



How to Use This Guide

This publication was prepared to help producers manage insect populations with the best available methods proven practical under Kansas conditions. It is revised annually and intended for use during this calendar year. The user should be aware that pesticide label directions and restrictions are subject to change, and some may have changed since this publication was written. The economics of control should be considered in any pest management decision. Because costs vary greatly over time and are influenced by factors beyond the scope of this publication, product cost in general is not considered a reason for including or omitting specific insecticide products in these recommendations. Always compare product price, safety and availability when making treatment decisions. The user bears ultimate responsibility for correct pesticide use and should always read label directions carefully before making pesticide applications. Remember, it is illegal to use a pesticide in a manner inconsistent with the label. Additional problem-specific information may be available through the local K-State Research and Extension office and on our Website at: <http://www.entomology.ksu.edu/extension/>. Kansas State University entomologists assume no responsibility for product performance, personal injury, property damage, or other types of loss resulting from the handling or use of the pesticides listed.

Sampling Techniques

Surveying for soybean insects attacking aboveground plant parts is not difficult if beans are planted in rows. On plants less than a foot high, insect densities can be established by kneeling along the row, turning over leaves and looking for insects. On larger plants a shake cloth technique is generally recommended. Place a 3-foot square cloth between the soybean rows. Bend about 1.5 row feet of plants from adjacent rows over the cloth, and shake vigorously for a few seconds. Count the

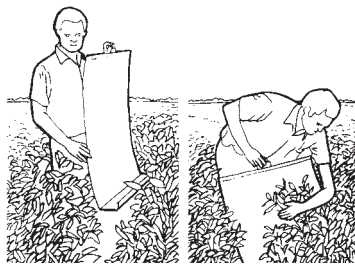
insects that fall on the cloth. Repeat this operation in at least 10 locations per field, and average the results. Use of a slick-sided material will help keep the insects from



Ground cloth sampling method

crawling away before they are counted.

To survey narrow-row or drilled soybeans for insects use the "Texas Vertical Beat Sheet." This device is made of a piece of galvanized metal flashing or similarly stiff material, 36 inches wide, 32 inches tall and crimped on the bottom to form a collecting trough 4 inches wide. Place it next to the row and shake plants against the vertical surface. Dislodged arthropods slide into the trough where they can be counted or poured into a container to be counted elsewhere.



Vertical beat sheet method

Seed-Attacking Insects

Seedcorn Beetle, Seedcorn Maggot

These are soil-infesting insects that attack seeds. Damage is heaviest in cool, wet springs when emergence is delayed. Recent problems in Kansas seem to be most serious where heavy rates of liquid or solid livestock manure have been spread on the field just before planting or where

soybeans are planted in no-till situations.

Some planter box seed treatments containing permethrin (Kernel Guard Supreme or KickStart VP) are labeled for controlling these pests in soybeans. In addition, the seed treatments thiamethoxam (Cruiser 5FS or CrusierMaxx) and imidacloprid (Attendant, Dyna-Shield Imidacloprid and Senator) are labeled for protecting soybeans against the seed corn maggot. Follow label directions and DO NOT use leftover seed for food, oil, or livestock feed.

Aphids

Soybean Aphid

The soybean aphid, *Aphis glycines*, has been present in eastern Kansas since 2002. It became widely distributed throughout soybean-growing regions of the state in 2004, with populations approaching damaging levels in some areas. From 2004 to 2007 soybean aphid populations were relatively low with no reports of serious injury. But in 2008 populations were again well established in northeast Kansas. The cool weather during the summers of 2004 and 2008 is thought to be responsible for the abundance of soybean aphids during those summers. Temperatures above 70 degrees Fahrenheit are suboptimal for to soybean aphid populations.

The soybean aphid is a small, yellowish or lime-green aphid with black cornicles. During vegetative growth look for aphids under young upper leaves, petioles, and stems. Later in the season, when soybeans are in the reproductive stage, look for aphids in the mid-canopy leaves and on the stems and pods. Other aphid species occasionally infest soybean, but soybean aphid is the only one to develop large colonies.

Growers are encouraged to be watchful for this pest in eastern Kansas, but to resist the temptation to treat it until populations exceed established thresholds (around 50 aphids per leaflet in vegetative plants, and 250 aphids per plant from onset of bloom through pod fill). This threshold incor-

porates an approximate 7-day lead-time between scouting and treatment to allow time for spray arrangements or weather delays. Soybeans in early reproductive stages appear most susceptible to yield loss that takes the form of reduced pod numbers. Aphid populations on maturing plants are typically in decline and producing winged forms that will leave the field. Treating these fields generally is not justified.

Several seed treatments are labeled for early season protection against soybean aphid. Although infestations in Kansas have not warranted the use of seed treat-

ments, there might be justification for treating late-planted or double cropped soybeans in northeast Kansas in years of high soybean aphid populations.

If significant populations of aphids are observed on soybeans in Kansas, please contact a local K-State Research and Extension office or e-mail jwhitwor@ksu.edu so the infestation can be tracked and studied. As it becomes available, more information will be posted on the K-State entomology Website at: www.oznet.ksu.edu/entomology/extension/InsectInfo/Soybeanaphid.htm.

For more information on this pest see

MF-2582, *The Soybean Aphid: A New Pest in Kansas Soybeans*, which can be found on the Web at www.ksre.ksu.edu/library/entml2/MF2582.pdf.

Beetles

Bean Leaf Beetle

The bean leaf beetle is a red to light tan, ¼-inch-long beetle found in all parts of the state. The upper back is marked by six black spots near the midline bordered by a narrow black band. Insects react to nearby disturbances by dropping to the ground.

Typically, bean leaf beetles chew oval

Soybean Aphid Management Options

Insecticide	Rate
Acephate (selected formulations of Acephate, Bracket and Orthene)	(See supplemental labels for formulations and rates.)
Beta-cyfluthrin (Baythroid XL)	0.0155 to 0.022 lbs. a.i./acre (2.0 to 2.8 fl. oz.)
Chlorpyrifos (numerous products)	Check label, but generally 1 to 2 pints/acre
Chlorpyrifos plus gamma-cyhalothrin (Cobalt)	13 to 26 fl. oz. of product/acre
Chlorpyrifos plus zeta-cypermethrin (Stallion)	5.0 to 11.75 fl. oz./acre
Deltamethrin (Delta Gold)	0.018 to 0.022 lb. a.i./acre (1.5 to 1.9 fl. oz.)
Esfenvalerate (Asana XL 0.66)	2ee label, apply 0.03 to 0.05 lb. a.i./acre (5.8 to 9.6 fl. oz.)
Gamma-cyhalothrin* (Proaxis)	0.0075 to 0.0125 lb. a.i./acre (1.92 to 3.20 fl. oz/acre)
Imidacloprid (Alias 4F, Sherpa)	Check labels
Imidacloprid plus cyfluthrin (Leverage)	2.8 fl. oz./acre
Lambda-cyhalothrin (numerous products)	0.015 to 0.025 lb. a.i./acre
Lambda-cyhalothrin plus thiamethoxam (Endigo ZC)	2.5 to 3.5 fl. oz./acre
Methyl parathion (Cheminova Methyl 4 EC)	0.375 to 1.0 lb. a.i./acre (³ »4 to 2 pt.)
Microencapsulated Methyl Parathion (PennCapM)	0.25 to 0.75 lb. a.i./acre (1 to 3 pt.)
Permethrin (Pounce 3.2 E)	2ee label (Agrisolutions), 0.1 to 0.2 lb. a.i./acre (4 to 8 fl. oz.)
Zeta-cypermethrin (Mustang MAX EC)	0.0175 to 0.025 lb. a.i./acre (2.8 to 4.0 fl. oz.)
Zeta-cypermethrin plus bifenthrin (Hero)	4.0 to 10.3 fl. oz. of product/acre

Bean Leaf Beetle Management Options

Insecticide	Rate
Acephate ((Acephate, Bracket, or Orthene)	(See supplemental labels for formulations and rates.)
Beta-cyfluthrin (Baythroid XL)	0.0125 to 0.022 lbs. a.i./acre (1.6 to 2.8 fl. oz.)
Carbaryl (Sevin)	0.5 to 1 lb. a.i./acre
Chlorpyrifos (numerous products)	Check label, but generally 1 to 2 pints/acre
Chlorpyrifos plus gamma-cyhalothrin (Cobalt)	19 to 38 fl. oz. of product/acre
Chlorpyrifos plus zeta-cypermethrin (Stallion)	5.0 to 11.75 fl. oz./acre
Cyfluthrin (Tombstone)	Growth stage VC–V2: 0.8 After V2: 1.6–2.8 fl. oz/acre, see label
Deltamethrin (Delta Gold)	0.018 to 0.022 lb. a.i./acre (1.5 to 1.9 fl. oz.)
Dimethoate (Check labels – bean leaf beetles are not listed on all labels).	0.5 lb. a.i./acre
Esfenvalerate (Asana XL 0.66)	0.03 to 0.05 lb. a.i./acre (5.8 to 9.6 fl. oz.)
Gamma-cyhalothrin (Proaxis)	0.0075 to 0.0125 lb. a.i./acre (1.92 to 3.20 fl. oz.)
Imidacloprid (Alias 4F, Sherpa)	Check labels
Imidacloprid plus cyfluthrin (Leverage)	2.8 fl. oz./acre
Lambda-cyhalothrin (numerous products)	0.015 to 0.025 lb a.i./acre
Lambda-cyhalothrin plus thiamethoxam (Endigo ZC)	3.5 to 4.5 fl. oz./acre
Microencapsulated Methyl Parathion (PennCap M)	0.5 to 0.75 lb. a.i./acre (2 to 3 pt.).
Permethrin (multiple products)	0.05 to 0.10 lb. a.i./acre
Thiodicarb (Larvin EC)	0.45 to 0.75 lb. a.i./acre
Zeta-cypermethrin (Mustang MAX EC)	0.0175 to 0.025 lb. a.i./acre (2.8 to 4.0 fl. oz.)
Zeta-cypermethrin plus bifenthrin (Hero)	2.6 to 6.1 fl. oz. of product/acre

holes in the foliage, which is of little economic consequence. Border rows of emerging soybeans may support populations capable of causing localized economic loss. Severe cotyledon feeding, threatened destruction of the growing point, or populations of seven beetles per row-foot on soybeans with four or fewer nodes and 25 percent defoliation, may justify limited-area treatments.

In most years, 50 or more beetles per row-foot are required to reduce yields in late season. Treatments may be justified if pod feeding results in the loss of three or more seeds per plant, if pods are not completely dry, or if beetles are not yet leaving the fields. This insect is known to transmit bean pod mottle virus disease. Research is ongoing to determine if reducing the treatment threshold would reduce the chance of plants being affected by this disease.

Several seed treatments are labeled for early season protection against bean leaf beetle. But unless bean leaf beetle populations are a recurring problem, some other controllable threat would be needed to justify the use of a systemic seed treatment.

Blister Beetles

Foliage feeding is generally localized, with only large aggregations causing economic problems. Rarely is more than

spot treatment required. Research has shown that soybean plants can withstand as much as 35 percent foliage loss during the blooming period. But when pods are forming and beginning to fill, a foliage loss of 20 percent or more may decrease yields. Defoliation rarely causes a yield reduction after the beans are nearly filled.

Soybean Stem Borer

The *Dectes* stem borer is a small, grayish longhorned beetle which lays its eggs in soybean petioles. Larvae tunnel down the petiole and into the stem, causing the entire leaf to wilt and die. Dead, wilted and drying leaves above the normal senescence zone at the bottom of the plant can help identify stem borer infestations. Bored stalks reveal reddish interior discoloration when split.

By the time the plants reach physiological maturity, the larva will have tunneled to the base of the plant. As the plants dry out, larvae girdle the stalk internally, which weakens stems and induces lodging. Larvae overwinter in the stem bases, plugging the hollowed section near the girdling point so the stem base appears solid. The larvae are cannibalistic, so only one insect is present within each infested plant late in the year.

Windy conditions cause girdled-plants

to lodge, causing significant harvesting problems and yield losses. Serious damage has been most common in south central Kansas, but is increasing in north central and western Kansas.

No resistant varieties are currently available for this pest. Recent insecticide trials have shown that some of the pyrethroid insecticides labeled for use on soybeans can provide good control of adult beetles for several days. However, since adult beetles emerge over several weeks and remain active for up to two months, multiple applications maybe needed to significantly reduce larval infestations. Since the timing, economics and treatment thresholds for such applications are not fully understood, treatment for this pest is not recommended.

Fields should be sampled before maturity for the presence of stem borer tunneling and live larvae by carefully splitting stems from several locations throughout the field. Fields with high percentages of infested stems should be harvested as soon as possible to avoid girdling and lodging. Recent research has revealed that the onset of girdling is associated with stalk desiccation, so timely harvest is especially important under conditions of low soil moisture.

More information on this pest is avail-

Blister Beetle Management Options

Insecticide	Rate
Beta-cyfluthrin (Baythroid XL)	0.0125 to 0.022 lbs. a.i./acre (1.6 to 2.8 fl. oz.)
Carbaryl (Sevin)	0.5 to 1 lb. a.i./acre
Chlorpyrifos plus gamma-cyhalothrin (Cobalt)	13 to 26 fl. oz. of product/acre
Chlorpyrifos plus zeta-cypermethrin (Stallion)	5.0 to 11.75 fl. oz./acre
Cyfluthrin (Tombstone)	0.025 to 0.044 lb. a.i./acre (1.6 to 2.8 fl. oz./a)
Gamma-cyhalothrin (Proaxis)	0.0125 to 0.015 lb. a.i./acre (3.20 to 3.84 fl. oz.)
Lambda-cyhalothrin (numerous products)	0.025 to 0.030 lb. a.i./acre
Lambda-cyhalothrin plus thiamethoxam (Endigo ZC)	3.5 to 4.5 fl. oz./acre
Methyl parathion (Cheminova Methyl 4 EC)	0.375 to 1.0 lb. a.i./acre. (3/4 to 2 pt.
Zeta-cypermethrin (Mustang MAX EC)	0.0175 to 0.025 lb. a.i./acre (2.8 to 4.0 fl. oz.)
Zeta-cypermethrin plus bifenthrin (Hero)	4.0 to 10.3 fl. oz. of product/acre

Blister Beetle Management Options

Insecticide	Rate
Beta-cyfluthrin (Baythroid XL)	0.0125 to 0.022 lbs. a.i./acre (1.6 to 2.8 fl. oz.)
Carbaryl (Sevin)	0.5 to 1 lb. a.i./acre
Chlorpyrifos plus gamma-cyhalothrin (Cobalt)	13 to 26 fl. oz. of product/acre
Chlorpyrifos plus zeta-cypermethrin (Stallion)	5.0 to 11.75 fl. oz./acre
Cyfluthrin (Tombstone)	0.025 to 0.044 lb. a.i./acre (1.6 to 2.8 fl. oz./a)
Gamma-cyhalothrin (Proaxis)	0.0125 to 0.015 lb. a.i./acre (3.20 to 3.84 fl. oz.)
Lambda-cyhalothrin (numerous products)	0.025 to 0.030 lb. a.i./acre
Lambda-cyhalothrin plus thiamethoxam (Endigo ZC)	3.5 to 4.5 fl. oz./acre
Methyl parathion (Cheminova Methyl 4 EC)	0.375 to 1.0 lb. a.i./acre. (3/4 to 2 pt.
Zeta-cypermethrin (Mustang MAX EC)	0.0175 to 0.025 lb. a.i./acre (2.8 to 4.0 fl. oz.)
Zeta-cypermethrin plus bifenthrin (Hero)	4.0 to 10.3 fl. oz. of product/acre

able in the publication, *The Soybean Stem Borer*, on the Web at: <http://www.ksre.ksu.edu/library/entml2/MF2581.pdf>

Miscellaneous Pests

Grasshoppers

Grasshopper damage may occur from June through September. Initially, hoppers accumulate on vegetation bordering the field. If a significant population exists,

nearby noncrop areas should be treated with an insecticide labeled for this purpose before migration starts. Nymphs are easier to control than adults. Observe precautions if soybean foliage is treated directly.

Spider Mites

Heavy infestations of spider mites, particularly in dry years, can cause leaves to turn yellow, then gray-green, and finally bronze. Leaves prematurely drop from

plants. Treatment decisions are not easy because drought stress can exacerbate mite damage and impede plant recovery. Plants losing more than 50 percent of their foliage during bloom and pod set may stop producing foliage until more favorable growing conditions return. Treatments may be beneficial if significant pod or seed filling remains and leaves have not yellowed. The use of drop nozzles may

Grasshopper Management Options

Field Sprays

Insecticide	Rate
Acephate (Acephate, Bracket, or Orthene)	(See supplemental labels for formulations and rates.)
Beta-cyfluthrin (Baythroid XL)	0.0155 to 0.022 lb. a.i./acre (2.0 to 2.8 fl. oz.)
Carbaryl (Sevin)	0.5 to 1.5 lb. a.i./acre
Chlorpyrifos (numerous products)	Check label, but generally 1/2 to 1 pint/acre
Chlorpyrifos plus gamma-cyhalothrin (Cobalt)	7 to 13 fl. oz. of product/acre
Chlorpyrifos plus zeta-cypermethrin (Stallion)	5.0 to 11.75 fl. oz./acre
Cyfluthrin (Tombstone)	0.031 to 0.044 lb. a.i./acre (2.0 to 2.8 fl. oz. /acre)
Deltamethrin (Delta Gold)	0.018 to 0.022 lb. a.i./acre (1.5 to 1.9 fl. oz.)
Diflubenzuron (Dimilin 2L)	0.03125 lb. a.i./acre (2 fl. oz. per acre). Treat when the majority of the infesting grasshoppers have reached the 2nd to 3rd nymphal stage. Treatment is not effective controlling grasshoppers once they have reached the adult stage.
Dimethoate (Dimethoate or Dimate)	0.5 lb. a.i./acre.)
Esfenvalerate (Asana XL 0.66)	0.03 to 0.05 lb. a.i./acre (5.8 to 9.6 fl. oz.)
Gamma-cyhalothrin (Proaxis)	0.0125 to 0.015 lb. a.i./acre (3.20 to 3.84 fl. oz.)
Imidacloprid plus cyfluthrin (Leverage)	2.8 fl. oz./acre
Lambda-cyhalothrin (numerous products)	0.025 to 0.03 lb. a.i./acre
Lambda-cyhalothrin plus thiamethoxam (Endigo ZC)	3.5 to 4.5 fl. oz./acre
Microencapsulated Methyl Parathion (PennCap M)	0.5 to 0.75 lb. a.i./acre (2 to 3 pt.)
Zeta-cypermethrin (Mustang MAX EC)	0.0175 to 0.025 lb. a.i./acre (2.8 to 4.0 fl. oz.)
Zeta-cypermethrin plus bifenthrin (Hero)	2.6 to 6.1 fl. oz. of product/acre

Noncrop Area Treatments

Insecticide	Rate	Special Instructions
Acephate (Bracket 90 Orthene 75S)	0.25 lb. a.i./acre	Apply in 10 to 20 gallons by ground, or in 1 to 5 gallons by air. Use as a treatment on ditch banks, roadsides, and field borders. Do not feed or graze treated forage.
Beta-cyfluthrin (Baythroid XL)	2.6 to 2.8 fl. oz./acre	Labeled for use in pastures, rangeland, grass for hay, and grass grown for seed. PHI is 0 days.
Carbaryl (Sevin 4F, 80S, XLR)	0.5 to 1.5 lb. a.i./acre	Apply to noncropland (CRP acreage, set-aside acreage, wasteland, rights-of-way, hedgerows, ditch banks, and roadsides). PHI is 14 days for grazing or harvest of forage for hay. (Label lists control of grasshoppers on multiple sites, which would include noncropland because that site is listed on the label.) Also labeled for use on rangeland at 0.5 to 1.5 a.i./acre where harvesting or grazing is allowed the same day as treatment.
Diflubenzuron (Dimilin 2L)	0.03125 lb. a.i./acre (2 fl. oz. per acre)	Apply to manage grasshoppers in breeding areas before they move into crop land. Treat early instars (majority in the second to third nymphal stages). For use on field border, fence rows, roadsides, farmsteads, ditchbanks, wasteland, and CRP land. REI is 12 hours.
Esfenvalerate (Asana)	0.015 to 0.03 lb. a.i./acre (2.9 to 5.8 fl.oz./acre of Asana XL)	This label is for noncrop use on land adjacent to tilled area to control migrating insects. Repeat as needed, but do not exceed 0.5 lb. a.i./acre per year. Do not feed the treated vegetation. Do not spray ditch banks or areas adjacent to water.
Gamma-cyhalothrin (Proaxis)	0.01 to 0.015 lb. a.i./acre (2.56 to 3.84 fl. oz. per acre)	Spray non-cropland adjacent to agricultural areas to control migratory insects that may threaten crops. Use highest labeled rates for dense/tall foliage, high insect populations and/or larger insects. Do not graze livestock in treated area. REI is 24 hours
Lambda-cyhalothrin (numerous products)	0.02 to 0.03 lb. a.i./acre	Spray non-cropland adjacent to agricultural areas to control migratory insects that may threaten crops. Use highest labeled rates for dense/tall foliage, high insect populations and/or larger insects. Do not graze livestock in treated area. REI is 24 hours.
Zeta-cypermethrin (Mustang MAX EC)	0.0175 to 0.025 lb. a.i./acre (2.8 to 4.0 fl. oz. per acre)	Labeled for use on grass forage, fodder, pasture, and rangeland with a 12 hour REI and a 0-day harvest restriction on forage. Thus, this material may be used to treat these areas when grasshoppers are threatening to move from these areas into neighboring crop fields.

enhance control by improving coverage of the undersides of leaves. Complete control is difficult to achieve. Mite problems typically develop near gravel roads (where road dust stresses plants by coating leaf surfaces), or downwind of newly swathed alfalfa fields or mowed roadside right-of-ways, which can serve as sources of emigrating mites.

Stink Bugs

Stink bugs are usually only damaging in south-central, central and southeast Kansas. Shrunken and deformed seeds can result from pod feeding. Controls should be applied when 10 bugs per 30 feet of row are found. More information on this pest is available in the publication MF-2891, *Stink Bugs on the Web* at: www.ksre.ksu.edu/library/entml2/mf2891.pdf. Localized infestations can be spot treated.

Worms

Corn Earworm

Corn earworm damage to soybeans occurs from August through September. Significant damage may occur when large larvae feed on pods consuming the developing seeds. Fields should be scouted for small larvae beginning at bloom. Control measures should be implemented when an average of one small worm per foot of row is detected.

Spider Mite Management Options

Insecticide	Rate
Chlorpyrifos (numerous products)	Check label, but generally 1 pt./acre
Chlorpyrifos plus gamma-cyhalothrin (Cobalt)	2ee label, 13-26 fl. oz./acre
Dimethoate (Dimethoate or Dimate)	0.5 lb. a.i./acre
Zeta-cypermethrin plus bifenthrin (Hero)	10.3 fl. oz. of product/acre

Stink Bug Management Options

Insecticide	Rate
Acephate (Acephate, Bracket, or Orthene)	(See supplemental labels for formulations and rates.)
Beta-cyfluthrin (Baythroid XL)	0.0125 to 0.022 lbs. a.i./acre (1.6 to 2.8 fl. oz.)
Carbaryl (Sevin)	1 lb. a.i./acre
Chlorpyrifos (numerous products)	Check label, but generally 2 pints/acre
Chlorpyrifos plus gamma-cyhalothrin (Cobalt)	19 to 38 fl. oz. of product/acre
Chlorpyrifos plus zeta-cypermethrin (Stallion)	9.25 to 11.75 fl. oz./acre
Cyfluthrin (Tombstone)	0.025 to 0.044 lb. a.i./acre (1.6 to 2.8 fl. oz.)
Deltamethrin (Delta Gold)	0.018 to 0.022 lb. a.i./acre (1.5 to 1.9 fl. oz.)
Esfenvalerate (Asana XL 0.66)	0.03 to 0.05 lb. a.i./acre (5.8 to 9.6 fl. oz.)
Gamma-cyhalothrin (Proaxis)	0.0125 to 0.015 lb. a.i./acre (3.20 to 3.84 fl. oz.)
Imidacloprid plus cyfluthrin (Leverage)	2.8 fl. oz./acre
Lambda-cyhalothrin (numerous products)	0.025 to 0.030 lb. a.i./acre
Lambda-cyhalothrin plus thiamethoxam (Endigo ZC)	3.5 to 4.5 fl. oz./acre
Methyl Parathion (Cheminova Methyl 4 EC)	0.375 to 0.1 lb. a.i./acre (¾ to 2 pt.)
Microencapsulated Methyl Parathion (PennCap M)	0.25 to 0.75 lb. a.i./acre (1 to 3 pt.)
Zeta-cypermethrin plus bifenthrin (Hero)	4.0 to 10.3 fl. oz. of product/acre

Corn Earworm Management Options

Insecticide	Rate
Beta-cyfluthrin (Baythroid XL)	0.0125 to 0.022 lbs. a.i./acre (1.6 to 2.8 fl. oz.)
Carbaryl (Sevin)	1.5 lb. a.i./acre
Chlorpyrifos (numerous products)	Check label, but generally 1 to 2 pints/acre
Chlorpyrifos plus gamma-cyhalothrin (Cobalt)	19 to 38 fl. oz. of product/acre
Chlorpyrifos plus zeta-cypermethrin (Stallion)	9.25 to 11.75 fl. oz./acre
Cyfluthrin (Tombstone)	0.025 to 0.044 lb. a.i./acre (1.6 to 2.8 fl. oz./a)
Deltamethrin (Delta Gold)	0.012 to 0.018 lb. a.i./acre (1 to 1.5 fl. oz.)
Esfenvalerate (Asana XL 0.66)	0.03 to 0.05 lb. a.i./acre (5.8 to 9.5 fl. oz.)
Flubendiamide (Belt)	2.0 to 3.0 fl. oz./acre
Gamma-cyhalothrin (Proaxis)	0.0075 to 0.0125 lb. a.i./acre (1.92 to 3.20 fl. oz.)
Imidacloprid plus cyfluthrin (Leverage)	2.8 fl. oz./acre
Indoxacarb (Seward 1.5 SC)	0.055 to 0.11 lb. a.i./acre (5.6 to 11.3 fl. oz.)
Lambda-cyhalothrin (numerous products)	0.015 to 0.025 lb. of a.i./acre
Lambda-cyhalothrin plus thiamethoxam (Endigo ZC)	2.5 to 3.5 fl. oz./acre
Methomyl (Lannate)	0.225 to 0.45 lb. a.i./acre when worms are up to ½ -inch long.
Methyl Parathion (Cheminova Methyl 4 EC)	1.0 lb. a.i./acre (2 pt.)
Permethrin (multiple products)	0.1 to 0.2 lb. a.i./acre
Spinosad (Tracer)	0.047 to 0.062 lb. a.i./acre (1.5 to 2 fl. oz.)
Zeta-cypermethrin (Mustang MAX EC)	0.0175 to 0.025 lb. a.i./acre (2.8 to 4.0 fl. oz.)
Zeta-cypermethrin plus bifenthrin (Hero)	4.0 to 10.3 fl. oz. of product/acre

Table 1. Guidelines for Determining the Need for Insecticides to Suppress Green Cloverworm Larvae on Soybeans

Soybean developmental stage	Resample in 7 to 10 days if: (do not treat)			Insecticides are probably justified (treat) if:		
	(Expected Market Value in \$/bu)			(Expected Market Value in \$/bu)		
	(\$5.00)	(\$6.50)	(\$8.00)	(\$5.00)	(\$6.50)	(\$8.00)
	The Average Number of Larvae per Foot of Row is ^{a,b,c}					
	Less than or equal to:			Greater than or equal to:		
Beginning bloom	5	4	4	10	9	9
Full bloom through early pod set	9	8	7	19	16	15
Full pod through beginning seed	7	6	5	15	13	11

a Resample in 3 to 4 days if the average larval density is between these values.

b Based on control costs of \$6.50/acre. Other factors including the prevalence of natural control agents, previous defoliation, moisture availability, larval age distribution, and yield potential may influence the no treat-resample-treat decision.

c Severe, extended weed competition may lower these treatment thresholds by pre-stressing the soybean plants before the insect defoliation develops. However, research in Iowa has shown that yield losses from velvetleaf competition and simulated green cloverworm defoliation are additive for practical purposes (velvetleaf densities below one weed per 5 feet of soybean row and defoliation during full-bloom).

Green Cloverworm Management Options

Insecticide	Rate
Acephate (Acephate, Bracket, or Orthene)	(See supplemental labels for formulations and rates.)
Bacillus thuringiensis (Biobit, Deliver, Dipel, Lepinox and Xentari)	Check labels: Rates vary by product and formulation.
Beta-cyfluthrin (Baythroid XL)	0.0065 to 0.0125 lbs. a.i./acre (0.8 to 1.6 fl. oz.)
Carbaryl (Sevin)	0.5 to 1 lb. a.i./acre
Chlorpyrifos (numerous products)	Check label, but generally 1/2 to 1 pint/acre
Chlorpyrifos plus gamma-cyhalothrin (Cobalt)	7 to 13 fl. oz. of product/acre
Chlorpyrifos plus zeta-cypermethrin (Stallion)	5.0 to 11.75 fl. oz./acre
Cyfluthrin (Tombstone)	0.013 to 0.025 lb. a.i./acre (0.8 to 1.6 fl. oz./acre)
Deltamethrin (Delta Gold)	0.012 to 0.018 lb. a.i./acre (1 to 1.5 fl. oz.)
Diflubenzuron (Dimilin 2L)	0.03125 to 0.0625 lb. a.i./acre (2 to 4 fl. oz. per acre). Make applications when larvae are small (less than 0.5 inches)
Esfenvalerate (Asana XL 0.66)	0.015 to 0.03 lb. a.i./acre (2.9 to 5.8 fl. oz.)
Flubendiamide (Belt)	2.0 to 3.0 fl. oz./acre
Gamma-cyhalothrin (Proaxis)	0.0075 to 0.0125 lb. a.i./acre (1.92 to 3.20 fl. oz.)
Imidacloprid plus cyfluthrin (Leverage)	2.8 fl. oz./acre
Indoxacarb (Steward 1.5 SC)	0.055 to 0.11 lb. a.i./acre (5.6 to 11.3 fl. oz.)
Lambda-cyhalothrin (numerous products)	0.015 to 0.025 lb. of a.i./acre
Lambda-cyhalothrin plus thiamethoxam (Endigo ZC)	2.5 to 3.5 fl. oz./acre
Methomyl (Lannate)	0.25 to 0.45 lb. a.i./acre. Light to moderate infestations of worms up to ¼-inch long may be controlled with 0.125 to 0.25 lb. a.i./acre. This rate has been shown to favor the survival of beneficial predators.
Methoxyfenozide (Intrepid 2F)	0.06 to 0.12 lb. a.i./acre (4 to 8 fl. oz)
Methyl Parathion (Cheminova Methyl 4 EC)	1.0 lb. a.i./acre (2 pt.)
Microencapsulated Methyl Parathion (PennCap M)	0.5 to 0.75 lb. a.i./acre (2 to 3 pt.)
Permethrin (multiple products)	0.05 to 0.10 lb. a.i./acre
Spinosad (Tracer)	0.047 to 0.062 lb. a.i./acre (1 to 2 fl. oz.)
Thiodicarb (Larvin EC)	0.25 to 0.4 lb. a.i./acre.
Zeta-cypermethrin (Mustang MAX EC)	0.0175 to 0.025 lb. a.i./acre (2.8 to 4.0 fl. oz.)
Zeta-cypermethrin plus bifenthrin (Hero)	2.6 to 6.1 fl. oz. of product/acre

Green Cloverworm

Green cloverworm larvae are light green with three pairs of white stripes running the length of the body. In addition to the three pairs of legs near the head, three pairs of fleshy legs appear near the middle of the body, and one additional pair occurs at the end of the body. Larvae wiggle vigorously when disturbed. Smaller stages may drop from the leaf when disturbed and hang from a silken thread. Larvae chew irregularly shaped holes in the leaves from July through September.

To determine if treatment is justified, sample a minimum of 10 locations in the field. Use a cloth and bend over one row-foot of soybeans on either side, shaking insects onto the cloth. Then calculate the average number of larvae per row-foot. Refer to Table 1 on page 4 to find what response, if any, is necessary. Note that treatment thresholds vary with stage of soybean development, density of larval

population, control costs, and expected soybean market value. This is an easy insect to kill, with most insecticides listing green cloverworm on the label.

Saltmarsh Caterpillar and other Woollybear Caterpillars

Woollybears are hairy (woolly), yellowish or brown caterpillars up to 2 inches in length. Populations are often overestimated because the larvae and damage are striking. The smaller larvae often are observed feeding in groups on the underside of the leaves, which quickly become skeletonized and die. The larger, showy larvae tend to feed exposed on the upper leaf surfaces. In 2006, scattered populations developed to levels justifying control.

Thistle Caterpillar

Soybean leaves may be webbed together by this hairy caterpillar (also known as the painted lady caterpillar). Larvae are

covered by branched black spines or hairs over much of the body. Treat if 10 or more caterpillars are found per foot of row, or where defoliation becomes severe (greater than 25 to 35 percent) during pod set.

Webworms

The garden webworm, a common webworm, is slender and green with three dark spots arranged in a triangle on the sides of each body segment. Each spot supports at least one hair. Larvae skeletonize the foliage in the protected, webbed area. If disturbed, larvae move backward rapidly.

Peak damage occurs July through August with multiple generations possible. The edges of some soybean fields in north-east Kansas became infested during 2001 with high numbers of webworms moving out of harvested alfalfa fields. Many fields in SE and central Kansas required treatment in 2009, and again in 2010.

Saltmarsh Caterpillar and other Woollybear Caterpillar Management Options

Insecticide	Rate
Beta-cyfluthrin (Baythroid XL)	0.0125 to 0.022 lbs. a.i./acre (1.6 to 2.8 fl. oz.)
Carbaryl (Sevin)	1.5 to 2 lb. a.i./acre
Chlorpyrifos (numerous products)	Check label, but generally 1 to 2 pints/acre
Chlorpyrifos plus gamma-cyhalothrin (Cobalt)	13 to 26 fl. oz. of product/acre
Cyfluthrin (Tombstone)	0.025 to 0.044 lb. a.i./acre (1.6 to 2.8 fl. oz./acre)
Deltamethrin (Delta Gold)	0.018 to 0.022 lb. a.i./acre (1.5 to 1.9 fl. oz.)
Esfenvalerate (Asana XL 0.66)	0.015 to 0.03 lb. a.i./acre (2.9 to 5.8 fl. oz.)
Gamma-cyhalothrin (Proaxis)	0.0075 to 0.0125 lb. a.i./acre (1.92 to 3.20 fl. oz.)
Imidacloprid plus cyfluthrin (Leverage)	3.8 fl. oz./acre
Lambda-cyhalothrin (numerous products)	0.015 to 0.025 lb. a.i./acre
Lambda-cyhalothrin plus thiamethoxam (Endigo ZC)	2.5 to 3.5 fl. oz./acre
Methoxyfenozide (Intrepid 2F)	0.06 to 0.12 lb. a.i./acre (4 to 8 fl. oz.)
Permethrin (multiple products)	0.05 to 0.10 lb. a.i./acre
Spinosad (Tracer)	0.047 to 0.062 lb. a.i./acre (1.5 to 2 fl. oz.)
Thiodicarb (Larvin EC)	0.25 to 0.4 lb. a.i./acre.
Zeta-cypermethrin (Mustang MAX EC)	0.0175 to 0.025 lb. a.i./acre (2.8 to 4.0 fl. oz.)
Zeta-cypermethrin plus bifenthrin (Hero)	4.0 to 10.3 fl. oz. of product/acre

Thistle Caterpillar Management Options

Insecticide	Rate
Carbaryl (Sevin)	1.5 to 2 lb. a.i./acre
Chlorpyrifos plus gamma-cyhalothrin (Cobalt)	13 to 26 fl. oz. of product/acre
Chlorpyrifos plus zeta-cypermethrin (Stallion)	3.75 to 11.75 fl. oz./acre
Gamma-cyhalothrin (Proaxis)	0.0075 to 0.0125 lb. a.i./acre (1.92 to 3.20 fl. oz.)
Lambda-cyhalothrin (numerous products)	0.015 to 0.025 lb. a.i./acre
Lambda-cyhalothrin plus thiamethoxam (Endigo ZC)	2.5 to 3.5 fl. oz./acre
Permethrin (multiple products)	0.05 to 0.10 lb. a.i./acre
Zeta-cypermethrin (Mustang MAX EC)	0.0175 to 0.025 lb. a.i./acre (2.8 to 4.0 fl. oz.)
Zeta-cypermethrin plus bifenthrin (Hero)	2.6 to 6.1 fl. oz. of product/acre

Garden Webworm Management Options

Insecticide	Rate
Beta-cyfluthrin (Baythroid XL)	0.0125 to 0.022 lbs. a.i./acre (1.6 to 2.8 fl. oz.)
Carbaryl (Sevin)	1 to 1.5 lb. a.i./acre
Chlorpyrifos plus gamma-cyhalothrin (Cobalt)	13 to 26 fl. oz. of product/acre
Chlorpyrifos plus zeta-cypermethrin (Stallion)	5.0 to 11.75 fl. oz./acre
Cyfluthrin (Tombstone)	0.025 to 0.044 lb. a.i./acre (1.6 to 2.8 fl. oz.)
Deltamethrin (Delta Gold)	0.018 to 0.022 lb. a.i./acre (1.5 to 1.9 fl. oz.)
Flubendiamide (Belt)	2.0 to 3.0 fl. oz./acre
Gamma-cyhalothrin (Proaxis)	0.0125 to 0.015 lb. a.i./acre (3.2 to 3.84 fl. oz.)
Lambda-cyhalothrin (numerous products)	0.025 to 0.030 lb. a.i./acre
Lambda-cyhalothrin plus thiamethoxam (Endigo ZC)	3.5 to 4.5 fl. oz./acre
Methyl Parathion (Cheminova Methyl 4 EC)	1.0 lb. a.i./acre (2 pt.)
Permethrin (multiple products)	0.1 to 0.2 lb. a.i./acre
Zeta-cypermethrin (Mustang MAX EC)	0.0175 to 0.025 lb. a.i./acre (2.8 to 4.0 fl. oz.)
Zeta-cypermethrin plus bifenthrin (Hero)	4.0 to 10.3 fl. oz. of product/acre

Label Terminology

The preharvest interval (PHI) refers to the time that must elapse between application and harvest. The interval usually is different for forage use than it is for grain harvest, but when not specified, the interval usually is the same regardless of use of the treated product. The waiting interval does not signify how long an insecticide will provide control following application.

The restricted entry interval (REI) specifies the time that must elapse before people can safely return to work in treated fields without the use of protective clothing and/or equipment.

A number of insecticides are classified as restricted use pesticides. All individuals must be certified by the Kansas Department of Agriculture before they can purchase or use restricted products. Some pesticide uses may be permitted by means of State of Kansas Special Local Needs (SLN) label. The law requires applicators

to possess this label before making an SLN application.

Endangered Species

EPA's Endangered Species Protection Program (ESPP) helps promote the recovery of endangered species. If limitations on pesticide use are necessary to protect listed species in a certain geographic area, the information is relayed through Endangered Species Protection Bulletins. Pesticide labels may direct you to contact your local county Extension office or you can obtain Bulletins directly using EPA's Bulletins Live! <http://www.epa.gov/espp/bulletins.htm>.

Poison Control

In case of emergency contact Mid-America Poison Control Center: Emergency Phone Number (800)-222-1222.

More Information

This information is intended to help producers select management options for

common soybean pests, but due to space limitations not every pest can be covered. Additional information can be found on our Website at: <http://www.entomology.ksu.edu>. At this site, click on **Extension**, then **Insect Information**, then **Crop Pests** and **Soybeans** in the menu bar on the left of each page (or on links in the text). This should take you to a page listing common arthropod pests of soybean.

One example of the type of additional information available from this Website is a link to a new publication on pillbugs. Pillbugs have recently been common in some no-till soybean fields, so a publication on this topic has been added to our Website: <http://www.ksre.ksu.edu/library/entml2/MF2855.pdf>. In addition, the Website contains color images of many of the pests mentioned in this document, which can be useful in helping to correctly identify pest problems.

Soybean Insecticide Use Instructions

Insecticide	Special Instructions
Acephate (Selected formulations of Acephate, Bracket and Orthene)	Acephate is labeled for treating non-crop areas for grasshoppers. Signal word on label: CAUTION. Do not graze or feed vegetation cut from treated areas. REI is 24 hours. In addition, Acephate 90SP, WSB & WSP, Bracket 90 WSP, Orthene 75S, 90S and 97 have supplemental federal labels that must be in possession of the user at the time of application for controlling grasshoppers, thrips, potato leafhoppers, stinkbugs, bean leaf beetles, green cloverworms and soybean aphids in soybeans. Refer to the supplemental label for specific instructions.
Bacillus thuringiensis (Biobit, Deliver, Dipel, Lepinox and Xentari)	These are biologically based products that act as stomach poisons and are very effective against some caterpillars, causing death in two to four days. Signal word on label: CAUTION. Chemigation is usually allowed by label. Rates and application instructions of Bacillus thuringiensis products vary widely, so refer to labels for specific instructions. REI is 4 to 12 hours depending on formulation. No PHI.
Beta-cyfluthrin* (Baythroid XL)	Warning. Extremely hazardous to fish and aquatic invertebrates – do not apply directly over water. Drift and runoff from treated areas may be hazardous to aquatic organisms. Beta-cyfluthrin is highly toxic to bees. Do not apply this product or allow it to drift to blooming crops or weeds on which bees are actively foraging. Minimum application is 2 gallons of water for aerial application and 10 gallons by ground. Chemigation and ultralow volume (ULV) applications are allowed by label. Signal word on label: WARNING. REI is 12 hours. PHI is 21 days, however green forage can be fed 15 days after last application.
Carbaryl (Sevin)	Do not apply or allow to drift to blooming crops or weeds if bees are visiting the treatment area. Extremely hazardous to aquatic invertebrates – do not apply directly over water. Most labels recommend the use of 25 to 40 gallons of water with ground equipment to ensure adequate coverage. Refer to specific product labels for information on chemigation. Signal word on label: CAUTION or WARNING, depending on formulation. REI is 12 hours. Do not apply within 14 days of grazing or harvest for forage, or within 21 days of harvest for seed.
Chlorpyrifos* (Numerous products: Lorsban 4E, Chlorpyrifos, Eraser, Govern, Nufos, Pilot, Warhawk, Whirlwind, and Yuma)	Highly toxic to bees exposed to direct treatment.. Do not apply more than 3 lb. a.i./acre per season. Signal word on label: WARNING. REI is 24 hours. PHI is 28 days. Do not allow livestock to graze in treated areas or feed treated soybean forage, hay or straw to meat or dairy animals.
Chlorpyrifos plus gamma-chalothrin* (Cobalt)	Minimum of 2 gallons of spray volume by air and 10 gallons by ground. Do not apply more than 85 fl. oz. of Cobalt per season. Do not make a second application of Cobalt or another product containing chlorpyrifos within 14 days of first application. Do not make more than 3 applications per year of cobalt or other products containing chlorpyrifos. Do not make more than on application after pod set. Do not allow meat or dairy animals to graze in treated areas or otherwise feed treated soybean forage, hay and straw to meat or dairy animals. Signal words on label: DANGER–POISON. REI is 24 hours. PHI 30 Days.
Chlorpyrifos plus zeta-cypermethrin* (Stallion)	A new product registration that is a combination of chlorpyrifos (2.72 lb./gal.) plus zeta-cypermethrin (0.272 lb./gal.). REI is 24 hrs. PHI is 28 days.
Cyfluthrin (Tombstone)	Maximum Tombstone allowed per 7-day interval: 2.8 fl. oz./acre. Maximum Tombstone allowed per crop season 11.2 fl. oz. /acre. Has WARNING on the label due to environmental toxicity to fish and bees.
Deltamethrin* (Delta Gold)	Extremely hazardous to fish and aquatic invertebrates. Do not apply directly over water or to areas where surface water is present. Drift and runoff may be hazardous to aquatic organisms in areas near application site. This pesticide is highly toxic to bees exposed to direct treatment. Do not apply this product or allow it to drift to blooming crops or weeds on which bees are actively foraging. Minimum gallonage is 2 gallons of water for aerial application and 5 gallons by ground, and should be increased under hot, dry environmental conditions. See label for chemigation directions. Signal words on label: DANGER–POISON. REI is 12 hours. Do not apply within 21 days of harvest. Do not allow livestock to graze treated forage, or feed treated hay to livestock.
Diflubenzuron (Dimilin 2L)	This insect growth regulator is labeled for treating non-crop areas for grasshopper nymphs before they move into cropland and is labeled on soybeans for controlling green cloverworm and grasshoppers. It is toxic to aquatic invertebrates. Signal word on label: CAUTION. REI is 12 hours. PHI is 21 days.
Dimethoate (Dimethoate or Dimate)	Highly toxic to bees. Do not apply directly to water. Runoff may be hazardous to aquatic organisms. Can be applied by ground or air. Refer to label for recommended gallonage. Chemigation allowed on some labels. Signal word(s) on label: WARNING or DANGER–POISON, depending on formulation. REI is 48 hours. Do not feed or graze within 5 days of last application. PHI is 21 days.

Insecticide	Special Instructions
Esfenvalerate* (Asana XL 0.66)	See label for chemigation instructions. Do not exceed 0.2 lb a.i./acre per season. Signal word on label: WARNING. REI is 12 hours. PHI is 21 days. Do not feed or graze treated plant parts.
Flubendiamide* (Belt)	Use a minimum of 10 gallons of water per acre by ground and 2 gallons of water/acre by air. PHI is 14 days for grain and 3 days for forage. REI is 12 hrs. Can be applied by ground, air, or chemigation. Do not apply more than 6.0 fl. oz./season.
Gamma-cyhalothrin* (Proaxis)	Apply in a minimum of 2 gallons of water per acre by air. Do not apply more than 0.03 pound active ingredient (0.48 pint) per acre per season. Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment area. Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. Signal word on label: CAUTION. REI is 24 hours and PHI is 30 days.
Imidacloprid (Attendant, Dyna-Shield Imidacloprid and Senator)	Imidacloprid systemic seed treatment that has efficacy against seed corn maggots, early season soybean aphids and early season bean leaf beetles. Signal word on label: CAUTION
Imidacloprid (Alias 4F, Sherpa)	A formulation of imidacloprid that allows foliar application to soybeans. Signal word on label: CAUTION. Check labels.
Imidacloprid plus cyfluthrin* (Leverage)	May be applied through properly calibrated ground, aerial or chemigation application equipment. Maximum amount allowed per crop season is 9.0 fl. oz./acre. Minimal interval between applications is 7 days. Signal word on label: WARNING. REI 12 hours. PHI 45 days.
Indoxacarb (Seward 1.5 SC)	Toxic to mammals, birds, fish and aquatic invertebrates. Highly toxic to bees exposed to direct treatment. Labeled for ground and aerial application, but not chemigation. Steward applications should target eggs and small instar larvae. Signal word on label: CAUTION. REI is 12 hours. PHI is 21 days.
Lambda-cyhalothrin* (Numerous products: Warrior II with Zeon Technology, Silencer, Taiga T, Lambda T)	Use a minimum of 2 gallons of water per acre by air. See label for chemigation instructions. Do not graze livestock in treated areas or harvest for fodder, silage or hay. Do not apply more than (0.48 pt.) 0.06 lb. a.i./acre per season. Signal word on label: WARNING. REI is 24 hours. PHI is 45 days.
Lambda-cyhalothrin plus thiamethoxam * (Endigo ZC)	Combination of a pyrethroid and a neonicotinoid insecticide. Extremely toxic to fish and aquatic organisms. Do not use less than 10 GPA for ground applications or 3 GPA for aerial applications. Can be chemigated; refer to label for more information. Signal word on label: WARNING. REI is 24 hours. PHI is 30 days. Do not exceed 9 fl. oz./acre per season. Allow 7 days between applications. Do not graze or harvest treated forage for forage straw or hay for livestock feed. Do not apply this product within 45 of planting if soybean seeds were treated with a neonicotinoid product.
Methomyl *(Lannate)	Toxic to fish and wildlife. Drift and runoff from treated areas may be hazardous to aquatic organisms. Highly toxic to bees. Do not apply or allow to drift to blooming crops or weeds if bees are visiting the treatment area. Do not apply through any type of irrigation system. Do not apply more than 1.35 lb. a.i./acre per crop. Signal words on label: DANGER-POISON. REI is 48 hours. PHI is 14 days. If under 0.225 lb. a.i./acre, forage can be used in 3 days and hay in 7 days. If more than 0.225 lb. a.i./acre, forage can be used in 10 days and hay in 12 days.
Methoxyfenozide (Intrepid 2F)	Use on soybeans is based on supplemental labeling that must be in possession of the user at time of use. Product must be ingested by larvae to be effective. Do not apply by ground within 25 feet, or by air within 150 feet of lakes, reservoirs, rivers, permanent streams, marshes, natural ponds or commercial fish farm ponds. Do not apply this product through any type of irrigation system. Signal word on label: CAUTION. REI is 4 hours. Do not apply within 7 days of harvest of hay and forage or within 14 days of harvest of seed.
Methyl Parathion* (Cheminova Methyl 4EC)	Should be used only by those willing to assume special safety precautions on the label. Do not apply through irrigation systems. Signal words on label: DANGER-POISON. REI is 5 days in areas where average rainfall is less than 25 inches per year and 4 days where rainfall is 25 inches or greater. PHI is 20 days.
Microencapsulated Methyl Parathion* (PennCap-M)	Highly toxic to bees, do not apply if crop or weeds in treatment area are in bloom. Do not apply more than twice per season. Refer to label for chemigation instructions. Signal word on label: WARNING. REI is 5 days in areas where average rainfall is less than 25 inches per year and 4 days where rainfall is 25 inches or greater. PHI is 20 days for grazing or grain.

Insecticide	Special Instructions
Permethrin *(Arctic, Ambush and Pounce)	Use a minimum of 10 gallons of finished spray per acre by ground application or a minimum of 2 gallons if applied by air. Can be chemigated. Refer to label for more information. Do not exceed 0.4 lb. a.i./acre per season. Signal word on label: CAUTION or WARNING, depending on formulation. REI is 12 hours. Do not graze treated areas or harvest for forage or hay. PHI is 60 days.
Spinosad (Tracer)	This product is highly toxic to bees exposed to direct treatment on blooming crops or other vegetation. Signal word on label: CAUTION. REI of 4 hours. Chemigation instructions on label. Do not feed treated forage or hay to meat or dairy animals. PHI is 28 days. Do not apply more than 6 fl. oz of Tracer (0.188 lb spinosad) per acre per year.
Thiamethoxam (Cruiser and CruiserMaxx)	A systemic neonicotinoid insecticide used as a seed treatment. Labeled for soybean insect pests, such as the bean leaf beetle, seedcorn maggot, and wireworm. Signal word on label: CAUTION.
Thiodicarb* (Larvin EC)	See label for chemigation instructions. Apply in a minimum of 2 gallons of finished spray by air or 5 gallons by ground. Do not feed forage, hay, or straw to livestock. Signal word on label: WARNING. REI is 12 hours. PHI is 28 days.
Zeta-cypermethrin* (Mustang MAX EC)	Extremely toxic to fish and aquatic invertebrates. Apply a minimum of 2 gallons of finished spray per acre by aerial equipment or 10 gallons per acre by ground equipment. Can be chemigated. Refer to label for more information. Signal word on label: CAUTION. REI is 12 hours. PHI is 21 days. Do not graze or harvest treated soybean forage, straw, or hay for livestock feed. Do not apply more than 0.15 lb. a.i./ acre per season. Do not make applications less than 7 days apart.
Zeta-cypermethrin plus Bifenthrin* (Hero)	Combination of two pyrethroid insecticides. Signal word on label CAUTION. Can be chemigated; refer to label for more information. Twelve hour REI. PHI is 21 days for grain. Do not graze or harvest soybean forage, straw or hay for livestock feed.

* Restricted Use Pesticide

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