2018
INSECT CONTROL GUIDE
for
Agronomic Crops









Classes of Pesticides

Effective resistance management requires rotation among the various classes of available insecticide chemistry. Often when one insecticide in a class fails because of insecticide resistance, other insecticides in the same class will also be ineffective. Selection of an insecticide from a different class will improve the chances of obtaining control. Growers need to be very aware of the type of insecticide chemistry being used. Classes of insecticides recommended in this guide are identified by the following abbreviations:

Avermectins – (AV)
Chloro-nicotinyl – (CN)
Organophosphate – (OP)
Pyridine Carboxamide – (PC)
Biologicals – (B)
Insect Growth Regulators – (IGR)
Oxadiazine – (OX)
Spinosyns – (SPN)
Carbamate – (C)
Pyrethroid – (P)
Tetronic Acid – (TA)
Diamides – (D)
METI-Acaricides – (M)
Propargite – (PG)
Sulfoxiimines – (SX)
Butenolides – (Bu)

SOYBEAN INSECT MANAGEMENT

Variety Selection/Cultural Practices

Currently available varieties of soybeans differ in growth characteristics and the time required for maturity. Variety characteristics can affect susceptibility to insect injury. For example, early-maturing varieties are less likely to be seriously damaged by soybean loopers or velvetbean caterpillars because they often mature before late-season generations of the pests occur. Also, varieties with little pubescence (hairs) on the undersides of leaves are susceptible to potato leafhopper infestations.

Maturity differences can be used to manage some insect pests. For example, planting about 5 percent of the soybean acreage in an area 10 to 14 days earlier than the remainder of the crop will concentrate overwintering bean leaf beetles into these earlier plantings. The early-planted soybeans serve as a trap crop for the adults, and a relatively small amount of insecticide can then be used to prevent their spread into later-planted soybeans. If early-maturing varieties are planted as the trap crop, they will also act as a trap crop for stink bugs during pod development.

Soybeans that do not have a closed canopy at the time of bloom, as often occurs in late plantings and wider row spacings, are more susceptible to bollworm infestations. No-till soybeans are at greater risk to cutworm damage than conventionally tilled soybeans.

The performance of many soybean varieties is tested every year in Mississippi at several locations. The information is published annually as a Mississippi Agricultural & Forestry Experiment Station (MAFES) Information Bulletin–Soybean Variety Trials.

Biological Control

Diseases — In mid- to late-season, naturally occurring diseases (fungi, bacteria, and viruses) of soybean insect pests can be important in control. A full leaf canopy, along with certain environmental conditions, apparently produces a microclimate favorable for insect disease development. Diseases often control armyworms, velvetbean caterpillars, green cloverworms, and soybean loopers. After diseased larvae have died, they may have a whitish mold-like growth covering their body surface, a black coloration with their bodies filled with fluid, or a near normal appearance (depending on the disease).

The presence of diseased worms indicates the population is being reduced naturally. When you find diseased larvae, withhold treatment for a few days to see if the disease will spread to a level that can control the population.

Predators and Parasites — Beneficial predators and parasites are very important in reducing the number of early-season insect pests. For this reason, you should protect them to have their full benefit. Predators and parasites can often keep pests from reaching treatable levels. Some early-season insecticide applications to soybeans can severely reduce predators and parasites. Regular scouting of fields is essential in detecting insect pests as well as beneficials.

Sampling for Soybean Insects

To minimize yield loss from insect pests attacking soybeans, you should sample fields at least once per week from emergence through maturity. There are several ways to sample soybeans for insect pests. The ground cloth and the sweep net are the two primary tools. Information you get by using either one of these sampling methods should be supplemented by visual examinations of plants for damage or insects.

Ground cloth — The ground cloth is the most accurate method for sampling insect pests in soybeans. A ground cloth is made of heavy white cloth 3 feet long on each side with a ½-inch to ¾-inch dowel rod attached to each side. To use the ground cloth, unroll it flat between two rows, then bend the plants on either side over the cloth, and shake them vigorously. The dislodged insects fall onto the cloth, where you can easily count them. Count any insect that has fallen at the base of the plant to the soil surface. This gives the number of insects per 6 feet of row (3 feet on each side of the cloth). Dividing by 6 gives the number of insects per foot of row.

Most soybean producers in Mississippi have changed their production practice from wide-row to narrow-row or drilled soybeans. Soybeans planted on narrow rows are difficult to sample using a ground cloth. In narrow-row soybeans, a sweep net is the preferred method for sampling.

Sweep net — A sweep net is a heavy cloth or canvas net on a strong 15-inch diameter steel hoop attached to a 3-foot wooden handle. To use it, you walk parallel to a row and swing the net briskly through the top third of the foliage. Each pass of the net through the foliage counts as one sweep and should be made 2½ to 3 feet apart down the row. Be sure to hold the net at an angle that lets dislodged insects fall into the net bag, and pass the net completely through the row. In soybeans planted on 36-inch rows or wider, sweep only one row. In narrow-row soybeans, let the normal arch of a sweep continue through the adjacent row. Then count insects as they are picked or fly from the net. Counts are usually expressed as number per 25 or 100 sweeps.

When to Apply Insecticides for Stem Feeders

The three most common stem-feeding pests are lesser cornstalk borers, cutworms, and three-cornered alfalfa hoppers. Apply insecticide from plant emergence to 10 inches in height when plant stand is being reduced below recommended plant populations. Use Table 1 on page 37 to determine best plant populations for soybeans grown in Mississippi.

When to Apply Insecticides for Foliage Feeders

Soybean plants can withstand as much as 35 percent foliage loss up to the blooming period. During blooming and when pods begin to form and fill out, any foliage loss of more than 20 percent will decrease yield. After the soybeans are mature and pods have fully expanded, a 35 percent loss of foliage will not usually reduce yield. Once fruiting begins, the soybean plant does not add new leaves, although existing leaves may expand. If plants are near the fruiting stage, don't let more foliage be removed if that will cause total defoliation to be more than 20 percent in pod-set or pod-filling.

It requires four or more foliage-feeding larvae ½-inch long or longer per foot of row to cause 20 percent defoliation. It requires eight or more foliage-feeding larvae ½-inch long or longer per foot of row to cause 35 percent defoliation. Apply insecticides when larval populations are at or above the number required to cause defoliation levels listed for the developmental stage of the plants. Apply insecticide if these defoliation levels have already occurred and larvae are still present.

Often several species of foliage-feeding caterpillars will be in a field at the same time. When several species of foliage-feeding caterpillars are present, treatment is necessary if any combination of foliage-feeding caterpillars meets or exceeds the threshold. Foliage-feeding caterpillars such as loopers, velvetbean caterpillars, and green cloverworms consume roughly the same amount of foliage per caterpillar regardless of species. However, the sweep net conversion ratio is about two times higher for velvetbean caterpillars and green cloverworms than for loopers because they are dislodged from the plant easier than loopers, making the catch efficiency of the sweep net greater for these two pests. Because of this, for a complex of foliage-feeding caterpillars, use a threshold of 300 caterpillars/100 sweeps before bloom, counting each looper twice, and 150 caterpillars/100 sweeps after bloom, counting each looper twice.

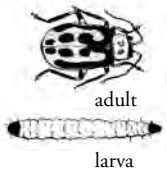
Bean Leaf Beetles

adult

larva

Insecticide	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Acres 1 Gallon or 1 Pound Dry Will Treat	PHI (days)	Comments
acephate (OP) Orthene 90S	0.83–1.1 lb	0.75–1.0	1.2–0.9	14	Do not harvest for hay or forage. Apply by air at 5–10 GPA and by ground at 10–50 GPA. Maximum AI per acre per season: 1.5 lb.
β-cyfluthrin (P) Baythroid XL 1EC	1.6–2.8 oz	0.0125–0.22	80–45.5	21	Extremely toxic to fish and aquatic invertebrates. Do not feed green forage within 15 days of harvest. Maximum AI per acre per season: 0.0875 lb. REI: 12 hours.
bifenthrin (P) Brigade 2EC Discipline 2EC	 2.1–6.4 oz 2.1–6.4 oz	 0.033–0.10 0.033–0.10	 61–20 61–20	 18 18	Do not apply more than one time per 30-day interval.
bifenthrin (P), imidacloprid (CN) Brigadier	3.8–6.1 oz	–	37–21	21	
bifenthrin (P), Z-cypermethrin (P) Hero 1.24EC	3.8–6.1 oz	–	33–21	21	
carbaryl (C) Sevin XLR 4L Sevin 4F	 16–32 oz 16–32 oz	 0.5–1.0 0.5–1.0	 8–4 8–4	 21 21	Toxic to bees and aquatic invertebrates. Maximum AI per acre per season: 6 lb.
chlorantranilipole (D), λ-cyhalothrin (P) Besiege	7–9 oz	–	18–14	30	
esfenvalerate (P) Asana XL 0.66EC	5.8 –9.6 oz	0.03–0.05	22–13	21	Do not feed or graze livestock on treated plants. Maximum AI per acre per season: 0.2 lb. REI: 12 hours.

Bean Leaf Beetles



adult

larva

Insecticide	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Acres 1 Gallon or 1 Pound Dry Will Treat	PHI (days)	Comments
γ-cyhalothrin (P) Declare 1.25EC	0.77–1.28 oz	0.0075–0.0125	166.7–100	21	Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. Maximum AI per acre per season: 0.06 lb.
imidacloprid (CN), β-cyfluthrin (P) Leverage 360	2.85 oz	–	45	21	
λ-cyhalothrin (P) Karate Z 2.08CS	0.96 –1.6 oz	0.015–0.025	138–83	30	Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. Maximum AI per acre per season: 0.03 lb.
permethrin (P) Ambush 2EC Pounce 3.2EC	6.4 oz 4 oz	0.1 0.1	20 32	60 60	Toxic to fish and aquatic organisms. Do not graze or feed soybean forage to livestock. Maximum AI per acre per season: 0.4 lb.
thiamethoxam (CN), λ-cyhalothrin (P) Endigo ZC	3.5–4.5 oz	–	37–28	30	
Z-cypermethrin (P) Mustang Max 0.8EC	2.8–4 oz	0.0175–0.025	45.7–32	21	Toxic to aquatic invertebrates. Maximum AI per acre per season: 0.125 lb.

The **BEAN LEAF BEETLE** adult is about ¼-inch long and may have three or four pairs of black spots along the inner edge of each wing cover. The outer margin of the wing cover may be banded in black. The color patterns of the adult can vary, but typically they are reddish to yellowish. The adult beetle damages the plant by chewing holes in the leaves and occasionally feeding on stems and pods. Adults spend the winter in or near old bean fields. In the spring, they feed on weeds and are attracted to early-planted soybeans. Adults lay eggs in the soil where newly emerged larvae feed on soybean roots and nitrogen-fixing nodules. The immature stage of the beetle is a slender, white larva about ½-inch long with a dark brown area at each end. CruiserMaxx and Gaucho 600 insecticide seed treatments provide good control approximatley 3 to 4 weeks after planting. In the Delta region of Mississippi, we have documented pyrethroid resistance in bean leaf beetle populations. Rotate classes of chemistry whenever possible.

THRESHOLD: If plants are not blooming or filling pods and beetles are present, treat when defoliation reaches 35 percent. If plants are blooming and filling pods and beetles are present, treat when defoliation reaches 20 percent or if 50 percent of the plants have pod feeding prior to R6. Insecticide termination for bean leaf beetle is R6 + 7 days (R6.5).

Three-Cornered Alfalfa Hoppers

Insecticide	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Acres 1 Gallon or 1 Pound Dry Will Treat	PHI (days)	Comments
acephate (OP) Orthene 90S	0.83–1.1 lb	0.75–1.0	1.2–0.9	14	Do not harvest for hay or forage. Apply by air at 5–10 GPA and by ground at 10–50 GPA. Maximum AI per acre per season: 1.5 lb.
β-cyfluthrin (P) Baythroid XL 1EC	1.6–2.8 oz	0.0125–0.022	80–45.5	21	Extremely toxic to fish and aquatic invertebrates. Maximum AI per acre per season: 0.0875 lb. REI: 12 hours.
bifenthrin (P), imidacloprid (CN) Brigadier	3.8–6.1 oz	–	37–21	21	
bifenthrin (P), Z-cypermethrin (P) Hero 1.24EC	3.8–6.1 oz	–	33–21	21	
chlorantranilipole (D), λ-cyhalothrin (P) Besiege	7–9 oz	–	18–14	30	
dimethoate (OP) Dimethoate 4EC	16 oz	0.5	8	21	
esfenvalerate (P) Asana XL 0.66EC	5.8–9.6 oz	0.03–0.05	22–13	21	Do not feed or graze livestock on treated plants. Maximum AI per acre per season: 0.2 lb. REI: 12 hours.
γ-cyhalothrin (P) Declare 1.25 EC	0.77–1.28 oz	0.0075–0.0125	166.7–100	21	Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. Maximum AI per acre per season: 0.03 lb.
imidacloprid (CN), β-cyfluthrin (P) Leverage 360	2.85 oz	–	45	21	
λ-cyhalothrin (P) Karate Z 2.08CS	0.96–1.6 oz	0.015–0.025	138–83	30	Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. Maximum AI per acre per season: 0.06 lb.
thiamethoxam (CN), λ-cyhalothrin (P) Endigo ZC	3.5–4.5 oz	–	37–28	30	
Z-cypermethrin (P) Mustang Max 0.8EC	2.8–4 oz	0.0175–0.025	45–32	21	Toxic to aquatic invertebrates. Maximum AI per acre per season: 0.125 lb.

The **THREE-CORNERED ALFALFA HOPPER** is a green triangular-shaped insect about ¼ inch long. Young hoppers or nymphs are green to light brown, wingless, and covered with spines. They feed around the stem of young plants, girdling the stem near the soil surface. Young seedling plants may lodge from the girdling. When bean pods are set, maturing plants may break over from early seedling damage. Both adults and nymphs will also feed on the petioles of leaves, blooms, and pods. Pod petiole feeding will cause pods to drop to the ground, reducing yield. Soybean plants are most susceptible to main stem girdling when plants are 10 inches or less in height. Once the plant is taller than 10 inches, the main stem is not the preferred feeding site, but the leaf, bloom, and pod petioles may be fed upon. Note: Often plants that have been girdled and do not lodge will produce normal yields. CruiserMaxx and Gaucho 600 insecticide seed treatments provide good control approximatley 3 to 4 weeks after planting.

THRESHOLD: For plants less than 10 inches tall, treat when plant stand is being reduced below recommended plant population. See Table 1 on page 37. For plants less than 6 inches tall, examine near the soil level for girdling. Bend the plants over, and look for hoppers. Threshold is 100 insects per 25 sweeps when plants are more than 10 inches tall. Insecticide termination for three-cornered alfalfa hoppers is when soybeans reach R6.

Cutworms

Insecticide	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Acres 1 Gallon or 1 Pound Dry Will Treat	PHI (days)	Comments
β-cyfluthrin (P) Baythroid XL 1EC	0.8–1.6 oz	0.0065–0.0125	154–80	21	Extremely toxic to fish and aquatic invertebrates. Maximum AI per acre per season: 0.0875 lb. REI: 12 hours.
bifenthrin (P) Brigade 2EC Discipline 2EC	 2.1–6.4 oz 2.1–6.4 oz	 0.033–0.10 0.033–0.10	 61–20 61–20	 18 18	Do not apply more than one time per 30-day interval.
esfenvalerate (P) Asana XL 0.66EC	5.8–9.6 oz	0.03–0.05	22–13	21	Do not feed or graze livestock on treated plants. Maximum AI per acre per season: 0.2 lb. REI: 12 hours.
γ-cyhalothrin (P) Declare 1.25 EC	0.77–1.28 oz	0.0075–0.0125	166.7–100	21	Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. Maximum AI per acre per season: 0.03 lb.
λ-cyhalothrin (P) Karate Z 2.08CS Warrior 1EC	 0.96 –1.6 oz 1.92–3.2 oz	 0.015–0.025 0.015–0.025	 138–83 66.7–40	 30 30	Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. Maximum AI per acre per season: 0.06 lb.
permethrin (P) Pounce 3.2EC Ambush 2EC	 4 oz 6.4 oz	 0.1 0.1	 32 20	 60 60	Toxic to fish and aquatic organisms. Do not graze or feed soybean forage to livestock. Maximum AI per acre per season: 0.4 lb.
Z-cypermethrin (P) Mustang Max 0.8EC	1.28–4 oz	0.008–0.025	100–32	21	Toxic to aquatic invertebrates. Maximum AI per acre per season: 0.125 lb.

CUTWORMS are rare pests of soybeans. Cutworms damage young soybean seedlings by cutting the plants off at the soil surface. Cutworms are about 1½ inch long when full grown. They hide under debris or clods during the hot part of the day. Cutworms are most active around dusk and dawn. They are often associated with grassy areas in the field. Burndown herbicides should be applied 3 to 4 weeks before planting. This will allow time for larvae already present feeding on winter vegetation to starve before soybean plants emerge.

THRESHOLD: Treat when plant stand is being reduced below the recommended plant population. See Table 1 on page 37. For best results, treat early in the morning or late in the evening when cutworms are active.

Grass-hoppers

Insecticide	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Acres 1 Gallon or 1 Pound Dry Will Treat	PHI (days)	Comments
acephate (OP) Orthene 90S	0.28–0.56 lb	0.25–0.5	3.6–1.8	14	Do not harvest for hay or forage. Apply by air at 5–10 GPA and by ground at 10–50 GPA. Maximum AI per acre per season: 1.5 lb.
β-cyfluthrin (P) Baythroid XL 1EC	2.0–2.8 oz	0.0155–0.022	60–45.5	21	Extremely toxic to fish and aquatic invertebrates. Maximum AI per acre per season: 0.0875 lb. REI: 12 hours.
bifenthrin (P) Brigade 2EC Discipline 2EC	 2.1–6.4 oz 2.1–6.4 oz	 0.033–0.10 0.033–0.10	 61–20 61–20	 18 18	Do not apply more than one time per 30-day interval.
diflubenzuron (IGR) Dimilin 2L	2 oz	0.031	64	21	Apply diflubenzuron (Dimilin) when most of the infesting grasshoppers have reached the second to third nymphal stage. Diflubenzuron will not control adult grasshoppers. Check label for additional comments.
dimethoate (OP) Dimethoate 4EC	16 oz	0.5	8	21	
esfenvalerate (P) Asana XL 0.66EC	5.8–9.6 oz	0.03–0.05	22–13	21	Do not feed or graze livestock on treated plants. Maximum AI per acre per season: 0.2 lb. REI: 12 hours.
γ-cyhalothrin (P) Declare 1.25EC	1.28–1.54 oz	0.0125–0.015	100–83	21	Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. Maximum AI per acre per season: 0.03 lb.
λ-cyhalothrin (P) Karate Z 2.08CS	1.6–1.92 oz	0.025–0.03	83–69	30	Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. Maximum AI per acre per season: 0.06 lb.
Z-cypermethrin (P) Mustang Max 0.8EC	3.2–4 oz	0.02–0.025	40–32	21	Toxic to aquatic invertebrates. Maximum AI per acre per season: 0.125 lb.

The two most common species of **GRASSHOPPERS** attacking soybeans in Mississippi are the redlegged and the differential grasshopper. Grasshoppers are mainly foliage feeders but will feed on pods. Females lay eggs in a cemented pod below the soil surface most often in grassy, undisturbed sites such as roadsides, prairies, field borders, or ditch banks. Nymphs go through five or six instars, depending on the species. Nymphs and adults are damaging. You can tell the difference between grasshopper nymphs and adults by the presence of wing pads (not fully developed wings). Weather is the most important factor influencing population densities. Grasshoppers are more numerous following drought, especially when it lasts for several years in a row. Populations usually build around field borders before spreading into the field.

THRESHOLD: If plants are not blooming or filling pods and grasshoppers are present, treat when defoliation reaches 35 percent. If plants are blooming and filling pods and grasshoppers are present, treat when defoliation reaches 20 percent or if 50 percent of the plants have pod feeding prior to R6. Insecticide termination for grasshoppers is R6 + 7 days (R6.5).

***Mow ditch before crop development to prevent grasshoppers from moving into the crop.**

Green Clover-worms

Insecticide	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Acres 1 Gallon or 1 Pound Dry Will Treat	PHI (days)	Comments
acephate (OP) Orthene 90S	0.83–1.1 lb	0.75–1.0	1.2–0.9	14	Do not harvest for hay or forage. Apply by air at 5–10 GPA and by ground at 10–50 GPA. Maximum AI per acre per season: 1.5 lb.
β-cyfluthrin (P) Baythroid XL 1EC	0.8–1.6 oz	0.0065–0.0125	154–80	21	Extremely toxic to fish and aquatic invertebrates. Maximum AI per acre per season: 0.0875 lb. REI: 12 hours.
bifenthrin (P) Brigade 2EC Discipline 2EC	 2.1–6.4 oz 2.1–6.4 oz	 0.033–0.10 0.033–0.10	 61–20 61–20	 18 18	Do not apply more than one time per 30 day interval.
bifenthrin (P), imidacloprid (CN) Brigadier	3.8–6.1 oz	–	37–21	21	
bifenthrin (P), Z-cypermethrin (P) Hero 1.24EC	3.8–6.1 oz	–	33–21	21	
carbaryl (C) Sevin XLR 4L Sevin 4F	 16–32 oz 16–32 oz	 0.5–1.0 0.5–1.0	 8–4 8–4	 21 21	Toxic to bees and aquatic invertebrates. Maximum AI per acre per season: 6 lb.
chlorantraniliprole (D) Prevathon 0.43SC	14–20 oz	0.047–0.067	9–6.4	1	Adjuvants such as methylated seed oil (MSO) may be added for improved coverage.
chlorantranilipole (D), λ-cyhalothrin (P) Besiege	7–9 oz	–	18–14	30	
diflubenzuron (IGR) Dimilin 2L	2–4 oz	0.031–0.0625	64–32	21	Apply Dimilin when larvae are small (<0.5 in) to give greater control and minimize insect damage to leaves. Consult label for more details.
esfenvalerate (P) Asana XL 0.66EC	2.9–5.8 oz	0.015–0.03	44–22	21	
γ-cyhalothrin (P) Declare 1.25 EC	0.77–1.28 oz	0.0075–0.0125	166.7–100	45	Do not feed or graze livestock on treated plants. Maximum AI per acre per season: 0.2 lb. REI: 12 hours.
imidacloprid (CN), β-cyfluthrin (P) Leverage 360	2.85 oz	–	45	21	
indoxacarb (OX) Steward 1.25EC	5.6 –11.3 oz	0.055–0.11	22.8–11.5	21	Toxic to fish, birds, and aquatic invertebrates. Do not feed or graze livestock on treated fields. Maximum AI per acre per season: 0.44 lb.
λ-cyhalothrin (P) Karate Z 2.08EC	0.96–1.6 oz	0.015–0.025	138–83	30	Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. Maximum AI per acre per season: 0.06 lb.

Green Clover-worms

Insecticide	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Acres 1 Gallon or 1 Pound Dry Will Treat	PHI (days)	Comments
methomyl (C) Lannate 2.4LV	12–24 oz	0.225–0.45	10.6–5.3	14	Toxic to fish, aquatic invertebrates, bees and wildlife. Maximum AI per acre per season: 1.35 lb.
methoxyfenozide (IGR) Intrepid 2F	4–8 oz	0.06–0.12	32–16	14	Drift and runoff may be toxic to sensitive aquatic vertebrates. Do not apply by air within 150 feet or by ground within 25 feet of surface water. Maximum AI per acre per season: 1 lb. (or 4 applications per acre per season). REI: 4 hours.
methoxyfenozide (IGR), spinetoram (SPN) Intrepid Edge	4–6.4 oz	0.06–0.12	32–20	28	Drift and runoff may be toxic to sensitive aquatic vertebrates. Do not apply by air within 150 feet or by ground within 25 feet of surface water. Maximum AI per acre per season: 1 lb. (or 4 applications per acre per season). REI: 4 hours.
permethrin (P) Ambush 2 EC Pounce 3.2 EC	 6.4 oz 4 oz	 0.1 0.1	 20 32	 60 60	Toxic to fish and aquatic organisms. Do not graze or feed soybean forage to livestock. Maximum AI per acre per season: 0.4 lb.
spinetoram (SPN) Radiant 1SC	2–4 oz	0.016–0.031	64–32	28	
spinosad (SPN) Blackhawk	1.1–2.2 oz	0.025–0.05	14.5–7.3	28	Toxic to bees and mollusks. Do not feed treated forage or hay to beef or dairy cattle. Maximum AI per acre per season: 0.186 lb. REI: 4 hours.
thiamethoxam (CN), λ-cyhalothrin (P) Endigo ZC	3.5–4.5 oz	–	37–28	30	
Z-cypermethrin (P) Mustang Max 0.8EC	2.8–4 oz	0.0175–0.025	45.7–32	21	Toxic to aquatic invertebrates. Maximum AI per acre per season: 0.125 lb.

The **GREEN CLOVERWORM** feeds on soybean foliage. This pest is uniformly pale green with white stripes running along the sides. Green cloverworms have the same looping motion as the soybean looper and look similar, but the body is not tapered toward the head. An identifying characteristic of the green cloverworm is that it has three pairs of abdominal prolegs. When disturbed, this insect becomes very active. It is attacked by a number of predators, parasites, and diseases and rarely requires chemical treatment.

THRESHOLD: IF NO DISEASED WORMS ARE PRESENT. **Drop cloth:** Prior to bloom, apply insecticide when eight or more worms ½-inch or longer are present per row foot. If plants are blooming and filling pods, apply insecticide when four or more worms ½-inch or longer are present per row foot. **Sweep net:** Prior to bloom, treat when 75 worms ½-inch or longer per 25 sweeps are present. After bloom, treat when 38 worms ½-inch or longer per 25 sweeps are present. **Defoliation:** Treat when 35 percent foliage loss has occurred and worms ½-inch or longer are present prior to bloom or when 20 percent foliage loss has occurred and worms ½-inch or longer are present after bloom. **Insecticide termination:** Terminate insecticide applications for green cloverworms at R6 + 7 days (R6.5).

Soybean Loopers

Insecticide	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Acres 1 Gallon or 1 Pound Dry Will Treat	PHI (days)	Comments
chlorantraniliprole (D) Prevathon 0.43SC	14–20 oz	0.047–0.067	9–6.4	1	Erratic and/or less than satisfactory control of soybean looper infestations may be observed. If retreatment is required, use a product from a different class.
chlorantranilipole (D), λ-cyhalothrin (P) Besiege	10 oz	–	12.8	30	Erratic and/or less than satisfactory control of soybean looper infestations may be observed. If retreatment is required, use a product from a different class.
indoxacarb (OX) Steward 1.25EC	5.6–11.3 oz	0.055–0.11	22.8–11.5	21	Toxic to fish, birds, and aquatic invertebrates. Do not feed or graze livestock on treated fields. Maximum AI per acre per season: 0.44 lb.
methoxyfenozide (IGR) Intrepid 2F	4–8 oz	–	32–16	14	Drift and runoff may be toxic to sensitive aquatic vertebrates. Do not apply by air within 150 feet or by ground within 25 feet of surface water. Maximum AI per acre per season: 1 lb (or 4 applications per acre per season). REI: 4 hours.
methoxyfenozide (IGR), spinetoram (SPN) Intrepid Edge	4–6.4 oz	–	32–20	28	Drift and runoff may be toxic to sensitive aquatic vertebrates. Do not apply by air within 150 feet or by ground within 25 feet of surface water. Maximum AI per acre per season: 1 lb (or 4 applications per acre per season). REI: 4 hours.
spinetoram (SPN) Radiant 1SC	2–4 oz	0.016–0.031	64–32	28	
spinosad (SPN) Blackhawk	1.1–2.2 oz	0.025–0.05	14.5–7.3	28	Toxic to bees and mollusks. Do not feed treated forage or hay to beef or dairy cattle. Maximum AI per acre per season: 0.186 lb.

SOYBEAN LOOPERS are migratory insects that fly in from Central and South America each year and infest soybeans mid- to late-season in Mississippi. Soybean loopers are leaf feeders and can cause extensive defoliation when present in high numbers. Soybean loopers generally start feeding in the middle of the plant canopy and move upward. The larva has a characteristic looping movement when crawling. It is light green, with white lines running the length of the body on the sides and top. The body tapers toward the head, and the larva has two pairs of abdominal prolegs. The soybean looper has developed resistance to some insecticides but is often controlled by disease organisms.

THRESHOLD: IF NO DISEASED WORMS ARE PRESENT. **Drop cloth:** Prior to bloom, apply insecticide when eight or more worms ½-inch or longer are present per row foot. If plants are blooming and filling pods, apply insecticide when four or more worms ½-inch or longer are present per row foot. **Sweep net:** Prior to bloom, treat when 38 worms ½-inch or longer per 25 sweeps are present. After bloom, treat when 19 worms ½-inch or longer per 25 sweeps are present. **Defoliation:** Treat when 35 percent foliage loss has occurred and worms ½-inch or longer are present prior to bloom or when 20 percent foliage loss has occurred and worms ½-inch or longer are present after bloom. **Insecticide termination:** Terminate insecticide applications for soybean loopers at R6 + 7 days (R6.5).

Velvetbean Caterpillars

Insecticide	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Acres 1 Gallon or 1 Pound Dry Will Treat	PHI (days)	Comments
acephate (OP) Orthene 90S	0.83–1.1 lb	0.75–1.0	1.2–0.9	14	Do not harvest for hay or forage. Apply by air at 5–10 GPA and by ground at 10–50 GPA. Maximum AI per acre per season: 1.5 lb.
β-cyfluthrin (P) Baythroid XL 1EC	1.6–2.8 oz	0.0125–0.022	80–45.5	21	Extremely toxic to fish and aquatic invertebrates. Do not feed green forage within 15 days of harvest. Maximum AI per acre per season: 0.0875 lb.
bifenthrin (P) Brigade 2EC Discipline 2EC	2.1–6.4 oz 2.1–6.4 oz	0.033–0.10 0.033–0.10	61–20 61–20	18 18	Do not apply more than one time per 30-day interval.
bifenthrin (P), imidacloprid (CN) Brigadier	3.8–6.1 oz	–	37–21	21	
bifenthrin (P), Z-cypermethrin (P) Hero 1.24EC	3.8 – 6.1 oz	–	33–21	21	
chlorantraniliprole (D) Prevathon 0.43SC	14–20 oz	0.047–0.067	9–6.4	1	Adjuvants such as methylated seed oil (MSO) may be added for improved coverage.
chlorantranilipole (D), λ-cyhalothrin (P) Besiege	7–9 oz	–	18–14	28	
diflubenzuron (IGR) Dimilin 2L	2–4 oz	0.031–0.0625	64–32	21	Diflubenzuron (Dimilin) should be applied when larvae are small (<0.5 in) to give greater control and minimize insect damage to leaves. The lower rate of diflubenzuron may be used to prevent damage from velvet-bean caterpillars when vegetative growth is completed and pod formation begins. Consult label for more details. Toxic to aquatic invertebrates. Do not make more than two applications per season.
esfenvalerate (P) Asana XL 0.66EC	2.9–5.8 oz	0.015–0.03	44–22	21	Do not feed or graze livestock on treated plants. Maximum AI per acre per season: 0.2 lb. REI: 12 hours.
γ-cyhalothrin (P) Declare 1.25EC	0.77–1.28 oz	0.0075–0.0125	166.7–100	21	Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. Maximum AI per acre per season: 0.03 lb.
imidacloprid (CN), β-cyfluthrin (P) Leverage 360	2.85 oz	–	45	21	
λ-cyhalothrin (P) Karate Z 2.08CS	0.96 –1.6 oz	0.015–.025	138–83	30	Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. Maximum AI per acre per season: 0.06 lb.

Velvetbean Caterpillars

Insecticide	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Acres 1 Gallon or 1 Pound Dry Will Treat	PHI (days)	Comments
methomyl (C) Lannate 2.4LV	12–24 oz	0.225–0.45	10.6–5.3	14	Toxic to fish, aquatic invertebrates, bees, and wildlife. Do not graze forage within 3 days and hay within 12 days of last application. Maximum AI per acre per season: 1.35 lb.
methoxyfenozide (IGR) Intrepid 2F	4–8 oz	0.06–0.12	32–16	14	Drift and runoff may be toxic to sensitive aquatic vertebrates. Do not apply by air within 150 feet or by ground within 25 feet of surface water. Maximum AI per acre per season: 1 lb. AI (or 4 applications per acre per season). REI: 4 hours.
methoxyfenozide (IGR), spinetoram (SPN) Intrepid Edge	4–6.4 oz	–	32–20	28	
permethrin (P) Ambush 2EC Pounce 3.2EC	6.4 oz 4 oz	0.1 0.1	20 32	60 60	Toxic to fish and aquatic organisms. Do not graze or feed soybean forage to livestock. Maximum AI per acre per season: 0.4 lb.
spinetoram (SPN) Radiant 1SC	2–4 oz	0.016–0.031	64–32	28	
spinosad (SPN) Blackhawk	1.1–2.2 oz	0.025–0.05	14.5–7.3	28	Toxic to bees and mollusks. Do not feed treated forage or hay to beef or dairy cattle. Maximum AI per acre per season: 0.186 lb.
thiamethoxam (CN), λ-cyhalothrin (P) Endigo ZC	3.5–4.5 oz	–	37–28	30	
Z-cypermethrin (P) Mustang Max 0.8EC	2.8–4 oz	0.0175–0.025	45.7–32	21	Toxic to aquatic invertebrates. Maximum AI per acre per season: 0.125 lb.

VELVETBEAN CATERPILLAR larvae vary from light to dull green, with white lines running the length of the body. The lines on the side of the body are usually much broader than those of the green cloverworm or looper. Velvetbean caterpillars have four pairs of abdominal prolegs and are about 1½ inch long when full grown. When disturbed, the velvetbean caterpillar becomes very active and wriggles about like the green cloverworm. Velvetbean caterpillars are voracious feeders, usually starting at the top of the plant and feeding downward causing complete defoliation if not controlled. Velvetbean caterpillars are migratory insects flying in from Central and South America each year. Velvetbean caterpillars are primarily foliage feeders but will feed on petioles, causing pods to drop to the ground after a significant loss of foliage. Velvetbean caterpillars generally are late-season pests of soybeans in Mississippi.

THRESHOLD: IF NO DISEASED WORMS ARE PRESENT. **Drop cloth:** Prior to bloom, apply insecticide when eight or more worms ½-inch or longer are present per row foot. If plants are blooming and filling pods, apply insecticide when four or more worms ½-inch or longer are present per row foot. **Sweep net:** Prior to bloom, treat when 75 worms ½-inch or longer per 25 sweeps are present. After bloom, treat when 38 worms ½-inch or longer per 25 sweeps are present. **Defoliation:** Treat when 35 percent foliage loss has occurred and worms ½-inch or longer are present prior to bloom or when 20 percent foliage loss has occurred and worms ½-inch or longer are present after bloom. **Insecticide termination:** Terminate insecticide applications for velvetbean caterpillars at R6 + 7 days (R6.5).

Bollworms (Corn Earworms or "Podworms") and Tobacco Budworms

Insecticide	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Acres 1 Gallon or 1 Pound Dry Will Treat	PHI (days)	Comments
chlorantranilipole (D) Prevathon 043SC	14–20 oz	0.047–0.067	9–6.4	1	Adjuvants such as methylated seed oil (MSO) may be added for improved coverage.
chlorantranilipole (D), λ-cyhalothrin (P) Besiege	7–9 oz	–	18–14	30	
indoxacarb (OX) Steward 1.25EC	5.6 –11.3 oz	0.055–0.11	22.8–11.5	21	Toxic to fish, birds, and aquatic invertebrates. Do not feed or graze livestock on treated fields. Maximum AI per acre per season: 0.44 lb.
methomyl (C) Lannate 2.4LV	12–24 oz	0.225–0.45	10.6–5.3	14	Toxic to fish, aquatic invertebrates, bees and wildlife. Do not graze forage within 3 days and hay within 12 days of last application. Maximum AI per acre per season: 1.35 lb. Use .45 lb. AI of methomyl for high populations of corn earworms.
methoxyfenozide (IGR), spinetoram (SPN) Intrepid Edge	4–6.4 oz	–	32–20	28	
HaNPV Heligen	1.0–1.6 oz	–	128–80	0	1.0 oz for small larvae (≤0.3 inch) with ≤10/25 sweeps. 1.6 oz for medium larvae (≤0.5 inch) with ≤10/25 sweeps. Do not apply to larvae >0.5 inch. Larvae stop feeding within 1–3 days and die within 3–9 days depending upon temperature. Larvae that die from HaNPV will release huge amounts of virus to cause secondary infection.
spinetoram (SPN) Radiant 1SC	2–4 oz	0.016–0.031	64–32	28	
spinosad (SPN) Blackhawk	1.7–2.2 oz	0.038–0.05	9.4–7.3	28	Toxic to bees and mollusks. Do not feed treated forage or hay to beef or dairy cattle. Maximum AI per acre per season: 0.186 lb.

The **BOLLWORM OR CORN EARWORM**, found on cotton and corn, is commonly referred to as the "podworm" in soybeans. It varies in color from light green to pink, dark brown, or rust, with pale lines running the length of the body. It has four pairs of abdominal prolegs and is about 1¼ inch long when fully grown. The worm usually curls up when knocked to the ground. Infestations occur most often during the reproductive stages of the soybean plant. In high numbers, this insect can cause significant yield loss.

THRESHOLD: Before bloom, treat on 35 percent defoliation level. If you use a drop cloth to detect bollworms, threshold is three worms per foot of row after bloom. With a sweep net, threshold is nine worms per 25 sweeps after bloom. For dynamic thresholds that account for price received and control costs, use Table 1 on page 44.

*Bollworms or podworms are difficult to sample with the sweep net. Sweep deeper into the canopy, using extra force; supplement with visual check for pod or bloom feeding.

Table 1. Economic thresholds for corn earworm larvae based on sweep net sampling.

	Larvae/25 sweeps				
	Control Costs ($/acre)[1]				
Crop value ($/bu)	10	15	20	25	30
6	7.4	11.0	14.7	18.4	22.1
7	6.3	9.5	12.6	15.8	18.9
8	5.5	8.3	11.0	13.8	16.5
9	4.9	7.4	9.8	12.3	14.7
10	4.4	6.6	8.8	11.0	13.2
12	3.7	5.5	7.4	9.2	11.0
13	3.4	5.1	6.8	8.5	10.2

Based on early-planted Maturity Group IV soybean varieties with >50 bu/acre yield potential.
[1]Including application costs.

Table 2. Economic thresholds for corn earworm larvae based on drop cloth sampling.

	Larvae/row foot				
	Control Costs ($/acre)[1]				
Crop value ($/bu)	10	15	20	25	30
6	1.0	1.5	2.0	2.4	2.9
7	0.8	1.3	1.7	2.1	2.5
8	0.7	1.1	1.5	1.8	2.2
9	0.7	1.0	1.3	1.6	2.0
10	0.6	0.9	1.2	1.5	1.8
12	0.5	0.7	1.0	1.2	1.5
13	0.5	0.7	0.9	1.1	1.4

Based on early-planted Maturity Group IV soybean varieties with >50 bu/acre yield potential.
[1]Including application costs.

Saltmarsh Caterpillars

Insecticide	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Acres 1 Gallon or 1 Pound Dry Will Treat	PHI (days)	Comments
β-cyfluthrin (P) Baythroid XL 1EC	1.6–2.8 oz	0.0125–0.022	80–45.5	45	Extremely toxic to fish and aquatic invertebrates. Do not feed green forage within 15 days of harvest. Maximum AI per acre per season: 0.0875 lb.
bifenthrin (P) Brigade 2EC Discipline 2EC	 2.1–6.4 oz 2.1–6.4 oz	 0.033–0.10 0.033–0.10	 61–20 61–20	 18 18	Extremely toxic to fish and aquatic invertebrates. Do not feed green forage within 15 days of harvest. Maximum AI per acre per season: 0.0875 lb.
carbaryl (C) Sevin XLR 4L Sevin 4F	 48 oz 48 oz	 1.5 1.5	 2.7 2.7	 21 21	Toxic to bees and aquatic invertebrates. Maximum AI per acre per season: 6 lb. Do not apply more than one time per 30-day interval. Do not apply within 18 days of harvest.
chlorantraniliprole (D) Prevathon 0.43SC	14–20 oz	0.047–0.067	9–6.4	1	Adjuvants such as methylated seed oil (MSO) may be added for improved coverage.
chlorantranilipole (D), λ-cyhalothrin (P) Besiege	5–8 oz	–	25.6–16	30	
esfenvalerate (P) Asana XL 0.66EC	2.9–5.8 oz	0.015–0.03	44–22	21	Do not feed or graze livestock on treated plants. Maximum AI per acre per season: 0.2 lb.
γ-cyhalothrin (P) Declare 1.25 EC	0.77–1.28 oz	0.0075–0.0125	166.7–100	21	Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. Maximum AI per acre per season: 0.03 lb.

Saltmarsh Caterpillars

Insecticide	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Acres 1 Gallon or 1 Pound Dry Will Treat	PHI (days)	Comments
λ-cyhalothrin (P) Karate Z 2.08CS	0.96 –1.6 oz	0.015–0.025	138–83	30	Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. Maximum AI per acre per season: 0.06 lb.
methomyl (C) Lannate 2.4LV	12–24 oz	0.3–0.45	8–5.3	14	Toxic to fish, aquatic invertebrates, bees, and wildlife. Do not graze forage within 3 days and hay within 12 days of last application. Maximum AI per acre per season: 1.35 lb. Use .45 lb AI of methomyl on heavy populations of saltmarsh caterpillar.
methoxyfenozide (IGR) Intrepid 2F	4–8 oz	0.06–0.12	32–16	14	Drift and runoff may be toxic to sensitive aquatic vertebrates. Do not apply by air within 150 feet or by ground within 25 feet of surface water. Maximum AI per acre per season: 1 lb (or 4 applications per acre per season).
methoxyfenozide (IGR), spinetoram (SPN) Intrepid Edge	4–6.4 oz	–	32–20	28	
permethrin (P) Ambush 2EC Pounce 3.2EC	6.4 oz 4 oz	0.1 0.1	20 32	60 60	Toxic to fish and aquatic organisms. Do not graze or feed soybean forage to livestock. Maximum AI per acre per season: 0.4 lb.
spinetoram (SPN) Radiant 1SC	2–4 oz	0.016–0.031	64–32	28	
spinosad (SPN) Blackhawk	1.7–2.2 oz	0.038–0.05	9.4–7.3	28	Toxic to bees and mollusks. Do not feed treated forage or hay to beef or dairy cattle. Maximum AI per acre per season: 0.186 lb.
Z-cypermethrin (P) Mustang Max 0.8E	1.8–4 oz	0.008–0.025	100–32	21	Toxic to aquatic invertebrates. Maximum AI per acre per season: 0.125 lb.

SALTMARSH CATERPILLARS (often called "woolly worms") feed in the larval stage on soybean foliage. Eggs are laid in masses on the soybean leaves. Infestations often start around field borders. You can easily recognize this caterpillar by the thick hair that covers the body. Color may be black, rust, or yellowish-orange. This pest seldom reaches treatable levels, but large numbers can cause extensive defoliation if left untreated.

THRESHOLD: IF NO DISEASED WORMS ARE PRESENT. **Defoliation:** Treat when 35 percent foliage loss has occurred and worms ½-inch or longer are present prior to bloom or when 20 percent foliage loss has occurred and worms ½-inch or longer are present after bloom. **Insecticide termination:** Terminate insecticide applications for saltmarsh caterpillars at R6 + 7 days (R6.5).

Beet Army-worms

Insecticide	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Acres 1 Gallon or 1 Pound Dry Will Treat	PHI (days)	Comments
chlorantranilipole (D) Prevathon 0.43SC	14–20 oz	0.047–0.067	9–6.4	1	Adjuvants such as methylated seed oil (MSO) may be added for improved coverage.
chlorantranilipole (D), λ-cyhalothrin (P) Besiege	7–9 oz	–	18–14	30	
indoxacarb (OX) Steward 1.25EC	5.6–11.3 oz	0.055–0.11	22.8–11.5	21	
methoxyfenozide (IGR) Intrepid 2F	4–8 oz	0.06–0.12	64–32	14	Drift and runoff may be toxic to sensitive aquatic vertebrates. Do not apply by air within 150 feet or by ground within 25 feet of surface water. Maximum AI per acre per season: 1 lb (or 4 applications per acre per season).
methoxyfenozide (IGR), spinetoram (SPN) Intrepid Edge	4–6.4 oz	–	32–20	14	
spinetoram (SPN) Radiant 1SC	2–4 oz	0.016–0.031	64–32	28	
spinosad (SPN) Blackhawk	1.7–2.2 oz	0.038–0.05	9.4–7.3	28	Toxic to bees and mollusks. Do not feed treated forage or hay to beef or dairy cattle. Maximum AI per acre per season: 0.186 lb.

The **BEET ARMYWORM** prefers to feed on foliage of seedling soybean plants. However, if they are present during fruiting, they will feed on bloom buds, blooms, and small pods. The larva has a small black spot on each side of the second body segment. This small black spot is directly above the second pair of true legs behind the head. The beet armyworm has four pairs of abdominal prolegs and a smooth body. The larvae are about 1¼ inch long when fully grown. They generally curl up when knocked to the ground. Color may vary from grayish-green to near black with pale lines running the length of the body. Beneficial insects and diseases usually control this pest. Beet armyworms are migratory insects that generally attack soybeans in Mississippi mid- to late-season.

THRESHOLD: IF NO DISEASED WORMS ARE PRESENT. **Defoliation:** Treat when 35 percent foliage loss has occurred and worms ½-inch or longer are present prior to bloom or when 20 percent foliage loss has occurred and worms ½-inch or longer are present after bloom. **Insecticide termination:** Terminate insecticide applications for beet armyworms at R6 + 7 days (R6.5).

Fall Armyworms

Insecticide	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Acres 1 Gallon or 1 Pound Dry Will Treat	PHI (days)	Comments
acephate (OP) Orthene 90S	0.83–1.1 lb	0.75–1.0	1.2–0.9	14	Do not harvest for hay or forage. Apply by air at 5–10 GPA and by ground at 10–50 GPA. Maximum AI per acre per season: 1.5 lb.
β-cyfluthrin (P) Baythroid XL 1EC	1.6–2.8 oz	0.0125–0.022	80–45	21	Extremely toxic to fish and aquatic invertebrates. Do not feed green forage within 15 days of harvest. Maximum AI per acre per season: 0.0875 lb. Do not apply more than one time per 30-day interval. Do not apply within 18 days of harvest.
bifenthrin (P) Brigade 2EC Discipline 2EC	 2.1–6.4 oz 2.1–6.4 oz	 0.033–0.1 0.033–0.1	 61–20 61–20	 18 18	Do not apply more than one time per 30-day interval. Do not apply within 18 days of harvest.
chlorantranilipole (D) Prevathon 0.43SC	14–20 oz	0.047–0.067	9–6.4	1	Adjuvants such as methylated seed oil (MSO) may be added for improved coverage.
chlorantranilipole (D), λ-cyhalothrin (P) Besiege	7–9 oz	–	18–14	30	
γ-cyhalothrin (P) Declare 1.25 EC	1.28–1.54 oz	0.0125–0.015	100–83	21	Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. Maximum AI per acre per season: 0.06 lb.
indoxacarb (OX) Steward 1.25EC	5.6 –11.3 oz	0.55–0.11	22.8–11.5	21	Toxic to fish, birds, and aquatic invertebrates. Do not feed or graze livestock on treated fields. Maximum AI per acre per season: 0.44 lb. First and second instars only.
λ-cyhalothrin (P) Karate Z 2.08CS	1.6–1.92 oz	0.025–0.03	83–69	30	Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. Do not apply within 45 days of harvest. Maximum AI per acre per season: 0.03 lb.
methoxyfenozide (IGR) Intrepid 2F	4–8 oz	0.06–0.12	32–16	28	Drift and runoff may be toxic to sensitive aquatic vertebrates. Do not apply by air within 150 feet or by ground within 25 feet of surface water. Maximum AI per acre per season: 1 lb. (or 4 applications per acre per season).
methoxyfenozide (IGR), spinetoram (SPN) Intrepid Edge	4–6.4 oz	–	32–20	14	
spinetoram (SPN) Radiant 1SC	2–4 oz	0.016–0.031	64–32	28	

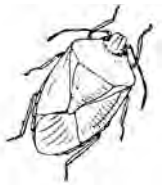
Fall Armyworms

Insecticide	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Acres 1 Gallon or 1 Pound Dry Will Treat	PHI (days)	Comments
spinosad (SPN) Blackhawk	1.7–2.2 oz	0.038–0.052	9.4–7.3	28	Toxic to bees and mollusks. Do not feed treated forage or hay to beef or dairy cattle. Maximum AI per acre per season: 0.186 lb.
Z-cypermethrin (P) Mustang Max 0.8EC	3.2–4 oz	0.02–0.025	40–32	21	Toxic to aquatic invertebrates. Maximum AI per acre per season: 0.125 lb.

FALL ARMYWORMS are occasional pests of soybeans that can be extremely damaging if present in high numbers. Fall armyworms will damage all stages of soybeans. In the early stages, they can act similar to cutworms by cutting seedlings off at ground level. Later stages will feed primarily on foliage and pods. The larva has a characteristic inverted "Y" on the head capsule and is brown to dark green. Eggs are laid in masses and are covered with gray scales from the female moth.

THRESHOLD: Treat young soybeans when plant stand is being reduced below the recommended plant population. See Table 1 on page 44. If plants are not blooming or filling pods and larvae are present, apply insecticide if defoliation reaches 35 percent. If plants are blooming and filling pods and larvae are present, apply insecticide if defoliation reaches 20 percent.

Green and Southern Green Stink Bugs



Insecticide	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Acres 1 Gallon or 1 Pound Dry Will Treat	PHI (days)	Comments
acephate (OP) Orthene 90S	0.56–1.1 lb	0.56–1.1	0.5–1.0	14	Do not harvest for hay or forage. Apply by air at 5–10 GPA and by ground at 10–50 GPA. Maximum AI per acre per season: 1.5 lb.
β-cyfluthrin (P) Baythroid XL 1EC	1.6–2.8 oz	0.0125–0.022	80–45.5	21	Extremely toxic to fish and aquatic invertebrates. Do not feed green forage within 15 days of harvest. Maximum AI per acre per season: 0.0875 lb.
bifenthrin (P) Brigade 2EC Discipline 2EC	 2.1–6.4 oz 2.1–6.4 oz	 0.033–0.10 0.033–0.10	 61–20 61–20	 18 18	Do not apply more than one time per 30-day interval. Do not apply within 18 days of harvest.
bifenthrin (P), imidacloprid (CN) Brigadier	3.8–6.1 oz	–	37–21	21	
bifenthrin (P), Z-cypermethrin (P) Hero 1.24EC	3.8–6.1 oz	–	33–21	21	
chlorantranilipole (D), λ-cyhalothrin (P) Besiege	7–9 oz	–	18–14	30	
esfenvalerate (P) Asana XL 0.66EC	5.8–9.6 oz	0.03–0.05	22–13	21	Do not feed or graze livestock on treated plants. Maximum AI per acre per season: 0.2 lb.
γ-cyhalothrin (P) Declare 1.25EC	1.28–1.54 oz	0.0125–0.015	100–83	21	Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. Do not apply within 45 days of harvest. Maximum AI per acre per season: 0.03 lb.

Green and Southern Green Stink Bugs

Insecticide	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Acres 1 Gallon or 1 Pound Dry Will Treat	PHI (days)	Comments
imidacloprid (CN), β-cyfluthrin (P) Leverage 360	2.85 oz	–	45	21	
λ-cyhalothrin (P) Karate Z 2.08CS	1.6–1.92 oz	0.025–0.03	83–69	30	Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. Maximum AI per acre per season: 0.06 lb.
thiamethoxam (CN), λ-cyhalothrin (P) Endigo ZC	3.5–4.5 oz	–	37–28	30	
Z-cypermethrin (P) Mustang Max 0.8EC	3.2–4 oz	0.02–0.025	40–32	21	Toxic to aquatic invertebrates. Maximum AI per acre per season: 0.125 lb.

THRESHOLD: If you use a drop cloth, the threshold is one bug per foot of row. If you are using a sweep net, the threshold is nine bugs per 25 sweeps. Count only stink bug nymphs larger than ¼ inch. When soybeans reach the R6 growth stage, treat only populations of 20 stink bugs per 25 sweeps or higher, and terminate stink bug applications at R6+7 days (R6.5). Read label to determine the preharvest interval.

Brown Stink Bugs

Insecticide	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Acres 1 Gallon or 1 Pound Dry Will Treat	PHI (days)	Comments
acephate (OP) Orthene 90S	0.56–1.1 lb	0.56–1.1	0.5–1.0	14	Do not harvest for hay or forage. Apply by air at 5–10 GPA and by ground at 10–50 GPA. Maximum AI per acre per season: 1.5 lb.
bifenthrin (P) Brigade 2EC Discipline 2EC	2.1–6.4 oz 2.1–6.4 oz	0.033–0.10 0.033–0.10	61–20 61–20	18 18	Do not apply more than one time per 30-day interval. Do not apply within 18 days of harvest.
bifenthrin (P), imidacloprid (CN) Brigadier	3.8–6.1 oz	–	37–21	21	
bifenthrin (P), Z-cypermethrin (P) Hero 1.24EC	3.8–6.1 oz	–	33–21	21	
thiamethoxam (CN), λ-cyhalothrin (P) Endigo ZC	3.5–4.5 oz	–	37–28	30	

THRESHOLD: If you use a drop cloth, the threshold is one bug per foot of row. If you are using a sweep net, the threshold is nine bugs per 25 sweeps. Count only stink bug nymphs larger than ¼ inch. Brown stink bugs are more difficult to control with pyrethroid insecticides. When soybeans reach the R6 growth stage, treat only populations of 20 stink bugs per 25 sweeps or higher, and terminate stink bug applications at R6+7 days (R6.5). Read label to determine the preharvest interval.

Redbanded Stink Bugs

Insecticide	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Acres 1 Gallon or 1 Pound Dry Will Treat	PHI (days)	Comments
acephate (OP) Orthene 90S	0.56–1.1 lb	0.56–1.1	0.5–1.0	14	Do not harvest for hay or forage. Apply by air at 5–10 GPA and by ground at 10–50 GPA. Maximum AI per acre per season: 1.5 lb.
bifenthrin (P) Brigade 2EC Discipline 2EC	 2.1–6.4 oz 2.1–6.4 oz	 0.033–0.10 0.033–0.10	 61–20 61–20	 18 18	Do not apply more than one time per 30-day interval. Do not apply within 18 days of harvest.
clothianidin (CN) Belay 2.13	3–6 oz	0.05–0.1	43–21	21	
thiamethoxam (CN), λ-cyhalothrin (P) Endigo ZC	3.5–4.5 oz	–	37–28	30	
Tank Mix Options with Bifenthrin					
acephate (OP) Orthene 90S	0.56–1.1 lb	0.56–1.1	0.5–1.0	14	Do not harvest for hay or forage. Apply by air at 5–10 GPA and by ground at 10–50 GPA. Maximum AI per acre per season: 1.5 lb. Tank mix with 5.12 fl oz of bifenthrin (Brigade 2EC or generic) per acre. Tank mixes have proven to give superior control.
clothianidin (CN) Belay 2.13	3–6 oz	0.05–0.10	42.7	21	
imidacloprid (CN) Imidacloprid 4F Imidacloprid 2F	 1.5 oz 3 oz	 0.047 0.047	 85.3 42.7	 21 21	

THRESHOLD: Treat when numbers reach four bugs per 25 sweeps or two bugs per 6 feet of row with a drop cloth. **Between R6.5 and R7:** Treat when populations reach or exceed 10 bugs per 25 sweeps. Treatment for redbanded stink bugs can be terminated at R7 unless adverse environmental conditions exist that would promote poor seed quality. Redbanded stink bugs are capable of causing much more damage than green, brown, or southern green stink bugs. Damage from this pest can prevent plants and seed from properly maturing and can render seed unmarketable. Redbanded stink bugs can also damage soybeans much later than other stink bugs.

Kudzu Bugs

Insecticide	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Acres 1 Gallon or 1 Pound Dry Will Treat	PHI (days)	Comments
acephate (OP) Orthene 90S	0.83–1.1 lb	0.75–1.0	1.2–0.9	14	
bifenthrin (P) Brigade 2EC Discipline 2EC Fanfare 2E	 5–6.4 oz 5–6.4 oz 5–6.4 oz	 0.078–0.1 0.078–0.1 0.078–0.1	 26–20 26–20 26–20	 18 18 18	
γ-cyhalothrin (P) Declare 1.25	1.28–1.54 oz	0.0125–0.015	100–83	21	
λ-cyhalothrin (P) Karate 2.08	1.92 oz	0.031	67	30	
Z-cypermethrin (P) Mustang Max 0.8EC	4 oz	0.025	32	21	

KUDZU BUGS originated in Asia and are an invasive pest of soybeans. Kudzu bugs have piercing-sucking mouthparts and preferentially feed on stems and petioles of soybean plants. Damage is caused when high numbers suck down the general vigor of the plant.

THRESHOLD: During the vegetative stages, treat when kudzu bugs average five bugs per plant. Often, only field borders will require treatment. During the reproductive stages, treat when you average 25 nymphs per 25 sweeps.

Blister Beetles

Insecticide	Amount of Formulation per Acre	Pounds Active Ingredient per Acre	Acres 1 Gallon or 1 Pound Dry Will Treat	PHI (days)	Comments
β-cyfluthrin (P) Baythroid XL 1EC	1.6–2.8 oz	0.0125–0.022	80–45.5	21	Extremely toxic to fish and aquatic invertebrates. Do not feed green forage within 15 days of harvest. Maximum AI per acre per season: 0.0875 lb.
carbaryl (C) Sevin XLR 4L Sevin 4F	16–32 oz 16–32 oz	0.5–1.0 0.5–1.0	8–4 8–4	21 21	Toxic to bees and aquatic invertebrates. Maximum AI per acre per season: 6 lb. Toxic to bees. Maximum AI per acre per season: 6 lb.
γ-cyhalothrin (P) Declare 1.25EC	1.28–1.54 oz	0.0125–0.015	100–83	21	Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. Maximum AI per acre per season: 0.03 lb.
λ-cyhalothrin (P) Karate Z 2.08CS	1.6–1.92 oz	0.025–0.03	83–69	30	Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. Do not apply within 45 days of harvest. Maximum AI per acre per season: 0.06 lb.
Z-cypermethrin (P) Mustang Max 0.8EC	2.8–4 oz	0.0175–0.025	45.7–32	21	Toxic to aquatic invertebrates. Maximum AI per acre per season: 0.125 lb.

BLISTER BEETLES feed mainly on the leaves of soybean plants. Blister beetles may be grayish, black, or orange with stripes and are about ¾-inch long. They are rarely a problem in soybeans, but large numbers can cause extensive defoliation. Some species will congregate in very large numbers within the soybean field, but damage is usually isolated to small patch-like areas. The larvae of the blister beetle can be considered a beneficial insect. First instar larvae are very mobile and search out and feed on grasshopper eggs.

THRESHOLD: If plants are not blooming or filling pods and beetles are present, apply insecticide if defoliation reaches 35 percent. If plants are blooming and filling pods and beetles are present, apply insecticide if defoliation reaches 20 percent.

Table 1. Suggested plant populations for soybeans planted in Mississippi.

Row Width in Inches	Feet of Row per Acre	Plants per Foot of Row	Plants per Acre
40	13,068	8.00	104,544
38	13,756	7.50	103,455
36	14,520	7.00	101,640
30	17,424	6.00	104,544
20	26,136	4.00	104,544
14	37,337	3.50	130,680
12	43,560	3.00	130,680
10	52,272	2.75	143,748
7	74,674	2.25	168,016
6	87,120	2.00	174,240

Table 2. Growth stages of soybeans (from Fehr & Caviness 1977).
VE – Emergence
VC – Cotyledon
V1 – First trifoliate
V2 – Second trifoliate
V3 – Third trifoliate
V4 – Fourth trifoliate
V (n) – Nth trifoliate (nth node)
R1 – Beginning bloom, one open flower at any node on the main stem.
R2 – Full bloom, open flower at one of the four uppermost nodes on the main stem with a fully developed trifoliate leaf.
R3 – Beginning pod, three-sixteenths inch pod at one of the four uppermost nodes on the main stem with a fully developed trifoliate leaf.
R4 – Full pod, three-fourths inch pod at one of the four uppermost nodes on the main stem with a fully developed trifoliate leaf.
R5 – Beginning seed, one-eighth inch long seed in the pod at one of the four uppermost nodes on the main stem with a fully developed trifoliate leaf.
R6 – Full seed, pod contains a green seed that fills the pod cavity at one of the four uppermost nodes on the main stem with a fully developed leaf.
R7 – Beginning maturity, one normal pod on the main stem that has reached mature pod color, normally brown or tan depending on variety.
R8 – Full maturity, 95 percent of the pods have reached their mature pod color. Five to ten days of drying weather are generally required after R8 before the soybeans have less than 15 percent moisture. This can occur more rapidly in early-planted soybeans in the Midsouth under very hot conditions.

Table 3. Approximate interval in days between successive reproductive growth stages by maturity group (MG) and planting date (PD) under irrigated field conditions at Stoneville, Mississippi.[1]

MG	PD	PD-R1	R1-R2	R2-R3	R3-R4	R4-R5	R5-R6	R6-R7	R7-R8	R1-R8	PD-R8
	month/day					Days					
3.9	3/15	48	3	11	7	7	23	19	13	83	131
3.9	4/15	38	3	14	8	7	24	18	13	87	125
3.9	5/15	34	4	14	9	7	22	16	12	84	118
3.9	6/14	33	4	14	8	7	19	14	9	75	108
3.9	7/04	33	4	13	7	6	17	12	7	66	99
4.4	3/15	53	3	12	8	8	25	20	12	87	140
4.4	4/15	42	4	15	8	8	25	18	13	91	133
4.4	5/15	37	5	15	8	8	23	17	11	87	124
4.4	6/14	36	4	14	8	8	20	14	9	76	112
4.4	7/04	35	4	13	7	7	18	12	7	67	102
4.9	3/15	58	4	13	9	8	26	21	14	95	153
4.9	4/15	47	4	16	9	8	26	19	13	95	142
4.9	5/15	41	5	15	9	8	24	17	11	89	130
4.9	6/14	38	5	14	9	7	20	14	10	79	117
4.9	7/04	37	4	13	7	7	18	12	8	69	106
5.4	3/15	64	4	15	9	10	26	22	14	100	164
5.4	4/15	53	4	16	10	9	26	20	13	98	151
5.4	5/15	46	4	16	10	8	24	18	13	93	139
5.4	6/14	41	5	15	8	8	21	14	9	80	121
5.4	7/4	39	4	14	7	7	18	13	8	71	110
5.9	4/15	58	5	17	11	9	27	20	13	102	160
5.9	5/15	50	5	17	10	8	25	18	11	94	144
5.9	6/14	44	5	16	8	8	22	14	10	83	127
5.9	6/29	42	4	15	8	7	20	13	8	75	117

Table 4. Recommended plant populations for Mississippi soybean producers.		
Planting date	**Recommended plant population (plants/acre)**	
	Group 4s	Group 5s
Late March to April 5	130,000	120,000
April 5 to April 20	120,000	100,000
Late April to early May	100,000	100,000

Table 5. Recommended plant populations for narrow row spacings. Final seeding rate based on 85% emergence of planted seed.

Desired # of plants	Seeding rate	Row spacing (inches)							
		7.5	8	10	15	18	20	25	30
plants/acre	seed/acre	seed / ft of row to be planted							
100,000	117,000	1.7	1.8	2.3	3.4	4.1	4.5	5.6	6.8
110,000	129,000	1.9	2.0	2.5	3.7	4.5	5.0	6.2	7.4
120,000	141,000	2.0	2.2	2.7	4.1	4.9	5.4	6.8	8.1
130,000	153,000	2.2	2.4	2.9	4.4	5.3	5.9	7.3	8.8

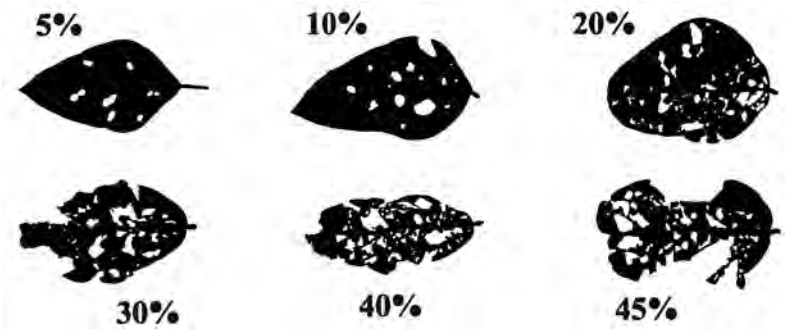
Table 6. Recommended plant populations for wide-row and twin-row patterns. Final seeding rate based on 85% emergence of planted seed.

Desired # of plants	Seeding rate	Wide-row (inches)		Twin-row*	
				38-inch row	40-inch row
plants/acre	seed/acre	38	40	seed/ft of row to be planted in each row	
100,000	117,000	8.6	9.0	4.3	4.5
110,000	129,000	9.4	9.9	4.7	5.0
120,000	141,000	10.3	10.8	5.2	5.4
130,000	153,000	11.1	11.7	5.6	5.9

Estimating Foliage Loss

Effectively estimating whole plant foliage loss is important in determining economic thresholds. Concise determinations in the field are difficult to make. Following is one procedure that may help in making defoliation estimates more accurate.

1. Study the leaflet photographs that show different foliage losses. Remember the threshold is 35 percent foliage loss for soybeans not blooming or filling pods and 20 percent foliage loss for soybeans blooming or filling pods.
2. Randomly select 10 to 20 leaflets from the middle or upper position of plants within a field.
3. Compare each leaflet with the photographs to the left and score each leaflet collected.
4. Average the scores to find the average foliage loss for the field sampled.
5. Practice this method using several field surveys.



Occasional Pests of Soybeans

Grape colaspis larvae occasionally are present early in the season in soybean fields. Feeding injury may result in stand reduction. Although uncommon, even severe infestations are difficult to detect early enough for chemical control, and replanting is often required.

Potato leafhopper populations are occasionally extremely high in soybean fields. Smooth-leaf varieties are particularly susceptible to potato leafhoppers. Extensive feeding on leaves by this pest may cause leaf discoloration and malformation, often called "hopperburn." Although this is generally insignificant, yields can sometimes be reduced. Approximate thresholds are five to nine per plant before bloom, with smaller plants being more susceptible. Blooming and more mature plants can tolerate larger populations.

Lesser cornstalk borer larvae damage soybeans by boring into the main stem at or just below the soil surface. Seedlings are cut off at the soil surface or may lodge because of extensive tunneling. The larvae are bluish-green and travel on top of the soil in silken tubes. Treatment is usually preventive and based on field history. Preventive treatments of Lorsban 15G applied T-band or in-furrow at planting at 8 oz/1,000 row feet are recommended when the field has a history of this pest. See label for additional details.

Soybean aphids are a new pest to soybeans in Mississippi. Currently soybean aphids have only been found in a few counties in Mississippi. While several species of aphids will feed on soybeans, soybean aphids are the only species that will colonize in very large numbers on soybeans. Soybean aphids, like whiteflies, excrete honeydew while they feed. This honeydew can cover the plant and cause sooty mold. This sooty mold prevents photosynthesis and can cause premature defoliation. Since this is a new pest to Mississippi, there are no current established thresholds. In Midwest states, thresholds are generally 250 aphids per plant. Apparently, there is no value in treating after R6.

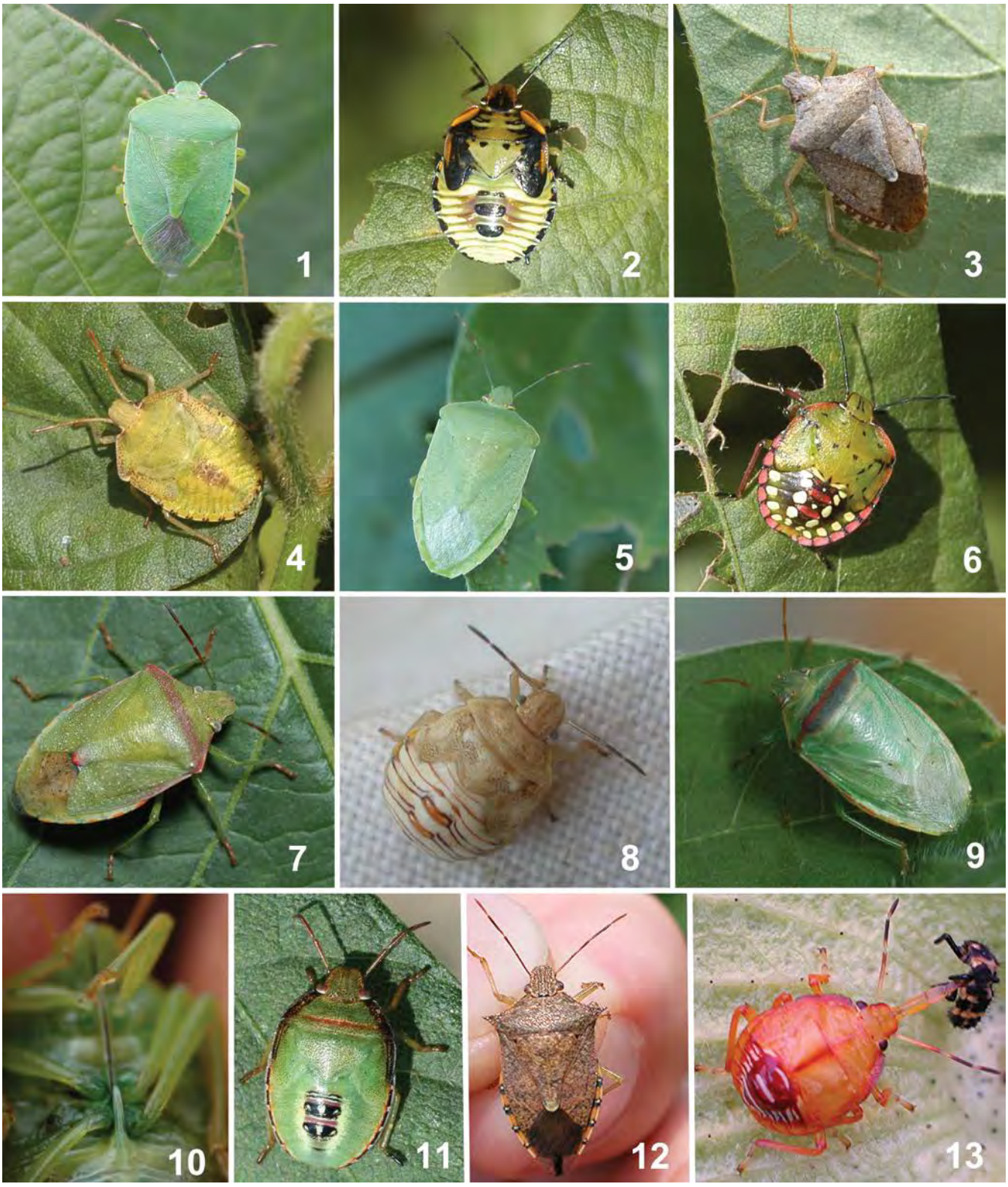
Thrips can occur in high populations on soybeans and are most damaging during periods of drought. Although these populations may delay maturity, they generally do not reduce yields.

Tobacco budworms only occasionally develop high populations in soybeans. Heaviest infestations often occur in areas with the highest concentration of cotton acreage. This insect is very similar in appearance and habits to the bollworm, and you should use the same treatment threshold. Budworms have developed resistance to many insecticides and are more difficult to control.

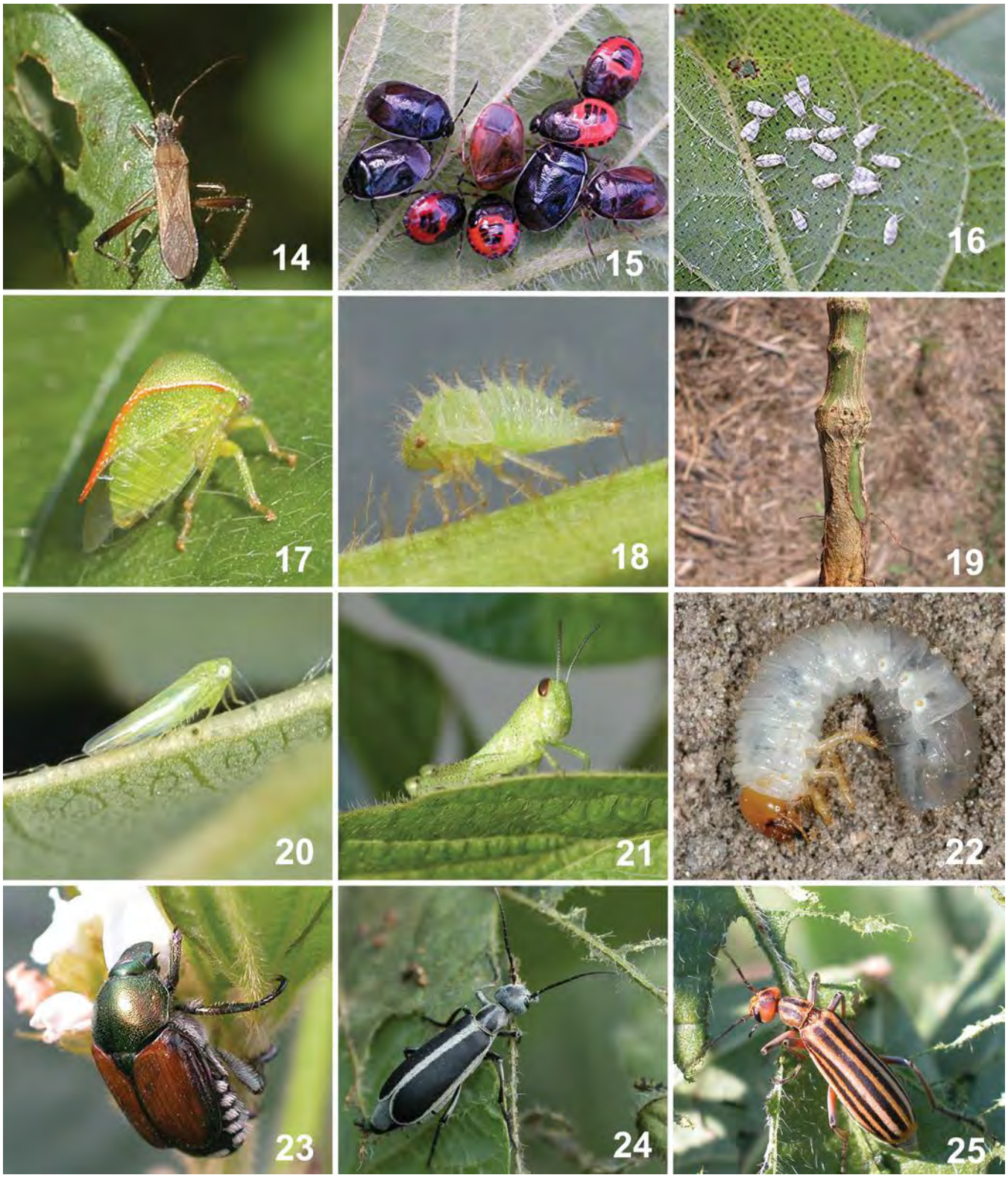
Whiteflies normally do not build damaging populations on soybeans, but in favorable conditions, extremely large populations can occur. Very little direct damage results from whitefly feeding. These insects produce honeydew. A fungus known as sooty mold grows on the honeydew. When this mold covers the leaf surface, it blocks sunlight, which prevents photosynthesis and can cause premature defoliation.

Whitefringed beetles occur in soybeans on the Coastal Plain. Although adults feed on foliage, populations are usually low. Whitefringed beetles are not thought to be of economic importance, but we don't know how much soybean damage they cause.

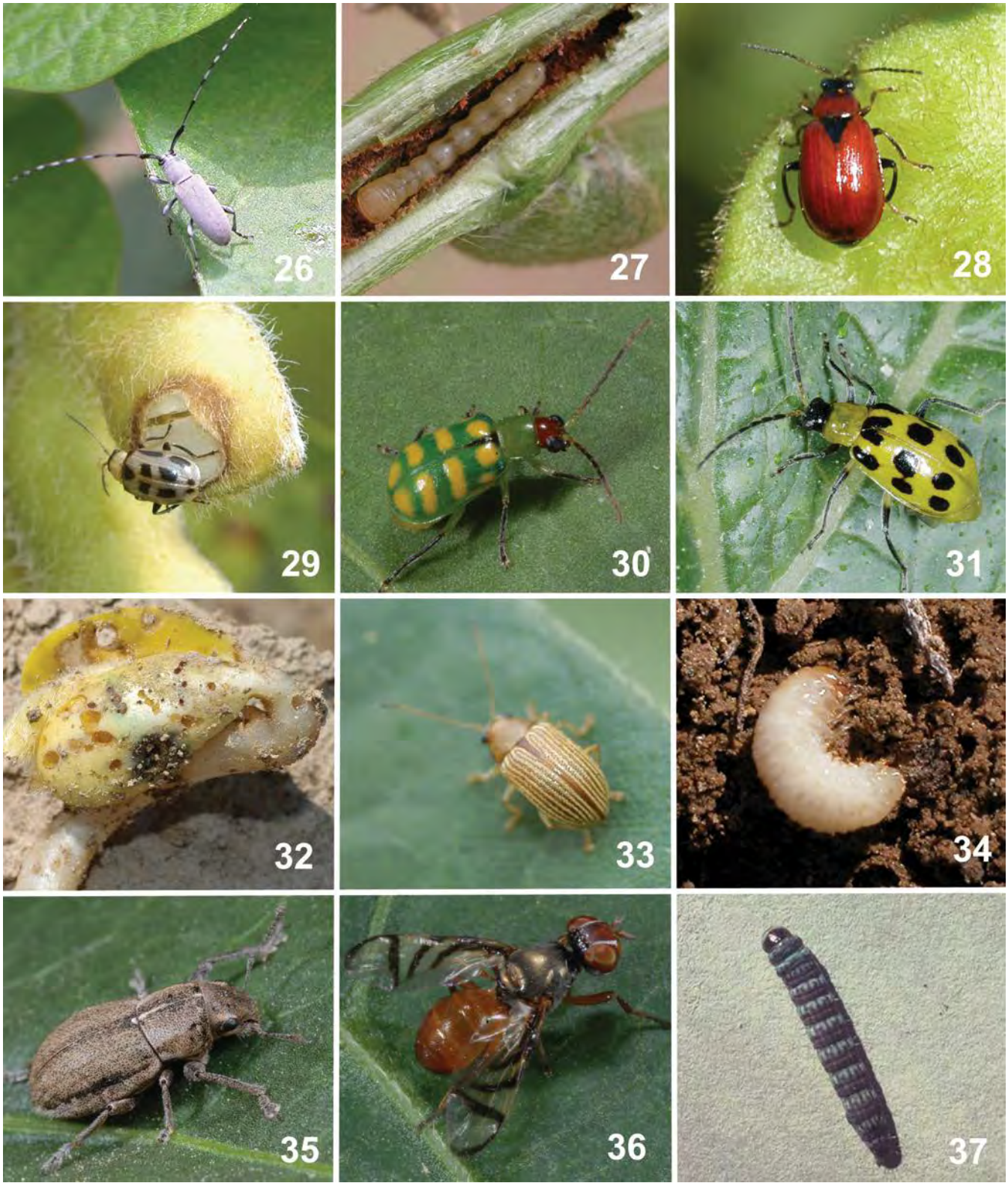
Dectes stem borers are cylindrical, ash-gray beetles with long antennae. The adults are minor foliage feeders and sometimes girdle plants at the soil level. The immature are grubs that tunnel the petioles and main stalk of the plants. We believe that, since they tunnel in the pith of the plant, there is no or very little yield loss with these insects, even under extremely heavy infestations.



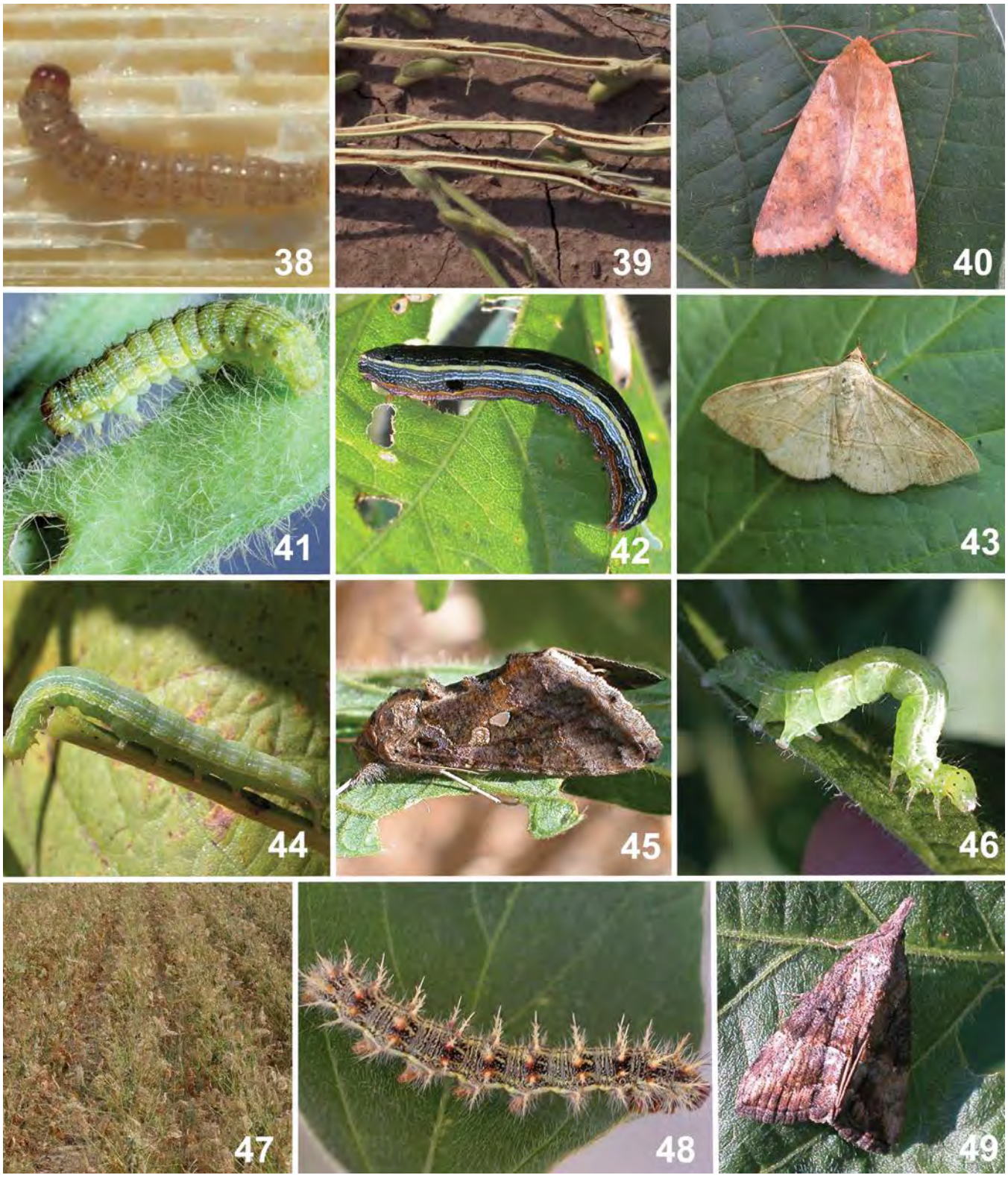
Figures 1–13. Green stink bug adult (1), green stink bug nymph (2), brown stink bug adult (3), brown stink bug nymph (4), southern green stink bug adult (5), southern green stink bug nymph (6), redshoulderd stink bug adult (7), redshoulderd stink bug nymph (8), redbanded stink bug adult (9), redbanded stink bug adult showing characteristic spine on abdomen (10), redbanded stink bug nymph (11), spined soldier bug adult (12), spined soldier bug nymph (13).



Figures 14–25. Broad-headed bug (14), burrower bug (15), bandedwinged whitefly (16), threecornered alfalfa hopper adult (17), threecornered alfalfa hopper nymph (18), threecornered alfalfa hopper girdled main stem (19), potato leafhopper (20), grasshopper (21), white grub (22), Japanese beetle (23), margined blister beetle (24), striped blister beetle (25).



Figures 26–37. Dectes stem borer adult (26), dectes stem borer larva (27), bean leaf beetle (28), bean leaf beetle feeding on soybean pod (29), banded cucumber beetle (30), spotted cucumber beetle (31), cucumber beetle larval feeding damage (32), grape colaspis adult (33), grape colaspis larva (34), whitefringed beetle (35), soybean nodule fly (36), lesser cornstalk borer (37).



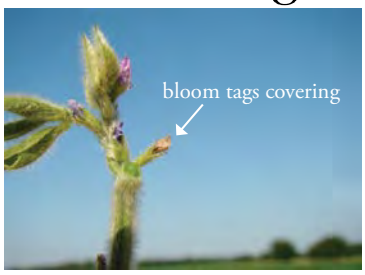
Figures 38–49. European corn borer (38), European corn borer damage, similar to dectes stem borer tunneling (39), corn earworm adult (40), corn earworm larva (41), yellowstriped armyworm (42), velvetbean caterpillar adult (43), velvetbean caterpillar larva (44), soybean looper adult (45), soybean looper larva (46), soybean looper defoliated field (47), painted lady (48), green cloverworm adult (49).

Figures 50–61. Green cloverworm larva (50), silver-spotted skipper (51), saltmarsh caterpillar (52), beet armyworm (53), fall armyworm (54), alfalfa caterpillar (55), garden webworm (56), black cutworm (57), thrips (58), soybean aphid (59), spider mites (60), slug (61), kudzu bug nymphs (62), kudzu bug adult (63).

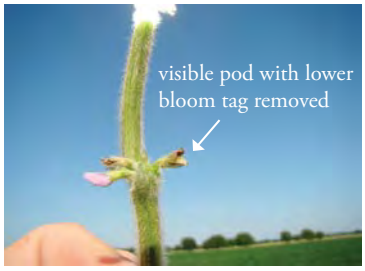
Guide to Soybean Growth Stages and Growth Stage Predictor

R1: First flower anywhere on the plant.

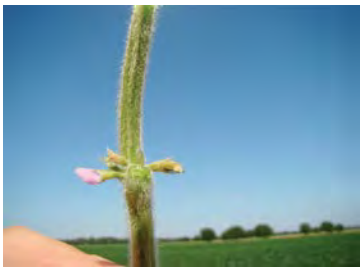
R2: Flower in the upper (youngest) two nodes.



R3: 3⁄16-inch-long pod in upper four nodes.



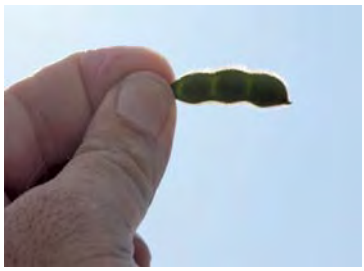
R3: 3⁄16-inch-long pod in upper four nodes.



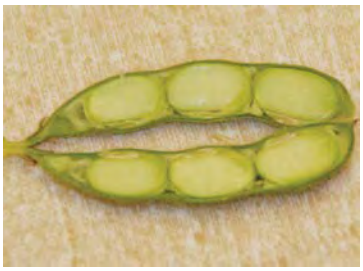
R3.5: ½-inch-long pod in upper four nodes.

R4: ¾-inch-long pod in upper four nodes.

R5: Visible seed in pod of upper four nodes.



R5.5: Beans filling half the space in the pod of upper four nodes.



R6: Beans touching inside pods of upper four nodes.

R6.5: Pod and pod wall beginning to turn mature color.

R7: Pod mature in color anywhere on plant.

R8: 50 percent of the pods mature in color and containing mature seed.

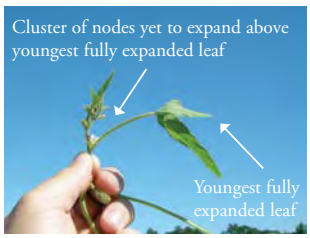
How to Determine Soybean Growth Stage

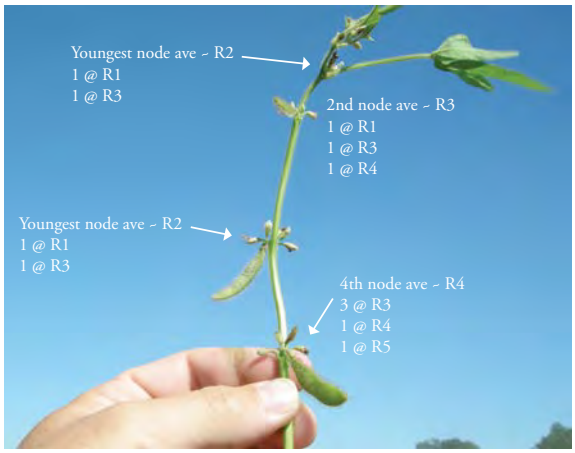
Concentrate on the youngest (upper) four nodes to determine soybean growth stage. Estimate the average growth stage for the reproductive growth (flowers and pods) on the youngest four nodes. Begin with the youngest fully expanded leaf (see picture 1 right), and estimate growth stage down the next three nodes (see picture 2 below).

Indeterminate varieties (most group 4 varieties and a few group 5 varieties) start reproductive growth toward the bottom of the plant. The reproductive growth progresses from the bottom of the plant upward as the plant produces more nodes.

Determinate varieties (most of our group 5 varieties) start reproductive growth uniformly up and down the main stem.

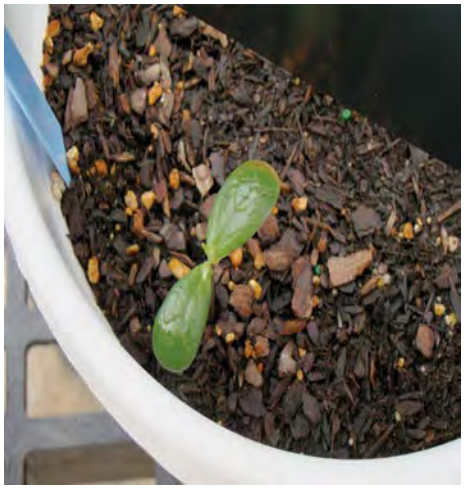
Another way of thinking about this is that it is common to see pods in the R5 growth stage at the bottom of plants and new flowers and pods at the top of indeterminate growth plants. Determinate growth plants have same-sized flowers and pods that grow uniformly up and down the stem.





Avg growth stage = R3

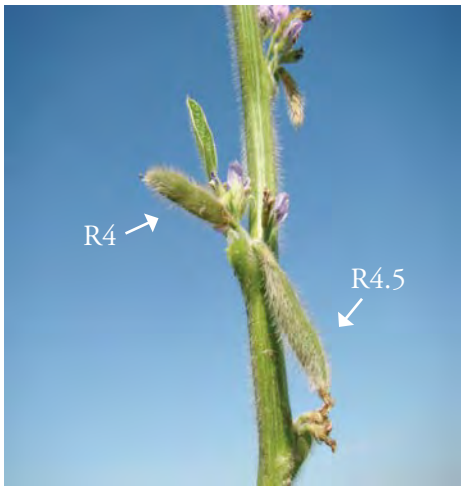
Vegetative and Reproductive Soybean Growth Stages



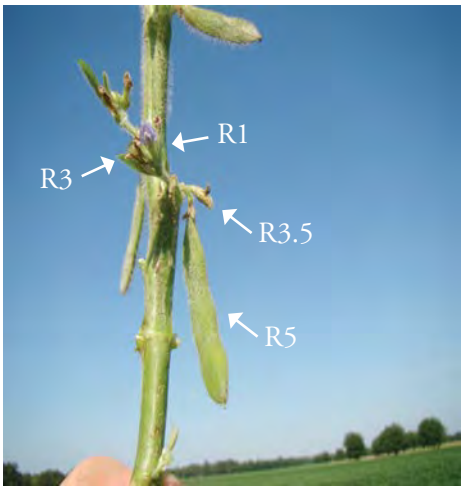
VC: Cotyledons

V1: Unifoliate fully emerged

V2: First trifoliate fully emerged (second node)



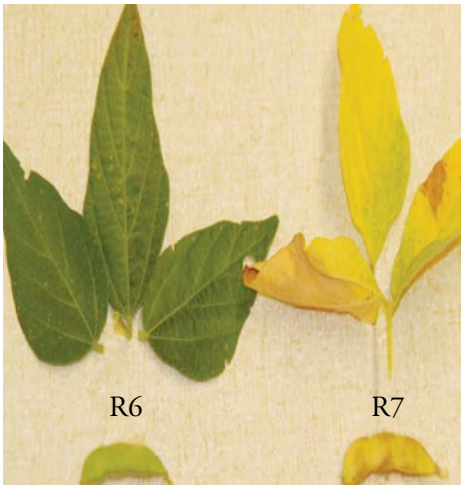
R4 and R4.5 at same node



R1–R5 at same node

R5.2 cross-section

R5.4 cross-section



Leaves/pods of R6–R7 plants

R5–R7.5 pods

Insecticide Classes, Reentry Intervals, and EPA Registration Numbers

The reentry interval is the time period required by federal law between application of pesticides to crops and the entrance of workers into those crops without protective clothing. Reentry intervals serve to protect workers from possible pesticide poisoning. Growers, scouts, and other farm laborers must effectively communicate when and where pesticides have been applied. Reentry periods vary by product. Scouts should not enter fields until all reentry intervals have expired. Safety is of utmost importance. Be sure to establish proper communication channels with all parties involved.

Producers are required to keep records, including EPA product registration numbers, of all insecticides applied to fields. Reentry intervals and product registration numbers for products not listed below are provided on the insecticide labels.

Insectidicide	Company	IRAC Class	REI (hours)	Restricted Use	EPA Number
Actara 25 WDG	Syngenta	4A	12		100-938
Adjourn 0.66EC	Adama	3A	12	X	352-515-66222
Admire Pro 4.6SC	Bayer	4A	12		264-827
Aeris	Bayer	4A, 1A		X	264-1057
AgLogic 15G	AgLogic	1A	48	X	
Agri-Mek .7SC	Syngenta	6	12	X	100-1351
Agri-Mek 1.5EC	Syngenta	6	12	X	100-989
Ambush 2EC	Amvac	3A	12	X	5481-549
Ammo 2.5EC	FMC	3A	12	X	279-3027-5905
Asana XL 0.66EC	DuPont	3A	12	X	352-515
Assail 30 SG	UPI	4A	12		8033-36-70506
Athena	FMC		12	X	279-3356
Aztec 2.1G	Amvac		48	X	5481-9030
Battalion 0.2EC	Arysta LifeScience	3A	12	X	66330-374
Baythroid XL 1E	Bayer	3A	12	X	264-840
Belay 2.13	Valent	4A	12		59639-150
Beleaf 50SG	FMC	9C	12		71512-10-279
Belt 4SC	Bayer	28	12		264-1025
Besiege	Syngenta	3A, 28	24	X	100-1402
Bidrin 8E	Amvac	1B	6 days	X	5481-448
Bidrin XPII	Amvac	3A, 1B	6 days	X	5481-9024
Bifenture 2EC	UPI	3A	12	X	70506-57
Blackhawk	Dow	5	4		62719-523
Brigade 2EC	FMC	3A	12	X	279-3313
Brigadier	FMC	3A,4A	12	X	279-3332
Capture LFR	FMC	3A	12	X	279-3302
Carbaryl 4L	Loveland	1A	12		34704-447
Carbine 50WG	FMC	9C	12		71512-9-279
Centric 40WG	Syngenta	4A	12		100-1147
Comite II 6EC	Arysta LifeScience	12C	144		400-154
Coragen 1.67SC	DuPont	28			352-729
Counter 15G	Amvac	1B	48	X	5481-545
Cruiser 5FS	Syngenta	4A	12		100-941
Declare 1.25	FMC	3A	24	X	67760-96
Delta Gold 1.5EC	Winfield Solutions LLC	3A	12	X	264-783-67760
Diamond 0.83EC	Adama	15	12		66222-35-400

Insectidicide	Company	IRAC Class	REI (hours)	Restricted Use	EPA Number
Dimethoate 4EC	FMC	1B	12		66222-56
Dimilin 2L	Arysta LifeScience	15	12	X	400-461
Discipline 2EC	Amvac	3A	12	X	5481-517
Endigo ZC	Syngenta	3A,4A	24	X	100-1276
Fanfare 2EC	Adama	3A	12	X	66222-99
Force 3G	Syngenta	3a	0	X	100-1075
Fulfill 50 WDG	Syngenta	9B	12		100-912
Fyfanon ULV 9.9C	FMA	1B, 3A	24	X	67760-108
Gaucho 600	Bayer	4A	12		264-968
Gaucho XT	Bayer	4A	12		264-971
Hero 1.24	FMC	3A	12	X	279-3315
Imidan 70W	Gowan	1B	4–5 days		10163-169
Intrepid 2F	Dow	18	4		62719-442
Intrepid Edge	Dow	5,18	4		62719-666
Karate Z 2.08CS	Syngenta	3A	24	X	100-1097
Knack 0.86	Valent	7C	12		59639-95
Lambda-Cy 1EC	UPI	3A	24	X	70506-121
Lannate 2.4LV	DuPont	1A	48	X	352-384
Leverage 360	Bayer	3A,4A	12	X	264-1104
Lorsban 15G	Dow	1B	24	X	62719-34
Lorsban 4E	Dow	1B	24	X	62719-220
Lorsban Advanced	Dow	1B	24	X	62719-591
Malathion 5	Winfield Solutions LLC	1B	12		9779-5
Malathion 57 EC	Loveland	1B	12		34704-108
Mocap 6EC	Amvac	1B	48	X	5481-9041
Movento 2SC	Bayer	23	24		264-1050
Mustang Max 0.8EC	FMC	3A	12	X	279-3426
Nipsit Inside	Valent	4A	12		59639-151
Oberon 4SC	Bayer	23	12		264-850
Orthene 90S	Amvac	1B	24		59639-33
Orthene 97AG	Amvac	1B	24		5481-8978
Platinum 2SC	Syngenta	4A	12		100-939
Poncho 600	Bayer	4A			264-789
Portal 0.4EC	Nichino America	21A	12		71711-19
Pounce	FMC	3A	12	X	279-3059
Prevathon 2.4SC	DuPont	28	4		352-844
Radiant SC	Dow	5	4		62719-545
Rimon 0.83EC	Arysta LifeScience	15	12		66222-35-400
Sevin 4F	Wilbur-Ellis Company	1A	12		61842-38
Sevin XLR 4L	NovaSource	1A	12		61842-37
Silencer 1 EC	Adama	3A	24	X	6622-104
Stallion	FMC	3A, 1B	24	X	279-9545
Steward 1.25EC	DuPont	22A	12		352-638

Insectidicide	Company	IRAC Class	REI (hours)	Restricted Use	EPA Number
Strafer 70WP	Gowan	4A	12		8033-24-10163
Thimet 20G	Amvac	1B	48	X	5481-530
Tombstone 2E	Loveland	3A	12	X	34704-912
Transform WG	Dow	4C	24		62719-625
Velum Total	Bayer	7, 4A	12		264-1171
Voliam Flexi	Syngenta	4A, 28	14		100-1319
Vydate C-LV 3.77	DuPont	1A	48	X	352-532
Warrior 1EC	Syngenta	3A	24	X	100-1112
Zeal 72WSP	Valent	10B	12		59639-123

*Insecticide mode of actions class as identified by Insecticide Resistance Action Committee: 1A, carbamates; 1B, organophosphates; 3A, pyrethroids; 4A, neonicotinoids; 5, spinosyns; 6, avermectins; 9C, flonicamid; 10B, etoxazole; 12C, organosulfurs; 15, benzolureas; 18, diacylhydrazines; 21A, METI acaricides; 22A, oxadiazines; 23 = spiromesifen; 28, diamides; UN = unknown.
**Registration numbers change with company brands, although the product name or active ingredient may be the same. Check the label to be sure.

Trade Names of Generic Insecticides

Active Ingredient	Trade Names
abamectin	Abba, Abacus, AbamectinE, Agri-Mek, Avid, Clinch, Epi-Mek, Flora-Mek, Reaper, Temprano, Varsity, Zephyr, Zoro
acephate	Acephate, Bracket, Orthene, Avatar
acetamiprid	Assail, Intruder, Tristar
beta-cyfluthrin	Baythroid XL
bifenthrin	Bifentrhin AG, Bifenture, Bisect, Brigade, Capture, Discipline, Empower, Fanfare, Menace, Onyx, Sniper, Talstar, Tundra, UpStar, Wisdom
buprofezin	Applaud, Centaur, Courier, Talus
chlorpyrifos	Chlorpyrifos, Govern, Hatchet, Look-On, Lorsban, Nufos, Warhawk, Whirlwind, Yuma, Eraser, Pilot, CPF, Vulcan
chlothianidin	Belay, Clutch, Poncho, Nipsit Inside, Arena
cyfluthrin	Decathlon, Renounce, Tempo, Tombstone
cypermethrin	Ammo, Battery, Cypermethrin, Mustang, UP-Cycle, Cyper-G, Holster
deltamethrin	Chipco Choice, Chipco FireStar, DeltaDust, DeltaGard, Delta Gold, Over 'n Out!, Shooter, Top Choice, Battalion, Centynal, Suspend
esfenvalerate	Adjourn, Asana XL, S-FenvaloStar
gamma-cyhalothrin	Declare
lambda-cyhalothrin	Batle, Grizzly, Helena Lambda, Karate, Karate Z, Lambda T, Lambda-Cy, Lambda-Cyhalothin, LambdaStar, Mystic Z, Silencer, Taiga Z, Warrior II, Warrior Z, Kendo, Jitzu, Lamcap, Paradigm
imidacloprid	Admire, Adnise, Advise Max, Alias, Couraze, Couraze Max, Imida E, Imidacloprid, ImiGold, Nuprid, Pasada, Prey, Provado, Sherpa, Trimax Pro, Widow, Wrangler, Zenith
malathion	Fyfanon, Malathion
permethrin	Actronban, Ambush, Arctic, Astro, Ectiban, Permectrin, Permethrin, Perm-UP, Pounce
pyripoxyfen	Distance, Esteem, Knack, Seize
spinosad	Blackhawk, Conserve, Entrust, SpinTor, Success, Tracer, Contain, Senset
zeta-cypermethrin	Mustang Maxx, Respect

*Read the insecticide label before making application. Although active ingredients are the same or very similar, brands often have different formulations, different labeled uses, and different use rates. This information is provided for educational purposes, and some of the additional brands listed above have not been independently evaluated by Mississippi State University.

Spray Drift Precautions

- Keep all aerial and ground application equipment maintained and calibrated using appropriate carriers.
- Do not make aerial or ground applications during temperature inversions.
- Make aerial or ground applications when wind velocity (approximately 3 to10 mph) favors on-target product deposition. Do not apply when wind velocity exceeds 15 mph.
- For aerial applications, mount the spray boom on the aircraft to reduce drift caused by wing tip or rotor vortices. Boom length must not exceed 75 percent of wing span or rotor diameter.
- When using pyrethroid insecticides, do not apply by ground within 25 feet or by air within 150 feet of lakes, reservoirs, rivers, permanent streams, marshes, natural ponds, estuaries, commercial fish ponds, or other bodies of water. Increase the buffer zone to 450 feet when ultralow volume (ULV) applications are made. Be sure to observe all other label restrictions regarding drift precautions for pyrethroids and all other insecticides.

SOYBEANS 2017

			Stem Feeders		Defoliators									Defoliators and Pod Feeders					Pod Feeders	
Insecticide	**Restricted Entry Interval (hours)**	**Restricted Use (R)**	**Cutworm**	**Threecornered Alfalfa Hopper**	**Blister Beetle**	**Garden Webworm**	**Grasshopper**	**Green Cloverworm**	**Saltmarsh Caterpillar**	**Soybean Looper**	**Cabbage Looper**	**Spider Mite**	**Velvetbean Caterpillar**	**Bean Leaf Beetle**	**Beet Armyworm**	**Yellowstriped Armyworm**	**Fall Armyworm (Grass/Corn)**	**Corn Earworm**	**Green Stink Bug**	**Brown Stink Bug**
Asana XL/Adjourn	12	X	9	8	7	8	7	9	5	3	7	0	9	4	3	7	9/4	4	8	5
Bacillus thuringiensis	4		0	0	0	5	0	8	3	6	6	0	8	0	2	0	1/1	2	0	0
Baythroid XL	12	X	9	8	7	8	7	9	5	3	7	0	9	4	3	7	9/4	4	8	5
Belay	12													8					8	7
Belt	12		9			9		9	8	7	9		9		8	9	8/8	8		
Besiege	24	X	9	8	7	9	7	9	9	7	9	0	9	4	9	9	9/9	8	8	6
Blackhawk	4		8			9		9	9	7	9		9		8	9	7/7	7		
Brigade/Discipline/Fanfare	12	X	8	9	7	7	7	9	6	3	7	5	9	6	3	8	9/4	4	8	6
Brigadier	12	X	8	9	7	7	7	9	6	3	7	5	9	6	3	8	9/4	4	8	6
Cruiser	12			7										5						
Declare	24	X	9	8	7	8	7	9	5	3	7	0	9	4	3	7	9/4	4	8	5
Diamond	12							8	5	5	7						9/9	4		
Dimethoate	48		0	6	5	5	7	3	1	1	2	3	3	6	2	4		2	8	4
Dimilin	12	X					6	9	5	3	6		9		3	7	7/7	2		
Endigo	24	X	9	8	7	8	7	9	5	3	7	0	9	8	3	7	9/4	4	8	7
Gaucho	12			5										5						
Hero	12	X	9	9	7	7	7	9	6	3	7	8	9	6		8	9/4	4	9	6
Intrepid	4		8			8		9	8	7	8		9		8	8	8/8	3		
Intrepid Edge	4		8			8		9	8	8	9		9		8	8	9/9	8		
Karate/Silencer/Lambda-Cy	24	X	9	8	7	8	7	9	5	3	7	0	9	4	3	7	9/4	4	8	5
Lannate 2.4 LV	48	X	8	5	5	8	6	9	4	7	7	0	9	6	7	7	7/7	6	7	5
Leverage	12	X	9	8	7	8	7	9	5	3	7	0	9	4	3	7	9/4	4	8	7
Lorsban/Nufos/Warhawk	24	X	8	4	4	5	8	7	1	3	4	4	7	5	5	5	5/5	4	6	4
Mustang Max/Respect	12	X	9	8	7	8	7	9	5	3	7	0	9	4	3	7	9/4	4	8	6
Orthene/Acephate	24	X	7	8	7	5	8	8	6	4	7	0	7	7	0	7	8/4	4	8	8
Prevathon	4		9			9		9	9	7	9				9	9	9/9	9		
Sevin	12		5	3	8	3	7	8	5	1	1	0	8	8	3	6	8/3	6	5	4
Steward	12		9	0	0	8	0	9	5	8	9	0	4		8	8	8/8	8	1	1

Rating Scale: 0 = no control; 10 = excellent control
The performance ratings in the chart are for comparison purposes only and are not necessarily a measure of percent control. Shaded boxes indicate products recommended for specific pests in this guide.

Notes

COTTON, SOYBEAN, CORN, GRAIN SORGHUM, WHEAT, SWEETPOTATO, RICE, PASTURE, & PEANUT INSECT CONTROL GUIDE COMMITTEE

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The information given here is for educational purposes only. References to commercial products or trade names are made with the understanding that no discrimination is intended against other products that may also be suitable.

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