## Introduction

Many different insects can be found on soybeans in Tennessee. Some are detrimental, while others are beneficial. The most economical and effective insect control program must begin with scouting, proper insect identification and a determination of possible economic damage.

Serious reductions in yield and quality may result if an outbreak of an insect pest occurs and is not controlled. Some of these pests feed on leaves and stems; others are primarily pod feeders. Many times insecticides are not needed for control, but in some cases, damaging localized populations are not noticed until serious damage has occurred. Soybean fields should be scouted weekly, paying special attention during the time of early bloom (R1) to full seed (R6).

## Insect Identification

### Foliage Feeders

**Loopers:** Loopers are often the most common "worms" on soybeans. They are light green and have two pairs of abdominal prolegs (excluding the pair on the last abdominal segment). The body is thickest at the rear and tapers to the head. These insects form the characteristic hump or "loop" when crawling. When populations are heavy, loopers eat much of the leaf surface, causing plants to look very ragged. Populations are often held in check by beneficial insects and diseases. Note: Although many pyrethroid insecticides are labeled for soybean looper control, they are not recommended because resistance is well documented.

**Green Cloverworm:** This species is commonly found in Tennessee soybean fields. The green cloverworm is a slender green caterpillar with three pairs of abdominal prolegs. It becomes very active and falls to the ground when disturbed. The feeding damage produced by the green cloverworm is similar to that of loopers. Although they are present most of the growing season, they are damaging only at high populations or in combination with other defoliators.

**Japanese Beetle:** Japanese beetle adults are metallic green or greenish-bronze beetles, ½ inch long, with reddish wing covers. They have white spots near the tip of the abdomen and on the sides. As they feed on soybean foliage, Japanese beetles skeletonize the leaves. This pest rarely occurs at economically damaging levels.

**Bean Leaf Beetle:** The bean leaf beetle feeds on leaves and sometimes on small pods. The beetles may feed through the pod and eat the beans, leaving damage that resembles bollworm feeding. The adults can cause severe damage on small plants. The larvae feed on roots and nodules and underground portions of the stems. Adults are reddish to tan, usually with four dark spots on each wing.

**Mexican Bean Beetle:** Mexican bean beetles damage plants by feeding on the underside of the leaf surface, resulting in a skeletonized appearance. Both adults and larvae feed in a similar manner. Adults are copper brown with 16 black spots on the back. Larvae are yellow to brown with many spines on the back and sides. Both adults and larvae are about ¼ inch long. This pest rarely occurs at economically damaging levels.

**Blister Beetles:** Blister beetles are elongated, soft-winged beetles that feed on leaves. One species, the striped blister beetle, has alternating dark brown and yellow stripes running the length of the body. Another species, the margined blister beetle, is black with a gray stripe along margins of the wing covers. These insects usually feed in groups in one or several areas of the field.

**Soybean Aphid:** Also called Chinese aphid, this is a relatively new pest for Tennessee, discovered first in Middle Tennessee. Its distribution probably includes all soybean growing areas in Tennessee, but pest numbers are generally low and scattered at this time. Aphids pierce leaf tissue during feeding in order to suck sap from soybean leaves. Soybean mosaic virus and other viral diseases are sometimes transmitted by aphids during feeding.

### Pod Feeders

**Fall Armyworm:** The fall armyworm is a multicolored, striped caterpillar with an inverted "Y" on the head and four pairs of abdominal prolegs. Armyworms may feed on leaves, stems, pods and beans. They may appear in large numbers and quick control is important.

**Corn Earworm:** The corn earworm, also called the bollworm or podworm, can seriously reduce yields since it feeds directly on beans by eating a hole in the pod and

consuming the seed. Large caterpillars may be green, brown or yellow. The body is stocky and the head is usually pale brown or orange. Light and dark stripes run the length of the body. The larva has four pairs of abdominal prolegs. Young blooms and tender leaves are sometimes eaten. Beans should be checked during flowering and early pod set.

**Stink Bugs:** Stink bugs suck the juices from immature soybean seeds. This feeding introduces disease organisms into developing seeds, reduces germination and lowers milling quality. Damaged beans appear wrinkled and are smaller than normal. Adults are shield-shaped, either green or brown and are about ½ inch long.

### Stem Feeders

**Threecornered Alfalfa Hopper:** The adult threecornered alfalfa hopper is a green, wedge-shaped insect about ¼-inch long. Adults and nymphs feed by inserting their piercing-sucking mouthparts into the stem a few inches above the soil line. This feeding around the stem girdles the plant, often causing it to lodge later in the season. It is primarily a problem in reduced tillage fields. Maintaining a clean field border helps to reduce population numbers.

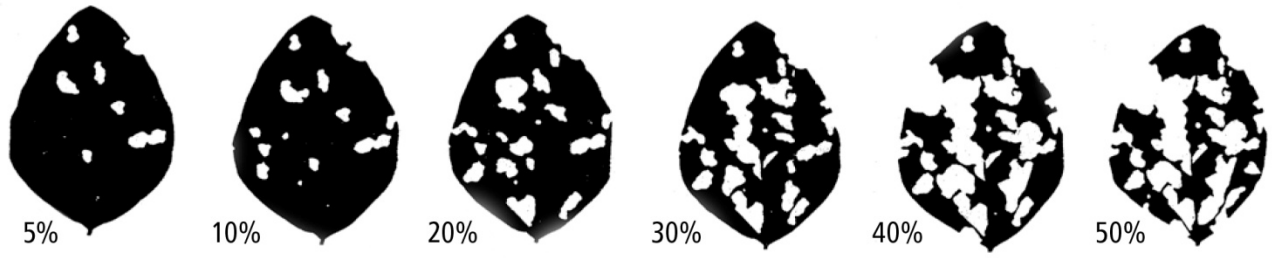
**Kudzu Bug:** Infestations of kudzu bug on kudzu and soybean have been reported from most soybean producing areas of Tennessee, and this invasive insect is spreading rapidly through the state. Adult kudzu bugs are about the same size as adult lady beetles. They are approximately ¼-inch long, almost square-appearing in shape with a brown to olive-green hue. The immature stages are similarly shaped but smaller and "hairy." Eggs of kudzu bugs are light-colored, barrel-shaped, and usually placed on plant leaves in two rows. Infestations often occur first and most heavily on field edges, and treatment decisions should be made based on thorough scouting of entire fields.

## Scouting Procedures

A good sampling plan is to check 6 feet of row at 5 locations or take 25 sweeps at 4 locations in average sized fields (about 50 acres). Increase sampling points proportionately with the acreage in a field. Make sure sample points are scattered over the entire field.
Look for:

- **Seedling/Stem Feeding:** 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 that may be on the plant (threecornered alfalfa hopper) or in the soil around the base of the plants (lesser corn stalk borer, cutworms). 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). Kudzu bug infestations often occur later, once plants start blooming.
- **Foliage Feeders:** Determine what insects are eating the foliage and estimate percent defoliation. Use a sweep net or a drop cloth (shake sheet) to sample for insect pests. At each sample point, estimate percent foliage loss so that an average can be calculated for the field. For soybean aphids, begin scouting in early July. Look for aphids on the undersides of upper leaves in vegetative and flowering soybeans. Estimate aphid density per plant at 5-10 locations throughout the field.
- **Pod-Feeders:** After full bloom, when pods are forming, look closely for any pod-feeding caterpillars (corn earworms and fall armyworms) and stink bugs which are dislodged onto the shake cloth or into the sweep net. Count these carefully.

**Figure 1 – Percent Defoliation**



## Expected Occurrence of Insect Pests in Soybean

Below is a timetable of when common pests are typically encountered in soybean, although conditions vary from season to season or farm to farm within a season.

| Stage of Plant Development | Common Pests | Occasional Pests |
|---|---|---|
| Seedling | Threecornered alfalfa hopper | Thrips, grasshoppers, bean leaf beetle, cutworms, grape colaspis, white grubs |
| V5 - R1 (Early flowering) | --- | Threecornered alfalfa hopper |
| R1 - R5 (Early flowering to early podfill) | Stink bugs, green cloverworm | Threecornered alfalfa hopper, blister beetles, corn earworm, fall armyworm, loopers, soybean aphid, kudzu bug |
| R5 + (mid to late podfill) | Stink bugs, loopers, green cloverworm | Blister beetles, fall armyworm, loopers, soybean aphid, kudzu bug |

## Insecticide Seed Treatments

Insecticide seed treatments such as thiamethoxam (e.g., Cruiser), imidacloprid (e.g., Gaucho, Acceleron I), and clothianidin (e.g., NipsIt Inside) are available from seed companies or local distributors. Seed treatments will help control some seed and seedling pests such as thrips, bean leaf beetle, grape colaspis, threecornered alfalfa hopper, wireworms and white grubs. Data indicates that insecticide seed treatments provide an average yield increase of 1-2 bushels per acre in Tennessee. Insecticide seed treatments are recommended when cover crops are planted and persist in fields within 3 to 4 weeks of planting, particularly if the cover crop includes a legume species such as vetch or winter peas.

| When to Treat | |
|---|---|
| Threecornered Alfalfa Hopper | Treat if 10 percent of young plants (up to 10-12 inches) are infested with adults or nymphs. Bend small plants over to check for girdling and consider treatment if 50 percent or more of plants are girdled. Treatment is not generally recommended for plants greater than 12 inches tall. |
| Defoliating Pests (bean leaf beetles, green cloverworm, blister beetles, loopers, grasshoppers, Japanese beetles, etc.) | Treat at 30 percent defoliation until bloom (R1), 20 percent from bloom to full seed (R1-R6), and 30 percent after R6 to R6 plus 7-10 days.<br><u>Alternatives to defoliation thresholds during pod filling (R1-R6):</u><br>Bean leaf beetle – 50 beetles per 25 sweeps<br>Green cloverworm – 38 larvae per 25 sweeps<br>Loopers – 19 larvae per 25 sweeps |
| Stink Bugs | From beginning bloom (R1) to full seed (R6), treat when an average of 9 or more stink bugs is found per 25 sweeps (or 1 stink bug is found per foot of row). From R6 to R7, treat when an average of 18 or more stink bugs is found per 25 sweeps. * |
| Corn Earworm | See tables below for treatment threshold based on sweep net sampling, or consider treatment once blooming has begun if an average of 1 or more larvae is found per foot of row. |
| Fall Armyworm | Once blooming has begun, treat when an average of 9 or more larvae is found per 25 sweeps (or 1 or more larvae is found per foot of row). Fall armyworm may also feed on foliage, and severe infestations may originate on weedy grasses. Treatment can be based on the percent defoliation thresholds above under these circumstances. |

| When to Treat | |
|---|---|
| Soybean Aphid | Treat when an average of 250 aphids or more is found per plant from early bloom (R1) until early pod fill (R5). Treatment after R5 is less likely to increase yield. |
| Kudzu Bug | Treat between emergence and R1 when 5 or more kudzu bugs are found per plant. From R1 to R7, treat when an average of 1 or more immature kudzu bug is present per sweep (25 per 25 sweeps). |

* In soybeans planted on 36-inch or wider rows, sweep only one row. In narrow-row soybeans, allow the normal arch of a sweep net to continue through the adjacent rows.

**Corn Earworm:** The suggested treatment threshold for corn earworm based on sweep-net sampling is below. To determine the treatment level, estimate the potential value of the crop and the cost of the insecticide application. For example; if the crop value is $8/bushel and the cost of control is $14/acre, including application costs, the sweep-net threshold would be 8.6 larvae per 25 sweeps.

| Crop Value ($/bu) | Number of Corn Earworm Larvae/25 Sweeps | | | | | | |
|---|---|---|---|---|---|---|---|
| | Control Costs ($/acre) Including Application | | | | | | |
| | **8** | **10** | **12** | **14** | **16** | **18** | **20** |
| **6** | 6.5 | 8.2 | 9.8 | 11.4 | 13.1 | 14.7 | 16.3 |
| **7** | 5.6 | 7.0 | 8.4 | 9.8 | 11.2 | 12.6 | 14.0 |
| **8** | 5.0 | 6.1 | 7.4 | 8.6 | 9.8 | 11.0 | 12.3 |
| **9** | 5.0 | 5.4 | 6.5 | 7.6 | 8.7 | 9.8 | 10.9 |
| **10** | 5.0 | 5.0 | 5.9 | 6.9 | 7.8 | 8.8 | 9.8 |
| **12** | 5.0 | 5.0 | 5.0 | 5.7 | 6.5 | 7.4 | 8.2 |
| **13** | 5.0 | 5.0 | 5.0 | 5.3 | 6.0 | 6.8 | 7.5 |
| **15** | 5.0 | 5.0 | 5.0 | 5.0 | 5.2 | 5.9 | 6.5 |

# Suggestions for Chemical Control of Soybean Insects

| Insects and Chemicals (Trade Names) | Lbs Active Ingredient Per Acre | Amount Formulation Per Acre | Acres a Gallon Will Cover |
|---|---|---|---|
| **CUTWORMS** | | | |
| bifenthrin (Brigade 2E, Discipline 2E, Fanfare 2E) | 0.047 - 0.10 | 3 - 6.4 oz | 42.7 - 20 |
| carbaryl (Sevin 80S)<br>(Sevin XLR Plus) | 1.0 - 1.5<br>1.0 - 1.5 | 1.25 - 1.875 lb<br>32 - 48 oz | ---<br>4 - 2.7 |
| chlorpyrifos (Lorsban 4E, Nufos 4E)<br>(Lorsban Advanced 3.755) | 0.5 - 1.0<br>0.5 - 0.94 | 16 - 32 oz<br>17 - 32 oz | 8 - 4<br>7.5 - 4 |
| esfenvalerate (Asana XL 0.66E) | 0.03 - 0.05 | 5.8 - 9.6 oz | 22 - 13 |
| permethrin (Pounce 3.2E) | 0.05 - 0.10 | 2 - 4 oz | 64 - 32 |
| β-cyfluthrin (Baythroid XL 1) | 0.065 - 0.0125 | 0.8 - 1.6 oz | 160 - 80 |
| γ-cyhalothrin (Declare 1.25) | 0.0075 - 0.0125 | 0.77 - 1.28 oz | 166 - 126 |
| λ-cyhalothrin (Karate 2.08, Warrior II) | 0.015 - 0.025 | 0.96 - 1.60 oz | 133 - 80 |
| Z-cypermethrin (Mustang Max 0.8E) | 0.008 - 0.025 | 1.28 - 4 oz | 100 - 32 |
| **THREECORNERED ALFALFA HOPPER** | | | |
| acephate 90 (Orthene 90S) | 0.75 - 0.99 | 0.83 - 1.10 lb | --- |
| bifenthrin (Brigade 2E, Discipline 2E, Fanfare 2E) | 0.05 - 0.10 | 3.2 - 6.4 oz | 40 - 20 |
| carbaryl (Sevin 80S)<br>(Sevin XLR Plus) | 1.0<br>1.0 | 1.25 lb<br>32 oz | ---<br>4 |
| esfenvalerate (Asana XL 0.66E) | 0.03 - 0.05 | 5.8 - 9.6 oz | 22 - 13 |
| β-cyfluthrin (Baythroid XL 1) | 0.025 - 0.044 | 1.6 - 2.8 oz | 80 - 45 |
| γ-cyhalothrin (Declare 1.25) | 0.0075 - 0.0125 | 0.77 - 1.28 oz | 166 - 126 |
| λ-cyhalothrin (Karate 2.08, Warrior II) | 0.015 - 0.025 | 0.96 - 1.6 oz | 133 - 80 |
| Z-cypermethrin (Mustang Max 0.8E) | 0.0175 - 0.025 | 2.8 - 4 oz | 45 - 32 |
| **BEAN LEAF BEETLE** | | | |
| acephate 90 (Orthene 90S) | 0.75 - 0.99 | 0.83 - 1.10 lb | --- |
| bifenthrin (Brigade 2E, Discipline 2E, Fanfare 2E) | 0.063 - 0.10 | 4 - 6.4 oz | 32 - 20 |
| carbaryl (Sevin 80S)<br>(Sevin XLR Plus) | 0.5 - 1.0<br>0.5 - 1.0 | 0.67 - 1.25 lb<br>16 - 32 oz | ---<br>8 - 4 |
| chlorpyrifos (Lorsban 4E, Nufos 4E)<br>(Lorsban Advanced 3.755) | 0.5 - 1.0<br>0.5 - 0.94 | 16 - 32 oz<br>17 - 32 oz | 8 - 4<br>7.5 - 4 |
| esfenvalerate (Asana XL 0.66E) | 0.03 - 0.05 | 5.8 - 9.6 oz | 22 - 13 |
| methomyl (Lannate LV 2.4) | 0.23 - 0.45 | 12 - 24 oz | 10.4 - 5.3 |
| methyl parathion 4 (Methyl 4E) | 1.0 | 32 oz | 4 |
| permethrin (Pounce 3.2E) | 0.05 - 0.1 | 2 - 4 oz | 64 - 32 |
| β-cyfluthrin (Baythroid XL 1) | 0.0125 - 0.022 | 1.6 - 2.8 oz | 80 - 45 |
| γ-cyhalothrin (Declare 1.25) | 0.0075 - 0.0125 | 0.77 - 1.28 oz | 166 - 100 |
| λ-cyhalothrin (Karate 2.08, Warrior II) | 0.015 - 0.025 | 0.96 - 1.6 oz | 133 - 80 |
| Z-cypermethrin (Mustang Max 0.8E) | 0.0175 - 0.025 | 2.8 - 4 oz | 45 - 32 |

| Insects and Chemicals (Trade Names) | Lbs Active Ingredient Per Acre | Amount Formulation Per Acre | Acres a Gallon Will Cover |
|---|---|---|---|
| **GRASSHOPPERS** | | | |
| acephate 90 (Orthene 90S) | 0.30 - 0.50 | 0.33 - 0.56 lb | --- |
| bifenthrin (Brigade 2E, Discipline 2E, Fanfare 2E) | 0.063 - 0.10 | 4 - 6.4 oz | 32 - 20 |
| carbaryl (Sevin 80S) | 0.5 - 1.5 | 0.67 - 1.875 lb | --- |
| (Sevin XLR Plus) | 0.5 - 1.5 | 16 - 48 oz | 8 - 2.7 |
| chlorpyrifos (Lorsban 4E, Nufos 4E) | 0.25 - 0.50 | 8 - 16 oz | 16 - 8 |
| (Lorsban Advanced 3.755) | 0.25 - 0.47 | 8.5 - 16 oz | 15.1 - 8 |
| diflubenzuron (Dimilin 2L), for immatures | 0.031 | 2 oz | 64 |
| esfenvalerate (Asana XL 0.66E) | 0.03 - 0.05 | 5.8 - 9.6 oz | 22 - 13 |
| methyl parathion 4 (Methyl 4E) | 1.0 | 32 oz | 4 |
| β-cyfluthrin (Baythroid XL 1) | 0.0155 - 0.022 | 2.1 - 2.8 oz | 60 - 45 |
| γ-cyhalothrin (Declare 1.25) | 0.0125 - 0.015 | 1.28 - 1.54 oz | 100 - 83 |
| λ-cyhalothrin (Karate 2.08, Warrior II) | 0.025 - 0.030 | 1.6 - 1.9 oz | 80 - 67 |
| Z-cypermethrin (Mustang Max 0.8E) | 0.020 - 0.025 | 3.2 - 4 oz | 40 -32 |
| **MEXICAN BEAN BEETLE** | | | |
| acephate 90 (Orthene 90S) | 0.75 - 0.99 | 0.83 - 1.10 lb | --- |
| bifenthrin (Brigade 2E, Discipline 2E, Fanfare 2E) | 0.063 - 0.10 | 4 - 6.4 oz | 32 - 20 |
| carbaryl (Sevin 80S) | 0.5 - 1.0 | 0.67 - 1.25 lb | --- |
| (Sevin XLR Plus) | 0.5 - 1.0 | 16 - 32 oz | 8 - 4 |
| chlorpyrifos (Lorsban 4E, Nufos 4E) | 0.5 - 0.75 | 16 - 24 oz | 8 - 5.3 |
| (Lorsban Advanced 3.755) | 0.5 - 0.75 | 17 - 25.6 oz | 7.5 - 5 |
| dimethoate 4 | 0.5 | 16 oz | 8 |
| esfenvalerate (Asana XL 0.66E) | 0.015 - 0.03 | 2.9 - 5.8 oz | 44 - 22 |
| methomyl (Lannate LV 2.4) | 0.23 - 0.45 | 12 - 24 oz | 10.4 - 5.3 |
| methyl parathion 4 (Methyl 4E) | 0.5 | 16 oz | 8 |
| permethrin (Pounce 3.2E) | 0.05 - 0.1 | 2 - 4 oz | 64 - 32 |
| β-cyfluthrin (Baythroid XL 1) | 0.0125 - 0.022 | 1.6 - 2.8 oz | 80 - 45 |
| γ-cyhalothrin (Declare 1.25) | 0.0075 - 0.0125 | 0.77 - 1.28 oz | 166 - 100 |
| λ-cyhalothrin (Karate 2.08, Warrior II) | 0.015 - 0.025 | 0.96 - 1.6 oz | 133 - 80 |
| Z-cypermethrin (Mustang Max 0.8E) | 0.0175 - 0.025 | 2.8 - 4 oz | 45 - 32 |
| **BLISTER BEETLE** | | | |
| carbaryl (Sevin 80S) | 0.5 - 1.0 | 0.67 - 1.25 lb | --- |
| (Sevin XLR Plus) | 0.5 - 1.0 | 16 - 32 oz | 8 - 4 |
| methyl parathion 4 (Methyl 4E) | 0.5 | 16 oz | 8 |
| β-cyfluthrin (Baythroid XL 1) | 0.0125 - 0.022 | 1.6 - 2.8 oz | 80 - 45 |
| γ-cyhalothrin (Declare 1.25) | 0.0125 - 0.015 | 1.28 - 1.54 oz | 100 - 83 |
| λ-cyhalothrin (Karate 2.08, Warrior II) | 0.025 - 0.03 | 1.6 - 1.9 oz | 80 - 67 |
| Z-cypermethrin (Mustang Max 0.8E) | 0.0175 - 0.025 | 2.8 - 4 oz | 45 - 32 |

| Insects and Chemicals (Trade Names) | Lbs Active Ingredient Per Acre | Amount Formulation Per Acre | Acres a Gallon Will Cover |
|---|---|---|---|
| **JAPANESE BEETLE** | | | |
| bifenthrin (Brigade 2E, Discipline 2E, Fanfare 2E) | 0.063 - 0.10 | 4 - 6.4 oz | 32 - 20 |
| carbaryl (Sevin 80S) | 1.0 | 1.25 lb | --- |
| (Sevin XLR Plus) | 0.5 - 1.0 | 16 - 32 oz | 8 - 4 |
| esfenvalerate (Asana XL 0.66E) | 0.03 - 0.05 | 5.8 - 9.6 oz | 22 - 13.3 |
| permethrin (Pounce 3.2E) | 0.05 - 0.10 | 2 - 4 oz | 64 - 32 |
| β-cyfluthrin (Baythroid XL 1) | 0.0125 - 0.022 | 1.6 - 2.8 oz | 80 - 45 |
| γ-cyhalothrin (Declare 1.25) | 0.0125 -0 .015 | 1.28 - 1.54 oz | 100 - 83 |
| λ-cyhalothrin (Karate 2.08, Warrior II) | 0.025 - 0.03 | 1.6 - 1.9 oz | 80 - 67 |
| Z-cypermethrin (Mustang Max 0.8E) | 0.0175 - 0.025 | 2.8 - 4 oz | 45 - 32 |
| **GREEN CLOVERWORM** | | | |
| acephate 90 (Orthene 90S) | 0.75 - 0.99 | 0.83 - 1.10 lb | --- |
| bifenthrin (Brigade 2E, Discipline 2E, Fanfare 2E) | 0.063 - 0.10 | 4 - 6.4 oz | 32 - 20 |
| carbaryl (Sevin 80S) | 0.5 - 1.0 | 0.67 - 1.25 lb | --- |
| (Sevin XLR Plus) | 0.5 - 1.0 | 16 - 32 oz | 8 - 4 |
| chlorantraniliprole (Prevathon 0.43 SC) | 0.047 -0.067 | 14 - 20 oz | 9.1 - 6.4 |
| chlorantraniliprole, λ-cyhalothrin (Besiege) | See label | 6 - 8 oz | 21.3 - 16 |
| chlorpyrifos (Lorsban 4E, Nufos 4E) | 0.25 - 0.5 | 8 - 16 oz | 16 - 8 |
| (Lorsban Advanced 3.755) | 0.25 - 0.47 | 8.5 - 16 oz | 15.1 - 8 |
| diflubenzuron (Dimilin 2) | 0.031 – 0.063 | 2 - 4 oz | 64 - 32 |
| esfenvalerate (Asana XL 0.66E) | 0.015 - 0.03 | 2.9 - 5.8 oz | 44 - 22 |
| indoxacarb (Steward 1.25) | 0.055 - 0.11 | 5.6 - 11.2 oz | 22.8 - 11.5 |
| methomyl (Lannate LV 2.4) | 0.23 - 0.45 | 12 - 24 oz | 10.7 - 5.3 |
| methoxyfenozide (Intrepid 2) | 0.063 - 0.125 | 4 - 8 oz | 32 - 16 |
| methyl parathion 4 (Methyl 4E) | 0.375 - 0.50 | 12 - 16 oz | 10.6 - 8 |
| permethrin (Pounce 3.2E) | 0.05 - 0.1 | 2 - 4 oz | 64 - 32 |
| spinetoram (Radiant SC 1) | 0.016 - 0.031 | 2 - 4 oz | 64 - 32 |
| spinetoram, methoxyfenozide (Intrepid Edge) | See label | 4 - 6.4 oz | 32 - 20 |
| spinosad (Blackhawk 36% WDG) | 0.034 - 0.05 | 1.1 - 2.2 oz | 14.5 - 7.3 |
| β-cyfluthrin (Baythroid XL 1) | 0.025 - 0.044 | 1.6 - 2.8 oz | 80 - 45 |
| γ-cyhalothrin (Declare 1.25) | 0.0075 - 0.0125 | 0.77 - 1.28 oz | 166 - 100 |
| λ-cyhalothrin (Karate 2.08, Warrior II) | 0.015 - 0.025 | 0.96 - 1.6 oz | 133 - 80 |
| Z-cypermethrin (Mustang Max 0.8E) | 0.0175 - 0.025 | 2.8 - 4 oz | 45 - 32 |
| **SOYBEAN LOOPER** | | | |
| chlorantraniliprole (Prevathon 0.43 SC) | 0.047 -0.067 | 14 - 20 oz | 9.1 - 6.4 |
| chlorantraniliprole, λ-cyhalothrin (Besiege) | See label | 10 oz | 12.8 |
| indoxacarb (Steward 1.25) | 0.055 - 0.11 | 5.6 - 11.3 oz | 22.8 - 11.5 |

| Insects and Chemicals (Trade Names) | Lbs Active Ingredient Per Acre | Amount Formulation Per Acre | Acres a Gallon Will Cover |
|---|---|---|---|
| methoxyfenozide (Intrepid 2) | 0.063 - 0.125 | 4 - 8 oz | 32 - 16 |
| spinetoram (Radiant SC 1) | 0.016 - 0.031 | 2 - 4 oz | 64 - 32 |
| spinetoram, methoxyfenozide (Intrepid Edge) | See label | 4 - 6.4 oz | 32 - 20 |
| spinosad (Blackhawk 36% WDG) | 0.034 - 0.05 | 1.1 - 2.2 oz | 14.5 - 7.3 |
| **CORN EARWORM** | | | |
| bifenthrin (Brigade 2E, Discipline 2E, Fanfare 2E) | 0.063 - 0.10 | 4 - 6.4 oz | 32 - 20 |
| carbaryl (Sevin 80S)<br>(Sevin XLR Plus) | 0.5 - 1.5<br>0.5 - 1.5 | 0.67 - 1.25 lb<br>16 - 48 oz | ---<br>8 - 2.7 |
| chlorantraniliprole (Prevathon 0.43 SC) | 0.047 - 0.067 | 14 - 20 oz | 9.1 - 6.4 |
| chlorantraniliprole, λ-cyhalothrin (Besiege) | See label | 6 - 8 oz | 21.3 - 16 |
| esfenvalerate (Asana XL 0.66E) | 0.03 - 0.05 | 5.8 - 9.6 oz | 22 - 13 |
| indoxacarb (Steward 1.25) | 0.055 - 0.11 | 5.6 - 11.3 oz | 22.8 - 11.5 |
| methomyl (Lannate LV 2.4) | 0.23 - 0.45 | 12 - 24 oz | 10.7 - 5.3 |
| NPV virus (Heligen) | ---- | 1.0 - 1.6 oz | 128 - 80 |
| permethrin (Pounce 3.2E) | 0.1 - 0.2 | 4 - 8 oz | 32 - 16 |
| spinetoram (Radiant SC 1) | 0.031 | 4 oz | 32 |
| spinetoram, methoxyfenozide (Intrepid Edge) | See label | 4 - 6.4 oz | 32 - 20 |
| spinosad (Blackhawk 36% WDG) | 0.038 - 0.05 | 1.7 - 2.2 oz | 9.4 - 7.3 |
| β-cyfluthrin (Baythroid XL 1) | 0.0125 - 0.022 | 1.6 - 2.8 oz | 80 - 46 |
| γ-cyhalothrin (Declare 1.25) | 0.0098 - 0.0125 | 1 - 1.28 oz | 128 - 100 |
| λ-cyhalothrin (Karate 2.08, Warrior II) | 0.015 - 0.025 | 0.96 - 1.6 oz | 133 - 80 |
| Z-cypermethrin (Mustang Max 0.8E) | 0.0175 - 0.025 | 2.8 - 4 oz | 45 - 32 |
| **FALL ARMYWORM** | | | |
| acephate 90 (Orthene 90S) | 0.75 - 0.99 | 0.83 - 1.10 lb | --- |
| bifenthrin (Brigade 2E, Discipline 2E, Fanfare 2E) | 0.063 - 0.10 | 4 - 6.4 oz | 32 - 20 |
| carbaryl (Sevin 80S)<br>(Sevin XLR Plus) | 1.0 - 1.5<br>1.0 - 1.5 | 1.25 - 1.875 lb<br>32 - 48 oz | ---<br>4 - 2.7 |
| chlorantraniliprole (Prevathon 0.43 SC) | 0.047 -0.067 | 14 - 20 oz | 9.1 - 6.4 |
| chlorantraniliprole, λ-cyhalothrin (Besiege) | See label | 8 - 10 oz | 16 – 12.8 |
| indoxacarb (Steward 1.25) | 0.055 - 0.11 | 5.6 - 11.3 oz | 22.8 - 11.5 |
| methomyl (Lannate LV 2.4) | 0.23 - 0.45 | 12 - 24 oz | 10.7 - 5.3 |
| methoxyfenozide (Intrepid 2) | 0.063 - 0.125 | 4 - 8 oz | 32 - 16 |
| spinetoram (Radiant SC 1) | 0.031 | 4 oz | 32 |
| spinetoram, methoxyfenozide (Intrepid Edge) | See label | 4 - 6.4 oz | 32 - 20 |
| spinosad (Blackhawk 36% WDG) | 0.038 - 0.05 | 1.7 - 2.2 oz | 9.4 - 7.3 |
| β-cyfluthrin (Baythroid XL 1) | 0.0125 - 0.022 | 1.6 - 2.8 oz | 80 - 45 |
| γ-cyhalothrin (Declare 1.25) | 0.065 - 0.075 | 1.28 - 1.54 oz | 100 - 83 |
| λ-cyhalothrin (Karate 2.08, Warrior II) | 0.025 - 0.03 | 1.6 - 1.92 oz | 80 - 67 |

| Insects and Chemicals (Trade Names) | Lbs Active Ingredient Per Acre | Amount Formulation Per Acre | Acres a Gallon Will Cover |
|---|---|---|---|
| Z-cypermethrin (Mustang Max 0.8E) | 0.020 - 0.025 | 3.2 - 4 oz | 40 - 32 |
| **STINK BUGS** | | | |
| acephate 90 (Orthene 90S) | 0.50 - 0.99 | 0.56 - 1.10 lb | --- |
| bifenthrin (Brigade 2E, Discipline 2E, Fanfare 2E) | 0.063 - 0.10 | 4 - 6.4 oz | 32 - 20 |
| methyl parathion 4 (Methyl 4E) | 0.3 - 1.0 | 12 - 32 oz | 10.6 - 4 |
| β-cyfluthrin (Baythroid XL 1) | 0.025 - 0.044 | 1.6 - 2.8 oz | 80 - 45 |
| γ-cyhalothrin (Declare 1.25) | 0.0125-0.015 | 1.28-1.54 oz | 100 - 80 |
| λ-cyhalothrin (Karate 2.08, Warrior II) | 0.025 - 0.030 | 1.6 - 1.9 oz | 80 - 67 |
| Z-cypermethrin (Mustang Max 0.8E) | 0.020 - 0.025 | 3.2 - 4 oz | 40 - 32 |
| **SPIDER MITES** | | | |
| abamectin (Agri-Mek SC 0.7) | 0.01 - 0.019 | 1.75 - 3.5 oz | 73 - 36.6 |
| bifenthrin (Brigade 2E, Discipline 2E, Fanfare 2E) * | 0.063 - 0.10 | 4 - 6.4 oz | 32 - 20 |
| chlorpyrifos (Lorsban 4E, Nufos 4E) *<br>(Lorsban Advanced 3.755) * | 0.25 - 0.5<br>0.25 - 0.47 | 8 - 16 oz<br>8.5 - 16 oz | 16 - 8<br>15.1 - 8 |
| dimethoate 4 * | 0.5 | 16 oz | 8 |
| etoxazole (Zeal SC 2.88) | 0.045 - 0.135 | 2 - 6 oz | 64 - 21.3 |
| **SOYBEAN APHID** | | | |
| acephate 90 (Orthene 90S) | 0.75 - 0.99 | 0.83 - 1.10 lb | --- |
| bifenthrin (Brigade 2E, Discipline 2E, Fanfare 2E) | 0.063 - 0.10 | 4 - 6.4 oz | 32 - 20 |
| chlorpyrifos (Lorsban 4E, Nufos 4E)<br>(Lorsban Advanced 3.755) | 0.50 - 1.0<br>0.50 - 0.94 | 16 - 32 oz<br>17 - 32 oz | 8 - 4<br>7.5 - 4 |
| γ-cyhalothrin (Declare 1.25) | 0.010 - 0.0125 | 1.0 - 1.28 oz | 125 - 100 |
| λ-cyhalothrin (Karate 2.08, Warrior II) | 0.025 - 0.030 | 1.6 - 1.9 oz | 80 - 67 |
| Z-cypermethrin (Mustang Max 0.8E) | 0.0175 - 0.025 | 2.8 - 4 oz | 45 - 32 |
| **KUDZU BUG** | | | |
| acephate 90 (Orthene 90S) | 0.75 - 0.99 | 0.83 - 1.10 lb | --- |
| bifenthrin (Brigade 2E, Discipline 2E, Fanfare 2E) | 0.078 - 0.10 | 5 - 6.4 oz | 25.6 - 20 |
| γ-cyhalothrin (Declare 1.25) | 0.0125 - 0.015 | 1.28 - 1.54 oz | 100 - 83 |
| λ-cyhalothrin (Karate 2.08, Warrior II) | 0.031 | 1.92 oz | 67 |
| Z-cypermethrin (Mustang Max 0.8E) | 0.025 | 4 oz | 32 |

* May only provide suppression of spider mites.

** NPV virus (Heligen) will only control corn earworm. Applications should be made when larvae are small. Do not apply if most larvae are large or if infestations are well above treatment threshold.

## Premixed Insecticide Products

The following products are available as premixes of two or more insecticides. The use of premixes may provide suppression or control of multiple pests, and thus are typically recommended when several pests are present at treatment level.

| Trade Name (Insecticides) | Amount Product per Acre | Acres Treated per Gal of Product | Primary Target Pests (see label for other pests that may be controlled) |
|---|---|---|---|
| Besiege (chlorantraniliprole, λ-cyhalothrin) | 5 - 10 oz | 25.6 - 12.8 | Caterpillars, stink bugs, threecornered alfalfa hopper, kudzu bug |
| Brigadier (imidacloprid, bifenthrin) | 4 - 6.1 oz | 32 - 21 | Corn earworm, green cloverworm, stink bugs, kudzu bug |
| Cobalt Advanced (chlorpyrifos, γ-cyhalothrin) | 22 - 38 oz | 5.8 - 3.3 | Stink bugs, corn earworm, green cloverworm, threecornered alfalfa hopper |
| Double Take (diflubenzuron, λ-cyhalothrin) | 2 - 4 oz | 64 - 32 | Green cloverworm, stink bugs, threecornered alfalfa hoppers, kudzu bug, grasshoppers |
| Endigo ZC (thiamethoxam, λ-cyhalothrin) | 3.5 - 4.5 oz | 36.6 - 28.4 | Stink bugs, corn earworm, green cloverworm, threecornered alfalfa hopper, kudzu bug |
| Hero (bifenthrin, Z-cypermethrin) | 4 - 10.3 oz | 32 - 12.4 | Stink bugs, corn earworm, green cloverworm, threecornered alfalfa hopper, kudzu bug |
| Intrepid Edge (methoxyfenozide, spinetoram) | 4 - 6.4 oz | 32 - 20 | Most caterpillar pests |
| Justice (acetamiprid, bifenthrin) | 3 - 5 oz | 32 - 25.6 | Bean leaf beetle, aphids, armyworms, kudzu bugs |
| Leverage 360 (imidacloprid, β-cyfluthrin) | 2.8 oz | 45.7 | Stink bugs, corn earworm, green cloverworm, threecornered alfalfa hopper |
| Stallion (chlorpyrifos, Z-cypermethrin) | 9.25 - 11.75 oz | 13.8 - 10.9 | Stink bugs, corn earworm, green cloverworm, threecornered alfalfa hopper |
| Triple Crown (Z-cypermethrin, bifenthrin, imidacloprid) | 3.5 - 4.8 oz | 36.6 - 26.7 | Stink bugs, corn earworm, green cloverworm, threecornered alfalfa hopper, kudzu bug |