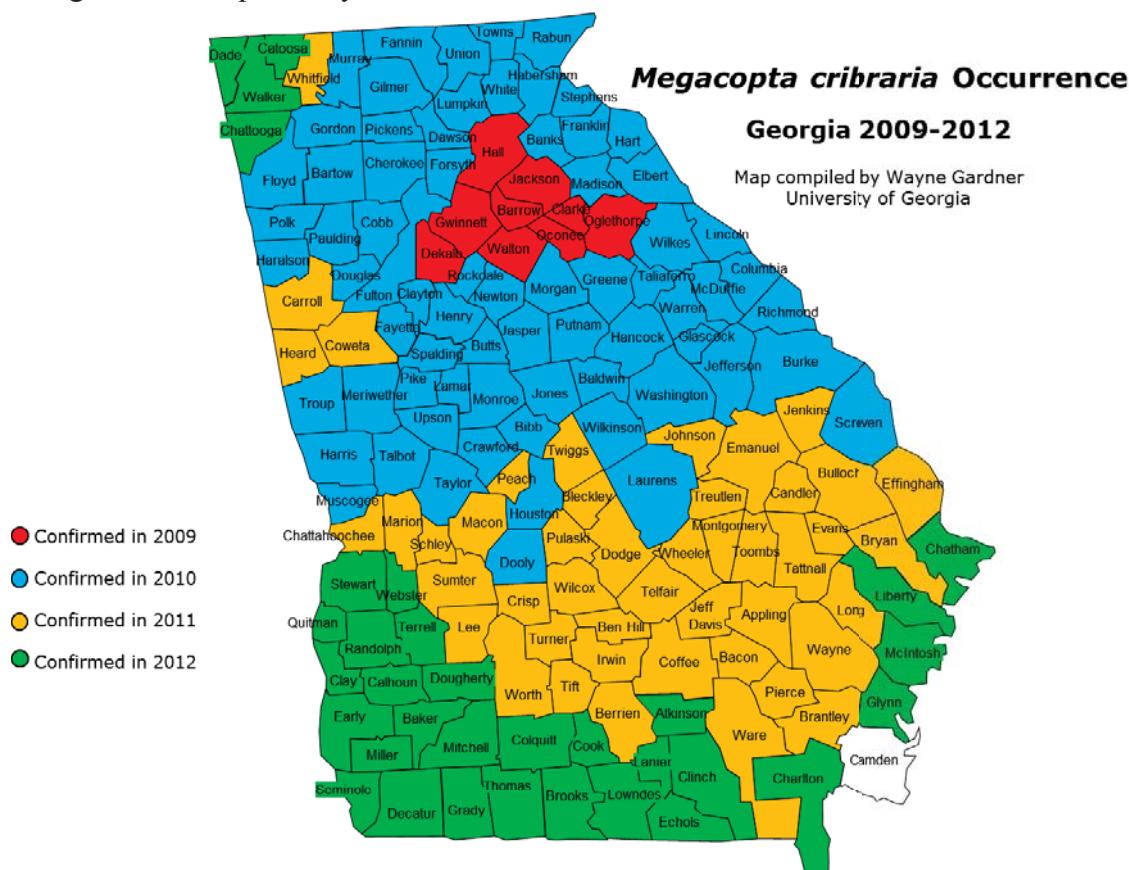
INSECT MANAGEMENT

(Phillip Roberts, Mike Toews, and David Buntin)

A number of insect pests are capable of severely damaging soybeans. However, it is important to realize that soybeans can withstand considerable insect damage at certain times without economic yield losses. In Georgia, it is possible to produce a crop of soybeans without having to use any insecticides. In some years, however, several insecticide applications may be necessary to protect the crop. Because of this situation, soybeans are ideally suited to an insect pest management program. This program consists of two phases: (1) planning to prevent damage from insects and (2) periodic monitoring or scouting of the insect pest situation in each field so that control decisions can be made based on the kinds and numbers of insects found.

Kudzu Bug, *Megacopta cribraria*, A New Invasive Pest of Soybeans in Georgia:

The “Kudzu Bug”, *Megacopta cribraria*, is an exotic pest that was first detected in the US during the fall of 2009 in nine northeast Georgia counties. Kudzu bugs have now been detected all Georgia counties with the exception of Camden. Observations during previous years suggest that economic damage to soybeans in a county is possible the season following initial detection. Thus all soybean production areas in Georgia are at risk to economic damage from kudzu bugs if not managed appropriately. Kudzu bugs have also been detected in South and North Carolina, Virginia, Tennessee, Alabama, Florida, and Mississippi. From 2010 to 2012 we have collected yield data from 24 field trials and **the average yield loss in unprotected plots was 20 percent** with a range of 0 to 60 percent yield loss.



Kudzu bug adults are oval shaped, small, about $\frac{1}{4}$ inch in diameter, and greenish brown in color. Eggs are creamy white and are laid in double-rowed batches of about 20 eggs. Nymphs are also oval shaped and are light green to brown in color and have numerous setae or hairs. Both adults and nymphs are most often observed on plant stems and have sucking mouthparts which they use to feed on plant sap. Excessive feeding weakens and stresses the plant which can result in fewer pods per plant, fewer seeds per pod, and smaller seed size.

Kudzu bugs survive the winter under tree bark and in debris on the ground in well drained areas. During early spring adults are active on warm days and are in search of a reproductive host. Although kudzu bug adults may be observed on many plant hosts (i.e. fig trees and others), the primary reproductive hosts in Georgia are kudzu and soybean; reproduction has also been observed on wisteria. Kudzu appears to be a very important spring host. Kudzu bugs begin laying eggs on kudzu shoots when kudzu breaks dormancy; this generally occurs in late March in south Georgia and mid-April in north Georgia. Adults will lay eggs on kudzu for several weeks. The time required to reach the adult stage is about 6-8 weeks. These new adults then disperse to soybeans and other reproductive hosts. Soybeans become attractive to kudzu bug adults when plants are in the V3 (three trifoliates) stage. Adults will begin laying eggs on the underside of soybean leaves and a generation requiring about 6 weeks will be completed on soybeans. Initial field invasions tend to be more concentrated on field margins but will eventually spread throughout the field. In many situations we will begin to see immature kudzu bugs in soybeans at about the R2-R3 stage. Kudzu bugs complete two generations per year.

Planting date has a significant impact on the risk of kudzu bug infestations. Field trials conducted during 2012 confirmed field observations in 2011 that early planted soybeans are more likely to experience high kudzu bug infestations compared with late plantings. For example, kudzu bug egg mass counts per 5 plants at the R2 growth (flowering) stage were 49, 23, 8, and 2 for soybeans planted in April, May, June, and July. Yield data tended to follow the same trend with the greatest yield loss in unprotected plots occurring in April followed by May, June, and July. These data should not be the deciding factor concerning planting date; soybeans should be planted when maximum yield potential occurs. But rather the grower should understand the risk of infestations does vary by planting date. Insecticide application(s) may be needed for kudzu bugs regardless of planting date so thorough monitoring for kudzu bugs and other pests is needed.

Kudzu bugs can be scouted using a 15-inch diameter sweep net. Kudzu bug populations can be extremely high. Current recommendations include interrupting the development of each generation of kudzu bug by applying an insecticide to target the immature stage of the insect. Treatment thresholds and sampling plans for kudzu bugs are being developed and refined. However, tentative recommendations include applying an insecticide whenever sweep-net sampling catches one immature insect per sweep. Samples should be taken from all areas of the field, including edges and the middle, taking care not to bias sampling along border rows where population build initially. As an alternative to sweep-net sampling, visual inspections of insect density lower in the canopy will suffice. If immature kudzu bugs are easily and repeatedly found on leaf petioles and/or main stems, treatment is likely warranted.

In some situations, a single properly timed insecticide application for kudzu bug based on the 1 nymph per sweep threshold has preserved soybean yield. If insecticides are applied when adults are still actively migrating from kudzu to soybeans; additional applications may be needed.

Multiple classes of insecticides have shown activity on kudzu bugs. Growers actively treating kudzu bugs with broad spectrum insecticides should consider using a preventive application of Dimilin at the R2/R3 growth stage for control of velvetbean caterpillar and green clover worm (*see Preventative Insect Control and Damage section*).

Prevent Early-Season Insect Problems

Each year, try to anticipate seedling-insect problems and apply preplant, at-planting, or early post-emergence insecticides to prevent stand losses. The following generalizations should be considered:

Before Planting

Check for soil insects such as wireworms, white grubs, and whitefringed beetle larvae in each field. Inspect soil closely when preparing land for planting (especially when turning land) for the presence of these insects. Since these insects will go back into the soil within seconds, inspections should be made immediately after turning. Inspect the soil and the root systems (and around the roots) of any weeds present for these insects and their feeding damage. Remember that these insects tend to build up in individual fields.

After cultivation, let fields remain fallow for as long as possible before planting. This practice reduces the risk of cutworms and lesser cornstalk borer which may have been established on weeds or the previous crop from infesting seedlings.

At-Planting

Probably the best way to apply an at-planting insecticide (where the label allows) is to apply it in a narrow band over the row in front of the press wheel and incorporate into the top $\frac{1}{2}$ to 1 inch of soil using suitable equipment. This method of application incorporates some of the material in a band near the surface of the soil, and insects which feed at or near the soil surface (lesser cornstalk borer, cutworms, sugarcane beetle) will be more likely to come in contact with it.

Anticipate seedling-insect problems in the following situations and plan at-planting and/or an early postemergence insecticide application accordingly:

1. When late-planting for any reason, lesser cornstalk borer populations may increase as the season progresses.
2. When planting on light soils following periods of drought, lesser cornstalk borer damage is more likely under these conditions.
3. When planting behind burned wheat stubble, lesser cornstalk borer infestations are more likely to develop.
4. When planting in double-crop or minimum-till situations where previous-crop residue remains on the soil surface, cutworms or other soil insects may have built up in the preceding crop.

Check Crop Regularly to Prevent Insect Damage

Soybeans should be checked at least once a week, twice a week under certain conditions, from the time plants begin emerging until the leaves begin to turn yellow and fall from the plants. Look for:

Seedling Pests

Check seedlings very closely until the plants are about 12 inches tall. The stems become woody and severe damage from seedling pests becomes less likely at this time. Look for insects on the plant (threecornered alfalfa hopper) or in the soil around the base of the plants (lesser cornstalk borer, cutworms, sugarcane beetle). Evaluate stand loss (percentage of dead or dying plants) and try to determine if future stand loss is probable (insects easily found and actively damaging plants).

Foliage Feeders

Throughout the season, determine what insects are feeding on the foliage and how much defoliation they are causing. On small beans, it is possible to brush the insects off the plants into the row middle where they can be counted. On larger beans, it is better to use a shake cloth or sweep net. Place the shake cloth on the ground in the row middle ahead of you under undisturbed plants, because some insects fly or fall off plants quickly when disturbed. Quickly shake or beat the plants on the 3 feet of row so that foliage feeders (and pod feeders after pods are set) are dislodged onto the cloth where they can be counted and identified. With a sweep net, take a 25 sweep sample across a single row to capture insects into the net. After passing the net through the foliage take a step forward, then pass the net back across the foliage. Then identify and count the insects present in the net. At each sample point, estimate the percent of the foliage loss so that an average defoliation value can be calculated for the field.

Pod Feeders

After full bloom (when pods are being set), look closely for any pod feeding caterpillars (corn earworm and fall armyworm) and stink bugs that are dislodged on the shake cloth or in the 25-sweep sample.

When to Treat

Important: Reserve materials which are highly disruptive to beneficial insects for late season use. Conservation of beneficial insects and spiders, especially during early and mid-season, suppress some pest species.

Soil Insects (wireworms, white grubs, whitefringed beetle larvae):

Treat fields with a history of infestation or if insects are found during land preparation at an average of one per square yard.

Seedling Pests

Use preventive methods if damage is expected due to planting situation and/or treat if stand is being threatened. From seedling emergence until plants are 12 inches tall treat for:

Lesser cornstalk borer: treat when 10% of seedlings are infested with larvae

Cutworms: treat when 10% of stand is lost and larvae are still present

Sugarcane beetle: treat when 10% of plants (regardless of plant size) are damaged or dead and beetles are still present

Threecornered alfalfa hopper: treat when 10% of plants are infested with nymphs and/or adults.

It is uncommon for the above pests (with the exception of sugarcane beetle) to damage soybeans larger than 12 inches.

Foliage Feeders (beet armyworm, loopers, corn earworm, velvetbean caterpillar, green cloverworm, Mexican bean beetle, bean leaf beetle, blister beetles, Japanese beetle):

Foliage feeders should be controlled based on defoliation and plant growth stage.

Prior to full bloom: foliage feeders should be controlled when the defoliation level reaches 30%.

After full bloom (2 to 3 weeks after first blooms are noted) and up to full-pod-fill: treat when the defoliation level reaches 15%.

After full-pod-fill: treat when the defoliation level reaches 25%. It usually requires an average of 8 or more beet armyworms, loopers or velvetbean caterpillars ($\frac{1}{2}$ inch long or longer) per foot of row to cause this much defoliation. It usually requires 4 corn earworms ($\frac{1}{2}$ inch long or longer) per foot of row to cause this much defoliation.

Fields should be scouted twice per week when insect pest populations and percent defoliation are within 50 percent of the treatment threshold, and the decision to treat is being delayed in order to derive maximum benefits from natural control factors.

The green cloverworm rarely requires control measures on soybeans in Georgia. It is very common on soybeans throughout the season but generally does not occur in sufficient numbers to cause economic defoliation losses. Green cloverworms infest soybeans early at low levels and serve as a host for numerous insect parasites and predators, spiders, and diseases. These beneficial insects in turn are of great value in suppressing subsequent infestations of insect pests.

Pod Feeders: (stink bugs, corn earworm and fall armyworm):

Pod feeders should be controlled based on number of pod feeding insects present and plant growth stage:

Stink Bugs: Bloom to mid pod fill: 0.33 stink bugs per row foot or 3 per 25 sweeps

Mid pod fill to maturity: 1 stink bug per row foot or 6 per 25 sweeps

* beans being grown for seed production, 1 stink bug per 6 row feet will justify control.

Pod Feeding Caterpillars: Pod feeding caterpillars such as the corn earworm or fall armyworm should be controlled at any time after bloom when an average of 2 per row foot (1/2 inch or longer) are found.

Trap Cropping

Trap cropping has been proven to be a cost effective means of managing insects in soybeans. Soybean producers have found that managing stink bugs using trap crops can often reduce insecticide applications and preserve yields. Soybean field borders (trap) are planted using a soybean variety at least 2 maturity groups earlier than the rest of the field. Early maturity group soybeans planted around late MG VII or MG VIII soybeans have been proven to be most effective in trapping stink bugs from the whole field. Treating only the trap area for stink bug controls the pest without disrupting beneficial insect populations in the rest of the field. Although a trap crop is used, be sure to scout the remainder of the field and treat on an as needed basis. Field evaluations indicate that trap cropping can be extremely effective in controlling stink bugs without flaring soybean looper or velvetbean caterpillar populations. Two or more insecticide treatments of the trap may be necessary.

Preventive Insect Control and Damage

Historical insect data indicate that the probability for treating late season foliage feeding caterpillars in soybeans is extremely high in the Coastal Plain Region of Georgia. Growers often budget 1-2 insecticide spray applications for late season insect control. Heavy populations of velvetbean caterpillar and soybean looper migrate into Georgia during August and September. For this reason, growers have been applying protective treatments using Dimilin in combination with boron at the R2-R3 stage.

Research with Dimilin and boron applied at the R2-R3 stage has consistently shown yield increases. A two ounce application of Dimilin at the R2-R3 stage controls velvetbean caterpillar and green cloverworm season long without disrupting beneficial insect populations. In most cases, fields treated with Dimilin at the R2 stage (full bloom) do not require an additional insecticide treatment for foliage feeders for the remainder of the growing season. However, soybean looper will sometimes require treatment and should be scouted closely. Fields that are not treated with Dimilin require an average of 1.5 treatments for late season insect control.

Sweep Net and Drop Sheet Sampling for Soybean Insect Pests

Research indicates that the sweep net is just as efficient as using the drop sheet for detecting most soybean insect pest problems. It has been found to be especially effective in capturing the

more mobile insect pests. It has also been found to be very effective in narrow row or lodged soybeans.

When using a drop sheet the scout typically makes 10 random 3-feet examinations for each 20 acres of soybeans being surveyed. If using a sweep net, the scout should also make 10 random checks of 25 sweeps for each 20 acres. Results of the drop sheet are reflected in the average number of larvae or insects per foot of row. The results of the sweep net should be averaged to reflect the number of insect pests per 25 sweeps.

Early Soybean Production System

Planting an early maturing soybean variety (Maturity Group IV or V) in mid-April can be an effective production practice for avoiding high populations of defoliating caterpillars. By using this early production system, soybeans mature in late August to early September, before the peak populations of these major soybean insect pests occur. However, growers should expect higher populations of kudzu bugs. For information on the Early Soybean Production System (ESPS), refer to the section entitled, "Early Soybean Production System" in the Georgia Soybean Production Guide. This is a very useful system for reducing the risks associated with insect pests.

Sweep Net and Drop Sheet Thresholds for Soybean Insects

<u>INSECT PEST</u>	<u>SWEEP NET</u>	<u>DROP SHEET</u>
	<u>Avg. no. per 25 Sweeps</u>	<u>Avg. no. per 1 foot of row</u>
Kudzu bug	25 immatures	
Stink bug (both adult and nymph)	3 bloom to mid pod fill 6 mid-pod fill to maturity	0.33 1
	<i>* beans being grown for seed production, 1 stink bug per 6 row feet will justify control.</i>	
Velvetbean caterpillar	40	8
Green cloverworm	60	10
Corn earworm	5	2
Soybean looper	20 small worms 15 large worms	8 6
Threecornered alfalfa hopper	25	3

Mites: Treat for mites if infestations become general over the field and leaf discoloration is becoming evident.

SOYBEAN

SOYBEAN INSECT CONTROL

Phillip Roberts, Extension Entomologist, Mike Toews, Research Entomologist, and David Buntin, Research Entomologist

PEST	INSECTICIDE	FORMULATION PER ACRE	LBS. ACTIVE PER ACRE	REMARKS AND PRECAUTIONS
Bean Leaf Beetle	bifenthrin (Brigade) 2EC (Discipline) 2EC	2.1-6.4 ozs. 2.1-6.4 ozs.	0.033-0.1 0.033-0.1	WHEN TO TREAT FOR SOYBEAN INSECTS SOIL INSECTS (Wireworms, white grubs, whitefringed beetle larvae): Treat fields with a history of <u>OR</u> , if these insects are found during land preparation at an average of 1 per square yard.
	carbaryl (Sevin) 80S (Sevin) 4F	0.625-1.25 lbs. 1-2 pts.	0.5-1.0 0.5-1.0	SEEDLING PESTS: Treat preventively if damage is expected due to planting situation <u>or</u> treat if stand is being threatened. From seedling emergence until plants are 12 inches tall, treat for: 1. <u>lesser cornstalk borer</u> when 10% of seedlings are infested with larvae; 2. <u>caterpillars</u> when 10% of stand is lost and larvae are still present; 3. <u>sugarcane beetle</u> (regardless of plant size) when 10% of plants are damaged or dead and beetles are still present; 4. <u>three-cornered alfalfa hopper</u> when 10% of plants are infested with nymphs and/or adults.
	beta-cyfluthrin (Baythroid XL) 1	1.6-2.8 ozs.	0.0125-0.022	
	gamma-cyhalothrin (Prolex) 1.25 (Declare) 1.25	0.77-1.28 ozs. 0.77-1.28 ozs.	0.0075-0.0125 0.0075-0.0125	
	lambda-cyhalothrin (Karate Zeon) 2.08 (Silencer) 1	0.96-1.6 ozs. 1.92-3.2 ozs.	0.015-0.025 0.015-0.025	
	methyl parathion (Penncap-M) 2	2-3 pts.	0.5-0.75	KUDZU BUG (Megacopta cribraria): Current recommendations include interrupting the development of each generation of kudzu bug by applying an insecticide to target the immature stage of the insect. Treatment thresholds and sampling plans for kudzu bugs are being developed and refined. However, tentative recommendations include applying an insecticide whenever sweep-net sampling catches one immature insect per sweep. Samples should be taken from all areas of the field, including edges and the middle, taking care not to bias sampling along border rows where population build initially. As an alternative to sweep-net sampling, visual inspections of insect density lower in the canopy will suffice. If immature kudzu bugs are easily and repeatedly found on leaf petioles and/or main stems, treatment is likely warranted.
	zeta-cypermethrin (Mustang Max) .8EC	2.8-4 ozs.	0.0175-0.025	
Beet Armyworm	flubendiamide (Belt) 4SC	2.0-3.0 ozs	0.063-0.094	
	indoxacarb (Steward) 1.25 EC	5.6-11.3 ozs.	0.055-0.1	
	methoxyfenozide (Intrepid) 2F	4-8 ozs.	0.06-0.12	
	spinosad (Tracer) 4SC	1.5-2 ozs.	0.047-0.062	FOLIAGE FEEDERS (beet armyworms, grasshoppers, blister beetles, loopers, corn earworm, velvetbean caterpillar, green cloverworm, Mexican bean beetle, bean leaf beetle, Japanese beetle, whitefringed beetle adults): Prior to full bloom, foliage feeders should be controlled when the defoliation level reaches 30%. From full bloom up to mid-pod-fill, treat when the defoliation level reaches 15%. After full-pod-fill, treat when the defoliation level reaches 25%. It usually requires an average of 8 or more green cloverworms, loopers or velvetbean caterpillars (1/2 inch long or longer) per foot of row to cause this much defoliation. It usually requires 4 corn earworms (1/2 in. long or longer) per foot of row to cause this much defoliation.
Blister Beetles	carbaryl (Sevin) 80S (Sevin) 4F	0.625-1.25 lbs. 1-2 pts.	0.5-1.0 0.5-1.0	
	beta-cyfluthrin (Baythroid XL) 1	1.6-2.8 ozs.	0.0125-0.022	
	gamma-cyhalothrin (Prolex) 1.25 (Declare) 1.25	1.28-1.54 1.28-1.54	0.0125-0.015 0.0125-0.015	
	lambda-cyhalothrin (Karate Zeon) 2.08 (Silencer) 1	1.6-1.92 ozs. 3.2-3.84 ozs.	0.025-0.03 0.025-0.03	
	zeta-cypermethrin (Mustang Max) .8EC	2.8-4 ozs.	0.0175-0.025	NOTE: The green cloverworm seldom requires control measures in Georgia. It is very common on soybeans throughout the season but does not occur in sufficient numbers to cause economic defoliation losses. It usually requires 15 green cloverworm larvae per foot of row to cause threshold level defoliation. This species infests soybeans early at low levels and serves as a good host for numerous insect parasites and predators, spiders and diseases. These beneficials, in turn, are of great value in suppressing infestations of economically important insect pests later in the season.
				NOTE: Beet armyworm infestations sometimes occur on seedling beans. When this occurs, controls should not be applied until the defoliation level exceeds 50% because soybeans can compensate for this early-season damage. (cont. next pg.)

SOYBEAN INSECT CONTROL (continued)

PEST	INSECTICIDE	FORMULATION PER ACRE	LBS. ACTIVE PER ACRE	REMARKS AND PRECAUTIONS
Blister Beetles (cont.)				POD FEEDERS: Pod feeding caterpillars, such as the corn earworm and fall armyworm should be controlled at any time after bloom when an average of <u>2 per foot of row</u> (1/2 inch long or longer) are found. After full bloom and up to the mid-pod-fill stage, stink bugs should be controlled when an average of <u>1 per 3 feet of row</u> is found. After mid-pod-fill, through maturity, they should be controlled when an average of <u>1 per foot of row</u> is found. If beans are being grown for seed, <u>1 stink bug per 6 feet of row</u> will justify control measures.
Corn Earworm	bifenthrin (Brigade) 2EC (Discipline) 2EC	2.1-6.4 ozs. 2.1-6.4 ozs.	0.033-0.1 0.033-0.1	IMPORTANT: Reserve materials containing methyl parathion for late season use. This material is very toxic to beneficial insects and spiders which help keep down insect pest infestations. Late season conservation of beneficials is not as critical as it is in the early season since it is unlikely a new pest infestation will have time to develop if a late treatment has to be made for velvetbean caterpillar or stink bugs.
	carbaryl (Sevin) 80S (Sevin) 4F	0.625-1.875 lbs. 1-3 pts.	0.5-1.5 0.5-1.5	MITES: Treat if infestations become general over the field and leaf discoloration is becoming evident.
	beta-cyfluthrin (Baythroid XL) 1	1.6-2.8 ozs.	0.0125-0.022	If using a 15-inch diameter sweep net, and taking several 25-sweep samples in each field, the following treatment threshold levels can be used:
	flubendiamide (Belt) 4SC	2.0-3.0 ozs	0.063-0.094	SWEEP NET
	gamma-cyhalothrin (Prolex) 1.25 (Declare) 1.25	0.77-1.28 0.77-1.28	0.0075-0.0125 0.0075-0.0125	Pests Average # Per 25 Sweeps Kudzu Bugs (immatures) 25 Corn Earworms 5 Green Cloverworms 60 Soybean Loopers 20 sm. or 15 lg. Stink Bugs (bloom to mid-pod) 3 (Mid-pod to maturity) 6 Three-cornered Alfalfa Hopper 25 Velvetbean Caterpillar 40
	lambda-cyhalothrin (Karate Zeon) 2.08 (Silencer) 1	0.96-1.6 ozs. 1.92-3.2 ozs.	0.015-0.025 0.015-0.025	If using a ground cloth, make 10 random 3-foot examinations for each 20 acres being surveyed.
	esfenvalerate (Asana XL) .66EC	5.8-9.6 ozs.	0.03-0.05	GROUND CLOTH
	indoxacarb (Steward) 1.25 EC	5.6-11.3 ozs.	0.055-0.1	Pests Average # Per 1 Foot of Row Corn Earworms 2 Green Cloverworms 10 Soybean Loopers 8 sm. or 6 lg. Stink Bugs (bloom to mid-pod) 0.33 (Mid-pod to maturity) 1 Three-cornered Alfalfa Hopper 3 Velvetbean Caterpillar 8
	methomyl (Lannate) 2.4LV	0.75-1.5 pts.	0.225-0.45	
	spinosad (Tracer) 4SC	1.5-2 ozs.	0.047-0.062	
	zeta-cypermethrin (Mustang Max) .8EC	2.8-4 ozs.	0.0175-0.025	
Cutworms	bifenthrin (Brigade) 2EC (Discipline) 2EC	2.1-6.4 ozs. 2.1-6.4 ozs.	0.033-0.1 0.033-0.1	
	chlorpyrifos (Lorsban) 4E	2 pts.	1.0	
	beta-cyfluthrin (Baythroid XL) 1	0.8-1.6 ozs.	0.0065-0.0125	
	gamma-cyhalothrin (Prolex) 1.25 (Declare) 1.25	0.77-1.28 ozs. 0.77-1.28 ozs.	0.0075-0.0125 0.0075-0.0125	
	lambda-cyhalothrin (Karate Zeon) 2.08 (Silencer) 1	0.96-1.6 ozs. 1.92-3.2 ozs.	0.015-0.025 0.015-0.025	
	zeta-cypermethrin (Mustang Max) .8EC	1.28-4 ozs.	0.008-0.025	

SOYBEAN INSECT CONTROL (continued)

PEST	INSECTICIDE	FORMULATION PER ACRE	LBS. ACTIVE PER ACRE	REMARKS AND PRECAUTIONS
Fall Armyworm	flubendiamide (Belt) 4SC indoxacarb (Steward) 1.25 EC methomyl (Lannate) 2.4 LV spinosad (Tracer) 4SC	2.0-3.0 ozs. 5.6-11.3 ozs. 1.5 pts. 1.5-2 ozs.	0.063-0.094 0.055-0.1 0.45 0.047-0.062	OBSERVE THE FOLLOWING PESTICIDE USE PRECAUTIONS: Apply any of the materials listed in this table with aerial or ground equipment (unless otherwise noted for each material) as label directs. Where a range of rates is given in the table, and if label does not direct otherwise, use the low rate on small plants or small larvae and the high rate on larger plants (especially, if lapped in the middle) or large larvae.
Grasshoppers	bifenthrin (Brigade) 2EC (Discipline) 2EC acephate (Orthene 90S) (Orthene 97) beta-cyfluthrin (Baythroid XL) 1 gamma-cyhalothrin (Prolex) 1.25 (Declare) 1.25 lambda-cyhalothrin (Karate Zeon) 2.08 (Silencer) 1 methyl parathion (Penncap-M) 2 zeta-cypermethrin (Mustang Max) .8EC	2.1-6.4 ozs. 2.1-6.4 ozs. 0.56 lb. 0.5 lb. 2.0-2.8 ozs. 1.28-1.54 ozs. 1.28-1.54 ozs. 1.6-1.92 ozs. 3.2-3.84 ozs. 2-3 pts. 3.2-4 ozs.	0.033-0.1 0.033-0.1 0.5 0.48 0.0155-0.022 0.0125-0.015 0.0125-0.015 0.025-0.03 0.025-0.03 0.5-0.75 .02-.025	acephate (Orthene): Do not apply within 14 days of harvest. Do not graze or cut vines for hay or forage. Do not apply more than 1.5 lbs. active ingredient per acre per season. bifenthrin (Brigade): Do not apply more than 0.3 lbs. per acre per season, minimum application interval is 30 days. Do not apply within 18 days of harvest. beta-cyfluthrin (Baythroid XL): Pre-harvest interval or feeding of dry vines is 45 days. Do not make more than 4 applications per season. carbaryl (Sevin): Highly toxic to bees. chlorpyrifos (Lorsban 4E): Do not apply more than 6 pints of Lorsban 4E per acre per season. Do not apply last treatment within 28 days of harvest nor apply last two treatments closer than 14 days apart. Do not allow livestock to graze in treated areas nor otherwise feed treated soybean forage to meat or dairy animals within 14 days after application. Do not feed straw from treated soybeans to meat or dairy animals within 28 days after application. chlorpyrifos (Lorsban 15G): Do not make more than one application per season. clothianidin (Belay 2.13): Do not apply foliar treatments less than 7 days apart. Do not apply within 21 days of harvest. Do not make foliar applications of Belay insecticide in fields treated with a neonicotinoid insecticide seed treatment(s) within 45 days of planting. Regardless of formulation or type of application (foliar or seed treatment), do not apply more than 0.2 lb ai of clothianidin per acre per season. Do not graze or feed soybean forage and hay to livestock.
Green Cloverworm	carbaryl (Sevin) 80S (Sevin) 4P beta-cyfluthrin (Baythroid XL) 1 flubendiamide (Belt) 4SC gamma-cyhalothrin (Prolex) 1.25 (Declare) 1.25 lambda-cyhalothrin (Karate Zeon) 2.08 (Silencer) 1 diflubenzuron (Dimilin) 2L esfenvalerate (Asana XL) .66EC indoxacarb (Steward) 1.25 EC	0.625-1.25 lbs. 1-2 pts. 0.8-1.6 ozs. 2.0-3.0 ozs 0.77-1.28 ozs. 0.77-1.28 ozs. 0.96-1.6 ozs. 1.92-3.2 ozs. 2-4 ozs. 2.9-5.8 ozs. 5.6-11.3 ozs.	0.5-1.0 0.5-1.0 0.0065-0.0125 0.063-0.094 0.0075-0.0125 0.0075-0.0125 0.015-0.025 0.015-0.025 .03-.063 0.015-0.03 0.055-0.1	 gamma-cyhalothrin (Prolex 1.25): Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. Do not apply within 30 days of harvest. Do not apply more than 0.03 pounds active ingredient per acre per season. lambda-cyhalothrin (Karate 2.08Z, Silencer): Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. Do not apply within 30 days of harvest. Do not apply more than 0.06 lb. ai/acre per season. diflubenzuron (Dimilin): Apply as needed but do not apply within 21 days of harvest for beans. Do not apply within 5 days of grazing or harvesting for hay. esfenvalerate (Asana XL): Do not make more than 2 applications per season. Do not apply within 21 days of harvest. Do not cut for hay nor allow milk or meat animals to graze. esfenvalerate (Asana XL): Do not feed or graze livestock on treated plants. Do not exceed 0.2 lb. a.i. per acre per season. Do not apply within 21 days of harvest.

SOYBEAN INSECT CONTROL (continued)

PEST	INSECTICIDE	FORMULATION PER ACRE	LBS. ACTIVE PER ACRE	REMARKS AND PRECAUTIONS
Green Cloverworm (cont.)	methomyl (Lannate) 2.4LV methoxyfenozide (Intrepid) 2F methyl parathion (4EC) (Penncap-M) 2 spinosad (Tracer) 4SC zeta-cypermethrin (Mustang Max) .8EC	0.4-0.75 pt. 4-8 ozs. 1-2 pts. 2-3 pts. 1-2 ozs. 2.8-4 ozs.	0.12-0.225 0.06-0.12 0.5-1.0 0.5-0.75 0.031-0.062 0.0175-0.025	<u>flubendiamide (Belt)</u> : Pre-harvest interval; Dry seed 14 days; Forage and hay-3 days. Do not apply more than 3 fl oz per acre per 5-day interval. Do not apply more than 6 fl ozs per acre per crop season. <u>indoxacarb (Steward)</u> : Will not provide acceptable control of velvetbean caterpillar. Do not feed or graze livestock on treated fields. <u>methomyl (Lannate)</u> : Apply Lannate as needed. Do not apply within 10 days of grazing, 12 days of harvest for hay, or 14 days of harvest for beans. <u>methoxyfenozide (Intrepid 2F)</u> : Do not apply more than 64 fl. ozs. or make more than 4 applications per season. Do not apply within 7 days of harvest of hay and forage or within 14 days of harvest of seed. <u>methyl parathion</u> : Do not apply within 20 days of grazing or hay or bean harvest. <u>methyl parathion (Penncap-M)</u> : Do not apply more than twice per season. Do not apply within 20 days of grazing or hay or bean harvest. <u>spinosad (Tracer)</u> : Do not apply within 28 days of harvest. Do not feed or graze livestock on treated foliage. Do not apply more than 6 ounces per acre per year. <u>zeta-cypermethrin (Mustang Max)</u> : Do not graze or harvest treated soybean forage, straw or hay for livestock feed. Do not exceed 0.15 lb a.i. per acre per season.
Japanese Beetle	carbaryl (Sevin) 80S (Sevin) 4F beta-cyfluthrin (Baythroid XL) 1 gamma-cyhalothrin (Prolex) 1.25 (Declare) 1.25 lambda-cyhalothrin (Karate Zeon) 2.08 (Silencer) 1 zeta-cypermethrin (Mustang Max) .8EC	0.625-1.25 lbs. 1-2 pts. 1.6-2.8 ozs. 1.28-1.54 ozs. 1.28-1.54 ozs. 1.6-1.92 ozs. 3.2-3.84 ozs. 2.8-4 ozs.	0.5-1.0 0.5-1.0 0.0125-0.022 0.0125-0.015 0.0125-0.015 0.025-0.03 0.025-0.03 0.0175-0.025	
Kudzu Bug	acephate (Orthene 97) bifenthrin (Brigade) 2EC (Discipline) 2EC clothianidine (Belay) 2.13 gamma-cyhalothrin (Declare) 1.25 lambda-cyhalothrin (Karate Zeon) 2.08 zeta-cypermethrin (Mustang Max) .8 EC	0.75-1.0 lb. 5.12-6.4 ozs. 6.4 ozs. 3-4 ozs. 1.28-1.54 ozs. 1.92 ozs. 4 ozs.	0.5-0.97 0.08-0.1 0.1 0.05-0.067 0.0125-0.015 0.03 0.025	
Lesser Cornstalk Borer	(Lorsban) 15G (Lorsban) 4E	8 ozs. per 1000 feet of row 2 pts.	1.0 1.0	
Loopers, Soybean	flubendiamide (Belt) 4SC indoxacarb (Steward) 1.25 EC	2.0-3.0 ozs 5.6-11.3 ozs	0.063-0.094 0.055-0.1	

SOYBEAN INSECT CONTROL (continued)

PEST	INSECTICIDE	FORMULATION PER ACRE	LBS. ACTIVE PER ACRE	REMARKS AND PRECAUTIONS
Loopers, Soybean (cont.)	methoxyfenozide (Intrepid) 2F	4-8 ozs.	0.06-0.12	
	spinosad (Tracer) 4SC	1-2 ozs.	0.031-0.062	
Note: Soybean loopers are highly resistant to pyrethroid insecticides and should not be used for control.				
Mites	bifenthrin (Brigade) 2EC (Discipline) 2EC	5.12-6.4 ozs. 5.12-6.4 ozs.	0.08-0.1 0.08-0.1	
	dimethoate (4EC)	1 pt.	0.5	
Stink Bugs	acephate (Orthene 90S) (Orthene 97)	0.56-1.1 lb. 0.5-1 lb.	0.5-1.0 0.5-0.97	
	beta-cyfluthrin (Baythroid XL) 1	1.6-2.8 ozs.	0.0125-0.022	
	bifenthrin (Brigade) 2EC (Discipline) 2EC	2.1-6.4 ozs. 2.1-6.4 ozs.	0.033-0.1 0.033-0.1	
	clothianidin (Belay) 2.13	3-6 ozs.	0.05-0.1	
	gamma-cyhalothrin (Prolex) 1.25 (Declare) 1.25	1.28-1.54 ozs. 1.28-1.54 ozs.	0.0125-0.015 0.0125-0.015	
	lambda-cyhalothrin (Karate Zeon) 2.08 (Silencer) 1	1.6-1.92 ozs. 3.2-3.84 ozs.	0.025-0.03 0.025-0.03	
	methyl parathion (4EC) (Penncap M) 2	1 pt. 1-3 pts.	0.5 0.25-0.75	
	zeta-cypermethrin (Mustang Max) .8EC	3.2-4 ozs.	0.02-0.025	
Sugarcane Beetles	The treatments for lesser cornstalk borer give helpful control.			
Three-cornered Alfalfa Hopper	acephate (Orthene 90S) (Orthene 97)	0.83-1.1 lb. 0.75-1 lb.	0.75-1.0 0.73-0.97	
	carbaryl (Sevin) 80S (Sevin) 4F	1.25 lbs. 2 pts.	1.0 1.0	
	beta-cyfluthrin (Baythroid XL) 1	1.6-2.8 ozs.	0.0125-0.022	
	gamma-cyhalothrin (Prolex) 1.25 (Declare) 1.25	0.77-1.28 ozs. 0.77-1.28 ozs.	0.0075-0.0125 0.0075-0.0125	
	lambda-cyhalothrin (Karate Zeon) 2.08 (Silencer) 1	0.96-1.6 ozs. 1.92-3.2 ozs.	0.015-0.025 0.015-0.025	

SOYBEAN INSECT CONTROL (continued)

PEST	INSECTICIDE	FORMULATION PER ACRE	LBS. ACTIVE PER ACRE	REMARKS AND PRECAUTIONS
Three-cornered Alfalfa Hopper (cont.)	methyl parathion (PennCap-M) 2FM	2-3 pts.	0.5-0.75	
	zeta-cypermethrin (Mustang Max) .8E	2.8-4 ozs.	0.0175-0.025	
Velvetbean Caterpillar	carbaryl (Sevin) 80S (Sevin) 4F	0.625-1.25 lbs. 1-2 pts.	0.5-1.0 0.5-1.0	
	beta-cyfluthrin (Baythroid XL) 1	1.6-2.8 ozs.	0.0125-0.022	
	flubendiamide (Belt) 4SC	2.0-3.0 ozs	0.063-0.094	
	gamma-cyhalothrin (Prolex) 1.25 (Declare) 1.25	0.77-1.28 ozs. 0.77-1.28 ozs	0.0075-0.0125 0.0075-0.0125	
	lambda-cyhalothrin (Karate Zeon) 2.08 (Silencer) 1	0.96-1.6 ozs. 1.92-3.2 ozs.	0.015-0.025 0.015-0.025	
	diflubenzuron (Dimilin) 2L	2-4 ozs.	.03-.063	
	esfenvalerate (Asana XL) .66EC	2.9-5.8 ozs.	0.015-0.03	
	methomyl (Lannate) 2.4LV	0.4-0.75 pt.	0.12-0.225	
	methoxyfenozide (Intrepid) 2F	4-8 ozs.	0.06-0.12	
	methyl parathion (4EC) (PennCap M) 2	1-2 pts. 2-3 pts	0.5-1.0 0.5-0.75	
	spinosad (Tracer) 4SC	1-2 oz.	0.031-0.062	
	zeta-cypermethrin (Mustang Max) .8EC	2.8-4 ozs.	0.0175-0.025	
Premixed or Co-Packaged Insecticide Products:				
Products listed below are available as premixes or co-packages of two insecticidal active ingredients. When using premixed or co-packaged products, be sure the use of all active ingredients is necessary. Unnecessary applications or use of reduced rates of an active ingredient may lead to or intensify insecticide resistance.				
bifenthrin, imidacloprid (Brigadier)				
zeta-cypermethrin, chlorpyrifos (Stallion)				
imidacloprid, cyfluthrin (Leverage)				
lambda-cyhalothrin, thiomethoxam (Endigo)				
Spinosad, gamma-cyhalothrin (Consero)				
zeta-cypermethrin, bifenthrin (Hero)				
chlorpyrifos, lambda-cyhalothrin (Cobalt Advanced)				