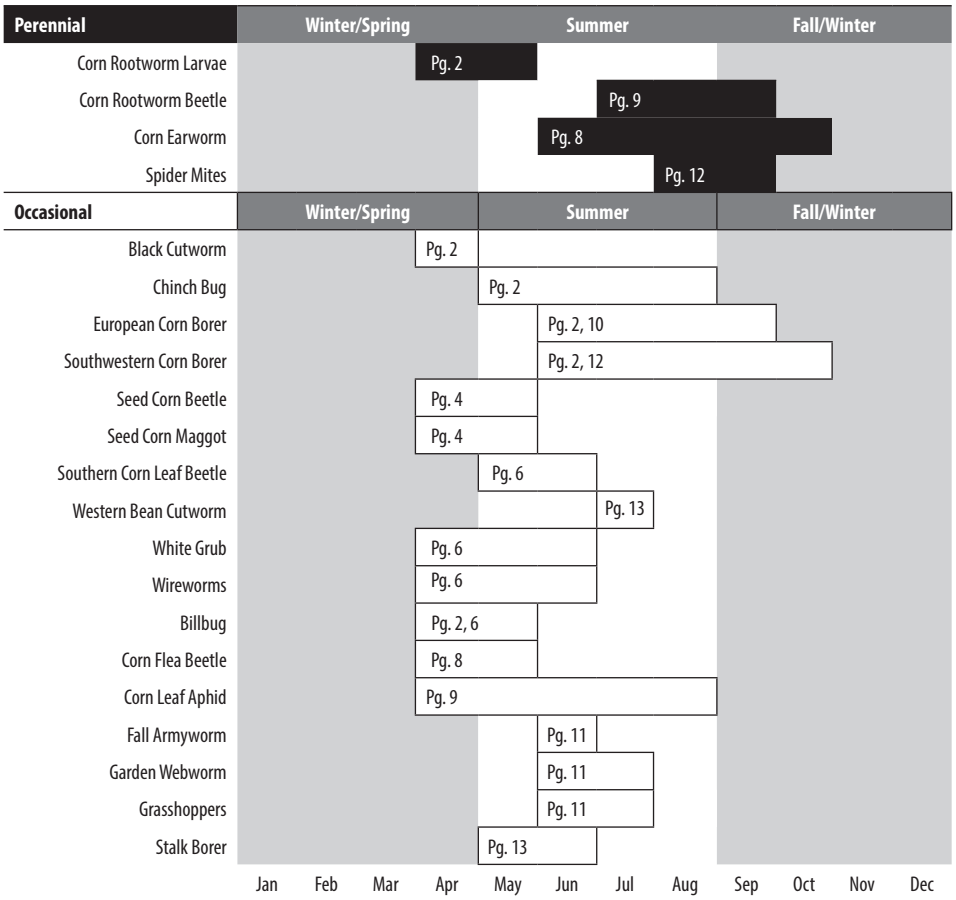
Corn INSECT PEST MANAGEMENT *2025*

K-STATE Research and Extension
Kansas State University
Agricultural Experiment Station
and Cooperative Extension Service

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 user bears the ultimate responsibility for correct pesticide use and should always read label directions carefully before making any pesticide applications. Remember, it is illegal to use a pesticide in a manner that is inconsistent with the label. 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. Additional problem-specific information may be available through the local K-State Research and Extension office and on our website at *entomology.k-state.edu/extension/insect-information/crop-pests/*.



Document Format

This guide contains brief descriptions of various corn pests and treatment thresholds. They are listed by season with insecticide treatment options for each. Insecticide use instructions can be found in the table that begins on page 16. Many insect pests have individual web pages with color pictures to aid identification and details about biology, ecology and behavior. These can be found at *entomology.k-state.edu/extension/insect-information/crop-pests/corn/*.

Insecticide Safety

Injury or death can result from swallowing, inhaling or prolonged skin contact with insecticides. The risk of injury following ingestion is greatest among pets, livestock, and young children. The greatest risk among users usually results from skin absorption, and sometimes inhalation. Practice handling all pesticides with care and use them only when needed. Wear protective equipment (respirators, clothing, etc.) as specified on the label. Bathe and change clothing frequently. Launder contaminated clothing separately from other articles in the wash. Avoid spilling concentrates on the skin or clothing. If a spill occurs, remove contaminated clothing immediately and wash with soap and water. If material gets into the eyes, flush them with clean water for 15 minutes and seek prompt medical attention. If exposed and in need of medical treatment, take the pesticide label with you.

Insecticide Use

Protect fish, wildlife and other non-target organisms. Do not dispose of unused pesticides where the runoff may contaminate streams, lakes, ponds or drinking water supplies, or apply in a manner that could pollute such sites. Consider the presence of honeybees before applying insecticides. Avoid drift to beehives or adjacent blooming crops. Notify bee owners before applying in the general vicinity. Applying treatment late in the day when bees are not foraging may reduce risk.

Read the label carefully. It is a legal document. It tells what, where, how and when the product can be used. It is against the law to use a pesticide in a manner inconsistent with the label. For poison control information contact the Mid-America Poison Control Center emergency phone number: 800-222-1222.

A Word About Seed Treatments

Seed treatment insecticides can be categorized into two major groups: contact seed treatments (permethrin) and systemic seed treatments. A contact insecticide, usually applied as a planter box application, is used to control insects that come in contact with or feed on planted seed. This type exhibits no action against pests feeding on other plant parts.

Systemic seed treatments (clothianidin, imidacloprid and thiamethoxam) are applied by commercial seed-treating establishments to protect against damage caused by most seed-attacking insects and some soil insects. They also work systemically to protect seedlings for up to two weeks post emergence. Recent assessments of the economic benefits of seed treatments across a range of crops in the midwest indicate that measurable benefits tend to be confined to southern states where crops receive substantial insect pressure very early in the season. The treatment of seed with insecticide in Kansas is not economically justified unless planting into fields that are 1) in their first year of cultivation following removal from CRP or 2) known to have significant populations of seed-destroying insects such as wireworms.

Planting-Time Decisions

Black Cutworm

Corn hybrids with Herculex I Insect Protection are resistant to black cutworm damage. Seed treatments containing clothianidin (Poncho), imidacloprid (numerous products), and thiamethoxam (numerous products) also are labeled for cutworm suppression and their use should be taken into account when planning black cutworm treatment options. The planting-time applications in Table 1 are also an option when black cutworm problems are anticipated. To learn more, see MF2954, Black Cutworms: *bookstore.ksre.ksu.edu/pubs/mf2954.pdf*.

Chinch Bug

Consider planting-time treatments where chinch bugs are observed in neighboring wheat fields or on wheat residue before planting. Systemic seed treatments clothianidin (Poncho), imidacloprid (numerous products), and thiamethoxam (numerous products) are labeled for this pest as well as the planting-time application, *Tefluthrin (Force3G)*, which is labeled for suppression with an application rate of 4 to 5 oz of product per 1,000 ft of row as a planting time application in a 7-inch band or T-band treatment.

Corn Borers (European, Southwestern)

European and southwestern corn borers have historically been serious corn pests in Kansas. Larvae feed in corn stalks and can cause significant yield losses. Bt corn hybrids that are resistant to corn borer feeding are currently the primary means of preventing damage by these pests. These genetically engineered, or transgenic, Bt corn hybrids contain genes that produce an insect-specific toxin that kills corn borers attempting to feed.

Insertion of the Bt gene into corn DNA is known as a transformation event. Each transformation event may contain a unique gene, gene promoter, gene marker, and/or gene location. The process is patented according to the gene(s) inserted and where and how they were inserted. Thus, the same gene can be inserted by different companies using slightly different processes.

Companies continue to modify these Bt events to improve control of other common pests. Bt corn acreage has increased from about 8 percent in 1997 to a little more than 63 percent in 2010. Commercial hybrids now have multiple genes targeting lepidopteran pests and rootworms.

Bt Corn Refuge Requirements

Registrations for Bt corn require that growers maintain a non-Bt corn refuge. Requirements differ depending upon the hybrid and the type of traits expressed, but should be planted with a conventional variety of similar maturity group. Growers should read and understand refuge requirements for all hybrids planted, be cognizant that the EPA monitors seed purchases to ensure compliance, and retain proof of purchase for all seed, especially if refuge seed is purchased separately. Also, be aware that some companies now provide refuge in the bag (RIB) which meets this requirement for some pests. For the latest information on how to comply, consult with seed companies or your local seed dealer.

Corn Rootworm Larvae

Corn rootworm larvae may be a pest where corn is planted continuously for three or more years. Corn rootworm beetles lay most of their eggs in corn fields from late summer through early fall. If corn is planted in the same fields the following spring some type of management often will be needed to avoid serious root injury. Planting-time options for controlling corn rootworm larvae include planting resistant corn hybrids, using seed treatments, and applying soil insecticides at planting.

Some corn hybrids are genetically engineered to resist corn rootworm larval feeding. These events are also being stacked with corn borer events. Corn hybrids stacked with multiple resistance genes are incrementally more expensive and a yield response that justifies the extra cost will only be obtained when there is significant pressure from multiple pests (i.e., corn borers and rootworms). These hybrids also require planting non-Bt corn refuges to reduce chances of resistance evolution. Refuge corn for rootworms is normally 'in the bag' with the Bt corn as adult corn rootworms mate closer to emergence sites. Check with seed dealers for specific refuge requirements on event(s) used.

Seed treatments are also available to help manage rootworm larval feeding (Table 2). Seed treatments can be applied at different rates, and higher rates are normally required to suppress rootworm feeding. Even then, they have not provided as consistent control of corn rootworm larvae as standard soil insecticides under significant rootworm pressure. Check efficacy trials on the Entomology website or ask seed dealers and chemical suppliers for more information. In addition, soil insecticides are still used to manage corn rootworm larvae and other insect pests. See Table 3.

Seed Corn Beetle and Seed Corn Maggot

Seed corn beetles are about ⅓-inch long. They are dark brown with a light-brown to tan border stripe on wing covers. Gaps in the crop stand may result from destruction of the seed germ (embryo) or completely hollowed seed. Some seedling plants may appear stunted because beetles feed on the mesocotyl.

The seed corn maggot is a slender, pale yellowish-white larva. Mature maggots are legless, tapered, and about ¼-inch long. The adult resembles a small, gray-brown housefly. Feeding maggots damage seed so germination fails. Land that is heavily manured or fields where a cover crop has

Table 1: Black Cutworm Management Options (Pre-plant or Planting-Time Treatments)

Insecticide	Rate
Alpha-cypermethrin (Fastac CS)	0.015 fl. oz./1,000 row ft. (0.001 lb. a.i./1,000 row ft.) in an in furrow band or T-band using a minimum 4 inch band. Can also be broadcast at 1.8 to 3.8 fl. oz./acre (0.012 to 0.25 lb. a.i.)
Beta-cyfluthrin (Baythroid XL)	0.0065 to 0.0125 lb. a.i./acre (0.8 to 1.6 fl. oz.)
Bifenthrin (numerous products)	Apply at planting in a 5- to 7-inch T-band at 0.04 to 0.08 lb. a.i./acre (0.15 to 0.30 fl. oz. product/1,000 ft. of row) or 2.56 oz./acre, broadcast. Follow label directions.
Chlorethoxyfos + bifenthrin (Index, Smart Choice HC)	Apply 0.44 to 0.72 fl. oz. of Index or 1.0 to 1.67 fl. oz. of Smart Choice HC in furrow at planting. Must be applied using a closed application system.
Deltamethrin (Delta Gold)	0.012 to 0.018 lb. a.i./acre (1.0 to 1.5 fl. oz.)
Gamma-cyhalothrin (Proaxis, Declare)	Apply 0.0025 lb. a.i. (0.66 fl. oz.) (See label for Declare) per 1,000 ft. of row as a 5- to 7-inch T-band across the open seed furrow in a minimum of 3 gallons per acre. Maximum use rate of 0.0045 lb. a.i./acre at planting is reached at 30-inch rows.
Lambda-cyhalothrin (numerous products)	Apply 0.005 lb. a.i. per 1,000 ft. of row as a 5- to 7-inch T-band across the open seed furrow in a minimum of 3 gal./acre. Maximum use rate of 0.009 lb. a.i./acre at planting is reached at 30-inch rows.
Permethrin (Pounce 25 WP)	Apply 0.1 to 0.15 lb. a.i./acre or 6.4 to 9.6 fl. oz./acre as a preplant incorporated, pre-emergence, or at planting time broadcast application by ground or air; or apply 0.3 to 0.6 fl. oz. per 1,000 ft. of row in a 4- to 15-inch band at planting using sufficient spray volume to achieve adequate coverage.
Permethrin (Pounce 1. 5G)	Apply 0.1 to 0.2 lb. a.i./acre (6.7 to 13.3 lb. Pounce 1.5G) preplant incorporated, preemergence or at planting as a broadcast application by ground or air; or apply 8 oz. of Pounce 1.5G per 1,000 linear ft. of row as a band at planting (equals 0.15 lb. a.i./acre or 10 lb. product/acre in 30-inch rows).
Phosphorothionate+ cyfluthrin (Defcon 2.1G)	Apply 6.7 oz. per 1,000 ft. of row in a 7-inch band over the row behind the press wheel with incorporation. Maximum of 7.3 lb. of product per acre per crop season.
Tebupirimphos + cyfluthrin (Aztec HC)	Apply Aztec HC at 1.5 fl. oz./1,000 row ft. Aztec HC must be applied using Smart Box or Smart Cartridge containers.
Tefluthrin (Force 6.5G, 10G HL and Evo)	Apply Force 10G HL at 1.25 fl. oz./1,000 row ft
Zeta-cypermethrin (Mustang MAXX, etc.)	Apply as a broadcast treatment at 0.008 to 0.0175 lb. a.i./acre (1.28 to 2.8 fl. oz. of product) before, during or after planting. For soil-incorporated applications, use higher rates for improved control. Can also be applied at planting as a in-furrow,* band or T-band treatment at 0.16 fl. oz. of product (0.001 lb. a.i.) per 1,000 ft. of row (0.018 lb. a.i./acre on 30-inch rows) using a minimum 4-inch wide band.

* Note: Some products are labeled for in-furrow treatments, but band or broadcast treatments probably would perform better for cutworm control.

recently been turned under may attract adult egg-laying flies.

Most standard soil insecticides employed for corn rootworm larval control also provide protection against seed attacking insects. However, when soil insecticides are not used, seed treatments may be beneficial, especially in fields with a recent history of sod, alfalfa, reduced tillage and/or cool, wet soils that delay germination. In most instances, seed treatments should be considered where planting-time soil insecticides are not used *and* planting occurs before June 2 in southeast Kansas, June 4 in south central Kansas, June 5 in northeast Kansas, June 7 in southwest Kansas, and June 12 in northwest Kansas. Be concerned if many adult flies are attracted to moist soil exposed as ground is worked just before planting. Several products are available to treat seed for one or both of these pests (Table 2). Check with seed companies or chemical suppliers for more information.

Southern Corn Leaf Beetle

Systemic seed treatments clothianidin (Poncho), imidacloprid (numerous products) and thiamethoxam (numerous products) are labeled for this pest. Check with seed companies or chemical suppliers for more information.

Western Bean Cutworm

Bt corn with Agrisure Viptera (Event MIR162) provides protection against western bean cutworm larvae and may be a consideration for producers who have experienced problems with this pest.

White Grubs

White grubs are white, C-shaped larvae with three pairs of legs, a distinctly noticeable tan to brown head, and a dark, subsurface zone near the rear of the body. White grubs may be cause for concern in the same situations where wireworms are found.

Planting-time insecticides may reduce grub numbers. Many of the soil insecticides used for rootworm control mention grubs and a reduction in grub numbers, may be obtained with these products. As with wireworms, improved protection against white grubs may be obtained with an in-furrow treatment. In addition, many of the seed treatments listed in Table 2 include white grubs on their labels and should provide suppression of these pests.

Wireworms

Wireworms are hard-shelled, smooth, cylindrical, yellowish larvae of click beetles. They chew into the germinating seed or burrow into the underground part of the stem. Several species occur in Kansas. Two to six years may be required for some to complete their life cycle. Damage in row

Equipment Calibration and Maintenance

This is an area producers frequently overlook. Remember that when changing products, applicators should be recalibrated. Two 15G products (15 percent active ingredients, 85 percent inactive carrier such as a clay or corncob grits) may look very much alike but often have very different flow rates.

A potentially more serious oversight develops when changing from one concentration of active ingredient to another. Changing from a 10G product (10 percent active ingredient) to a 20G product (twice as concentrated at 20 percent active ingredient), or vice versa, can cause severe problems resulting from applying too much or too little product. Crop damage or inadequate protection can result in addition to unnecessary expense, illegal pesticide residues, and violating the label requirements, which carry the force of federal and state law.

Normal wear also can alter the output of an applicator over time. The frequency of recalibration varies with the situation and level of use, but in all instances, equipment should be recalibrated at least yearly. One study found that more than half of planters surveyed had at least one insecticide applicator delivering 20 percent more or less insecticide than ideal.

Table 2: Corn Seed Treatments*

Chlorantraniliprole (Lumivia)	Chlorantraniliprole is a diamide insecticide. To be applied using commercially available equipment designed for seed treatment.
Clothianidin (Poncho 250 and 1250)	A systemic neonicotinoid insecticide labeled at two rates 0.25 and 1.25 mg. a.i./kernel. To be applied using commercially available equipment designed for seed treatment.
Clothianidin + Bacillus firmus I-1582 (Poncho/VoTivo)	A combination insecticide and biological seed treatment. Has activity against early season insects and pathogenic nematodes. For use only in commercial seed treating equipment.
Imidacloprid (numerous products)	Imidacloprid is a systemic, chloro-nicotinyl insecticide. Concur and Latitude are labeled as a planter box seed treatments. Other products are labeled for use by commercial seed treaters or in some cases for use in liquid or slurry seed treaters on agricultural establishments at or immediately before planting.
Permethrin + Vitavax (Kernel Guard Supreme and possibly others)	Pyrethroid insecticide. No systemic activity. Use as a planter box or seed treatment before planting. Do not mix with bare hands. Signal words on label: CAUTION. See label for other instructions and restrictions.
Thiamethoxam (Cruiser, Cruiser Extreme, Cruiser MAXX, Corn 250, and Avicta Complete Corn)	A systemic neonicotinoid insecticide. Labeled at 0.125 to 0.8 fl. oz./100 lb. of seed (0.25 to 1.25 mg. a.i./kernel). Cruiser Extreme is company-applied combination of Thiamethoxam plus three fungicides. Avicta Complete Corn is a seed treatment with a combination of Abamectin+Cruiser+Apron XL+Dynasty+Maxium XL.

* Unless otherwise noted, all corn seed in Kansas has commercially applied insecticides. **Storage insecticides**: Seed tags may indicate seed has been treated with insecticides such as Actellic or Dipel, but these products are a different type of seed treatment. These products protect against damage by stored grain insects, NOT against soil-dwelling, seed-attacking insects.

Table 3. Corn Rootworm Planting-Time Soil Insecticides Recommended in Continuous Kansas Cornfields

Insecticide	Formulat product	Product per 1,000 row feet[1]	Comments
Bifenthrin	Brigade 2 EC	0.0046 lb. a.i. (0.30 fl. oz)	Apply as a five to seven inch band over an open seed furrow or as an in furrow with the seed in a minimum of three gallons of water or fluid fertilizer. Recommended for both in furrow and T-band.
	Capture 3Rive3D Bifenthrin formulation and delivery system	0.46-0.92 fl. oz.	Expanding foam formulation requires application through 3Rive3D application system into the open seed furrow during planting.
	Capture LFR	1.5lbs/gal.	Formulated to mix readily with liquid fertilizers for ease of in-furrow or T-band application at planting time. 0.08 to 0.2 lb. a.i./acre (6.8 to 8.5 fl. oz./acre) or (0.39 to 0.98 fl. oz./1,000 ft. of row). Mix with three to five gallons of liquid fertilizer or water per acre.
	Ethos XB	0.39 to 0.98oz.	6.8 to 17.0 fl. oz./acre (30 in. rows) 0.39 to 0.98 oz./1,000 ft.). Controls many seed pests also and supresses common early season diseases with a biofungicide component.
Brofanilide	Nurizma	0.05 to 0.07 fl.oz	Apply through spray nozzles or microtubes into the open seed furrow, between the planter furrow openers and press wheels. NurizmaTM insecticide must be covered with soil immediately after application.
Chlorethoxyfos + bifenthrin	Index	0.65 to 0.72 oz.	Apply in-furrow using a closed handling system. Smart Choice HC can only be applied through the SmartBox™ system.
	Smart Choice HC	1.5 to 1.67 oz.	
Gamma-cyhalothrin	Proaxis	0.66 fl. oz.	Apply as a 5- to 7-inch T-band across the open seed furrow or as a band behind the press wheel, or in-furrow in a minimum of three gallons per acre. Maximum use rate of 0.045 lb. a.i./acre at planting is reached in 30-inch rows.
Lambda-cyhalothrin	Warrior II with Zeon Technology	0.005 to 0.33 fl. oz.	Apply as a 5- to 7-inch T-band across the open seed furrow, or as a band behind the press wheel, or in-furrow in a minimum of three gallons per acre. Maximum use rate of 0.09 lb. a.i./acre in planting is reached at 30-inch rows.
Phorate	Phorate or	6 oz.	Apply in a 7-inch band behind planter shoe, in front of or behind the press wheel, and lightly incorporate. Do not place Phorate granules in direct seed contact. Available in the Lock'n'Load closed handling system.
	Thimet 20G		
Phosphorothioate	Defcon 2.1 G	6.7 oz.	Apply in a 7-inch band over the row behind the press wheel w/ incorporation.
Tebupirimphos + cyfluthrin	Aztec 4.67 G	3.7 oz.	Apply as a 7-inch band over the row (incorporated with tines, chains or suitable equipment), as a T-band over the row (may be incorporated), or as an in-furrow application. All applications should be made behind planter shoe, and in front of the press wheel. Aztec HC is available in SmartBox and Smart Cartridge closed containers.
	Aztec HC	1.5 oz.	
Tefluthrin	Force 3G	4 to 5 oz.	Place granules in a 7-inch wide band over the row behind the planter shoe, either in front of or behind the press wheel. Granules must be incorporated. Force 10G HL is available in SmartBox and Smart Cartridge closed containers.
	Force 10G HL	1.2 to 1.5 oz.	
	Force CS	0.46 to 0.57 fl. oz.	Apply as a T-band or in-furrow. T-band must be incorporated.
Terbufos	Counter 20G	4.5 to 6 oz.	Apply in a 7-inch band behind planter shoe and in front of or behind press wheel and lightly incorporate. May also be applied in-furrow. Counter is available in Lock'n'Load, SmartBox and Smart Cartridge closed handling systems.

[1]Rates may vary with row spacing. Depending on the insect pest targeted and the insecticide used, products may need to be banded over the row or placed in-furrow. Some products call for band applications to be applied in front of the press wheel, and others call for the band to be applied behind the press wheel. To optimize a product's performance, either modify the planter to place the insecticide in the proper location or buy an insecticide that matches the equipment on the planter. Be sure that band spreaders are not too high off the ground, and confirm that banders uniformly distribute the product across the width of the bander. Wind guards can help keep granular products from blowing away from the target area. Furrow closers may be required under certain soil conditions to prevent insecticides from contacting the crop seed directly. Some method of incorporating banded applications may also be required. Verify that in-furrow delivery tubes are not excessively long and curved. Otherwise, the insecticide may settle out in the tube and bounce out sporadically rather than being applied evenly.

crops is generally highest during the first or second year following a sod or forage crop.

Watch for these insects if the field is worked before planting. Large numbers may indicate potential problems. A bait station sampling procedure can be used to assess wireworm population levels during early spring. Where control is necessary, most of the standard soil insecticides employed for corn rootworm larval control also provide protection against seed attacking insects. Research indicates that some products provide better control when insecticides are applied in-furrow rather than as an over-the-row band. Many of the seed treatments listed in Table 2 are also effective at reducing wireworm damage.

Postemergence Management

Armyworm

Adults frequently deposit eggs where grass is lush, often in low-lying areas on wheat or brome. Field margins or fields with dense growths of grassy weeds also are preferred oviposition sites. Problems develop when larvae consume all the grasses, or grasses dry (wheat matures) and larvae move to corn to survive. Problems from this insect are expected to increase as more reduced tillage is practiced, especially if grassy weed control is not adequate.

Later season damage is characteristic. Larvae remove all leaf tissue except the midrib and work their way up the plant, defoliating as they go. Large numbers of small white cocoons near dried armyworm larvae indicate armyworms killed by parasitic wasps.

Treat when larvae less than 1¼ inches long are present on 30 percent of plants with five to six extended leaves or when one larva is present on 75 percent of plants. Concern about yield loss during reproductive development is greatest if it appears that defoliation will approach the ear zone before hard dent. Lower thresholds may apply if plants are under other stresses.

Billbug

Damage occurs early in the growing season when adults destroy the growing point within the whorl near the soil surface. The larva is a white, robust, legless grub that tunnels in the lower stem and roots. Infested plants become twisted and distorted. Damage is often associated with areas infested with yellow nutsedge. Systemic seed treatments clothianidin (Poncho), imidacloprid (numerous products), and thiamethoxam (numerous products) are labeled for this pest as well as a planting time application.

Black Cutworm

Cutworm problems may occur statewide, but develop to more serious levels in eastern Kansas. Problems in Kansas are much less frequent than in corn production areas to the east. Conditions often associated with cutworm problems include early spring weed cover prior to planting, late wet springs, nearby permanent vegetation, corn following soybeans, and reduced tillage. Cutworm problems only develop if a significant flight of moths arrive and oviposit in a cornfield. This is a major reason that rescue treatments rather than preventive treatments are recommended.

Cutworm-susceptible fields should be scouted frequently for damage from the start of plant emergence until the corn is 6 to 8 inches high. The application of a rescue insecticide treatment may be justified if 3 to 5 percent of plants in the two-leaf stage are being cut and the majority of

Armyworm Management Options

Insecticide	Rate
Alpha-cypermethrin (Fastac CS)	3.2 to 3.8 fl. oz./acre
Bacillus thuringiensis (numerous products)	See label for product-specific recommendations.
Beta-cyfluthrin (Baythroid XL) (1st and 2nd instar)	0.0125 to 0.022 lbs. a.i./acre (1.6 to 2.8 fl. oz.)
Bifenthrin (Brigade 2EC)	2.1 to 6.4 oz. /acre
Bifenthrin plus chlorantraniliprole (Elevest)	0.098 to 0.167 lbs. a.i./acre (5.6 to 9.6 fl. oz.)
Carbaryl (Sevin XLR, 80S, 80WSP, etc.)	1.5 to 2 lb. a.i./acre
Chlorantraniliprole (Vantacor)	1.2 to 2.5 fl. oz./acre
Cyfluthrin (Tombstone) (1st and 2nd instar)	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, Declare)	0.01 to 0.015 lb. a.i./acre (2.56 to 3.84 fl. oz.) (See label for Declare)
Indoxacarb (Steward EC)	0.06 to 0.11 lb. a.i./acre (6.0 to 11.3 fl. oz.)
Lambda-cyhalothrin (numerous products)	0.02 to 0.03 lb. of a.i./acre
Lambda-cyhalothrin plus chlorantraniliprole (Besiege)	6.0 to 10.0 fl. oz./acre
Methomyl (Lannate SP)	0.25 to 0.5 lb. a.i./acre
Methoxyfenozide (Intrepid 2F)	0.06 to 0.25 lb a.i./acre (4 to 16 fl. oz.)
Permethrin EC (Multiple Products)	0.1 to 0.2 lb. a.i./acre
Spinosad (Blackhawk)	1.67 to 3.3 fl. oz./acre
Zeta-cypermethrin (Mustang MAXX, etc.)	0.02 to 0.025 lb. a.i./acre (3.2 to 4.0 fl. oz.)
Zeta-cypermethrin + Bifenthrin (Hero)	4 to 10.3 fl. oz./acre

worms are ½ inch or less in length. Each cutworm has the potential to cut from four to six plants at the two-leaf stage. Action should be taken at lower levels of stand loss under cool conditions and smaller plant developmental stages. However, warm conditions and larger plants reduce the damage potential per cutworm. Control attempts when the majority of cutworms are ¾ to 1 inch in length may give poor results. The alternative is to wait at least two weeks to give worms a chance to mature and pupate, then replant where necessary.

Sprays are usually most effective if the soil surface is moist to wet at the time of application. Rotary hoeing, immediately before or after application, may enhance the kill if some moisture is present in the top inch of soil or if a light crust is present. See K-State Research and Extension publication MF2954, Black Cutworms: *ksre.ksu.edu/bookstore/pubs/MF2954.pdf*.

Chinch Bug

Adult chinch bugs are black with whitish wings. Overall body length is slightly less than ⅛ inch. Immature bugs are reddish to blackish with a white band across the middle of the back. As nearby small grain fields mature and dry down, immense numbers of chinch bugs may migrate to adjacent corn fields. Migration takes place on the soil surface because immature bugs do not yet have functional wings. Bugs congregate in large numbers around plant bases, extract plant juices and inject toxic saliva. Stressed plants wilt and die from prolonged feeding. Damage is usually confined to a few outside rows. Chinch bugs tend to be more abundant in eastern Kansas. Field-wide infestations may develop.

If a chinch bug treatment is needed, use drop nozzles and direct sprays to base of plants. Over-the-top sprays used to control ear and stalk infesting corn pests, are not adequate for chinch bug control. Use 20 to 40 gallons of spray volume per acre. In most situations, only border rows require treatment, but repeated applications may be necessary until chinch bugs stop migrating. See the K-State Research and Extension publication MF3107, Chinch Bug: *ksre.ksu.edu/bookstore/pubs/MF3107.pdf*.

Chinch Bug Outlook 2025

Chinch bug numbers were relatively high in 2023 and 2024 and will probably be again in 2025. Growers should continue to monitor for chinch bug activity in the spring, especially when moisture is limited in April, May, and June and nearby wheat is thin and lacking in vigor.

Corn Earworm

Corn earworm infestations occur from June until dent stage. Insecticidal control is usually impractical in field corn. Current Bt corn hybrids provide some suppression of corn earworm feeding.

Corn Flea Beetle

Corn flea beetles are small, shiny, jumping beetles that strip the upper surface from seedling corn leaves. More injury is likely to occur on two- to four-leaf stage corn when cold temperatures slow growth. Carefully assess injury before applying controls. Often, injury is overestimated. Frequently, satisfactory results can be obtained by spot or border treatment. If the growing point has not been killed and conditions have been favorable, corn should recover with little effect on yield. Treatments are seldom warranted if populations on two-leaf corn remain below four to five beetles per plant. Systemic seed treatments listed in Table 2, page 4, can provide reasonable protection against flea

Billbug Management Options

Insecticide	Rate
Terbufos (Counter 20G)	Apply 4.5 to 6 oz. of Counter 20G per 1,000 ft. of row in a 7-inch band over the row. See label for specific directions.

Black Cutworm Management Options

Insecticide	Rate
Alpha-cypermethrin (Fastac CS)	1.3 to 2.8 fl. oz./acre
Beta-cyfluthrin (Baythroid XL)	0.0065 to 0.0125 lbs. a.i./acre (0.8 to 1.6 fl. oz.)
Bifenthrin plus chlorantraniliprole (Elevest)	0.084 to 0.167 lbs. a.i./acre (4.8 to 9.6 fl. oz.)
Cyfluthrin (Tombstone)	0.013 to 0.025 lb. a.i./acre (0.8 to 1.6 fl. oz.)
Deltamethrin (Decis 1.5EC)	0.012 to 0.018 lb. a.i./acre (1.0 to 1.5 fl. oz.)
Esfenvalerate (Asana XL)	0.03 to 0.05 lb. a.i./acre (5.8 to 9.6 fl. oz.)
Gamma-cyhalothrin (Proaxis, Declare)	0.0075 to 0.0125 lb. a.i./acre (1.92 to 3.20 fl. oz.) (See label for Declare)
Lambda-cyhalothrin (Warrior II with Zeon Technology)	0.02 to 0.03 lb. a.i./acre
Lambda-cyhalothrin plus chlorantraniliprole (Besiege)	5.0 to 10.0 fl. oz./acre
Permethrin (Multiple Products)	0.1 to 0.2 lb. a.i./acre
Zeta-cypermethrin (Mustang MAXX, etc.)	0.008 to 0.0175 lb. a.i./acre (1.28 to 2.8 fl. oz.)
Zeta-cypermethrin + Bifenthrin (Hero)	2.6 to 6.1 fl. oz./acre

beetles for about 2 weeks post-emergence. See product labels for details. Flea beetles can vector Stewart's wilt disease, but this has not been a significant problem in Kansas. See MF2832, Flea Beetle: *ksre.ksu.edu/bookstore/pubs/MF2832.pdf*.

Corn Leaf Aphid

Corn leaf aphids are soft-bodied, dark green insects that feed in dense colonies. Infestation occurs in midsummer. Aphids inside the leaf sheath congregate in the whorls and on tassels, producing large amounts of a sticky honeydew that may turn black with sooty mold. Chemical control rarely is recommended unless plants are under severe stress from other factors.

Corn Rootworm Beetle

Northern corn rootworm adults are about ¼-inch long with an overall pale green to yellow coloration. Western corn rootworm adults range from about the same size to slightly larger than northerns. Overall coloration when viewed from above is yellow with a black stripe around the margin of each wing cover. Westerns frequently have a dark stripe extending part way up the center of the wing covers. Southern corn rootworm adults are about ⅜ inch long and have 12 black spots on a chartreuse background.

Post-planting application to suppress larval damage

Basal application of most larval rootworm insecticides is approved for application when combined with cultivation. Over-the-row applications are labeled for phorate and terbufos. Control may be improved if the treatment is worked into the soil. Apply insecticides before rootworm damage becomes severe (mid-May through mid-June), sometime before or

Chinch Bug Management Options (Foliar Treatments)

Insecticide	Rate
Alpha-cypermethrin (Fastac CS)	3.2 to 3.8 fl. oz./acre
Beta-cyfluthrin (Baythroid XL)	0.013 to 0.022 lb. a.i./acre (1.6 to 2.8 fl. oz.)
Bifenthrin (numerous products)	0.033 to 0.10 lb. a.i./acre (2.1 to 6.4 fl. oz.)
Bifenthrin plus chlorantraniliprole (Elevest)	0.084 to 0.167 lbs. a.i./acre (4.8 to 9.6 fl. oz.)
Carbaryl (Sevin 80S)	1¼ to 2½ lb./acre
Cyfluthrin (Tombstone)	0.025 to 0.044 lb. a.i./acre (1.6 to 2.8 fl. oz.)
Deltamethrin (Decis 1.5EC)	0.018 to 0.022 lb. a.i./acre (1.5 to 1.9 fl. oz.)
Esfenvalerate (Asana XL)	0.03 to 0.05 lb. a.i./acre (5.8 to 9.6 fl. oz.)
Gamma-cyhalothrin (Proaxis, Declare)	0.015 lb. a.i./acre (3.84 fl. oz.) (See label for Declare)
Lambda-cyhalothrin (numerous products)	0.03 lb. a.i./acre
Lambda-cyhalothrin plus chlorantraniliprole (Besiege)	10.0 fl. oz./acre
Zeta-cypermethrin (Mustang MAXX, etc.)	0.02 to 0.025 lb. a.i./acre (3.2 to 4.0 fl. oz.)
Zeta-cypermethrin + Bifenthrin (Hero)	4 to 10.3 fl. oz./acre

Flea Beetle Management Options

Insecticide	Rate
Alpha-cypermethrin (Fastac CS)	2.7 to 3.8 fl. oz./acre
Beta-cyfluthrin (Baythroid XL)	0.8 to 1.6 fl. oz./acre (0.007 to 0.013 lb. a.i.)
Bifenthrin plus chlorantraniliprole (Elevest)	0.084 to 0.167 lbs. a.i./acre (4.8 to 9.6 fl. oz.)
Carbaryl (Sevin 4F)	1 to 2 quarts/acre
Cyfluthrin (Tombstone)	0.013 to 0.025 lb. a.i./acre (0.8 to 1.6 fl. oz.)
Deltamethrin (Decis 1.5EC)	0.012 to 0.018 lb. a.i./acre (1.0 to 1.5 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, Declare)	0.01 to 0.015 lb. a.i./acre (2.56 to 3.84 fl. oz.) (See label for Declare)
Lambda-cyhalothrin (Warrior II with Zeon Technology)	0.02 to 0.03 lb. a.i./acre (1.28 to 1.92 fl. oz.)
Lambda-cyhalothrin plus chlorantraniliprole (Besiege)	6.0 to 10.0 fl. oz./acre
Methomyl (Lannate SP)	0.25 to 0.5 lb. a.i./acre
Permethrin EC (Pounce 3.2EC)	4 to 8 oz. /acre (0.1 to 0.2 lb. a.i.)
Zeta-cypermethrin (Mustang MAXX, etc.)	0.017 to 0.025 lb. a.i./acre (2.72 to 4.0 fl. oz.)
Zeta-cypermethrin + Bifenthrin (Hero)	2.6 to 6.1 fl. oz./acre

soon after egg hatch. Efficacy can vary significantly among soil types. Adequate soil moisture must be available to move products into the rootworm feeding zone. See labels for restrictions on post-planting applications where planting-time applications have been used the same growing season.

Delayed post-planting broadcast treatments

One product is labeled for application through chemigation systems for corn rootworm control. Brigade 2EC has a section 2 (ee) label for chemigation at the rate of 5.12 to 6.4 oz. per acre applied at or near corn rootworm hatch in a minimum of 1 inch of irrigation water per acre.

Silk clipping protection

Damage is caused when the beetles prevent pollination by early silk clipping. Silk clipping after pollination does not affect yield. Foliar spray treatments may be justified if there are eight to 10 beetles per plant with 10 percent of silks beginning to show.

Managing rootworm beetles to control next year's larval populations

Corn rootworm adult scouting is needed to determine whether rootworm control is necessary the next spring in continuous corn fields. Fields must be scouted at least weekly from July 1 through August and sometimes into September. Counts should include only western and northern corn rootworm beetles. To realize the full benefits, adult controls should be implemented on an area-wide basis and whenever 50% of the plants have at least one adult beetle.

European Corn Borer

First-generation control usually is not required in Kansas, but is suggested in non-corn borer Bt cornfields where approximately 50 percent of the plants are infested with an average of at least one live larva per plant. For control, apply insecticides early in the infestation while small larvae are confined to the whorl area. Apply granules directly over planted rows into the whorls of the plants. Granular products have given inconsistent results in K-State experiments. Liquids probably should be applied so sprays are delivered into the whorl if ground travel equipment is used. Reports indicate that some products work better when applied with higher volumes. Check labels for chemigation information. Retreatment within seven to 14 days may be necessary if egg-laying continues for an extended period.

Typically, there is a greater need to control **second-generation** European corn borer in Kansas. Egg-laying by the second generation is generally greatest in silking-stage corn during the July to August moth flight. Prolonged adult emergence and egglaying periods make it more difficult to locate and evaluate these infestations. Yield loss can result from a variety of factors including physiological damage caused by larval tunneling, harvest losses caused by lodged stalks, ear droppage, and direct kernel feeding.

For second-generation control, treat when field inspection reveals an average of 10 to 20 egg masses per 100 plants. Egg mass counts should include both hatched and unhatched egg masses. Sampling should be intensive for 10 to 12 days after first eggs are detected.

Typically, 70 to 85 percent of the eggs are laid on the seven leaves nearest the ear (ear leaf and three leaves above or below). Samples should be taken from several locations to obtain a representative sample.

Corn Rootworm Adult Management Options (Foliar Treatments)

Insecticide	Rate
Alpha-cypermethrin (Fastac CS)	2.7 to 3.8 fl. oz./acre
Beta-cyfluthrin (Baythroid XL)	0.013 to 0.022 lb. a.i./acre (1.6 to 2.8 fl. oz.)
Bifenthrin (numerous products)	0.033 to 0.10 lb. a.i./acre (2.1 to 6.4 fl. oz.)
Bifenthrin plus chlorantraniliprole (Elevest)	0.084 to 0.167 lbs. a.i./acre (4.8 to 9.6 fl. oz.)
Carbaryl (Sevin SL)	1 to 2 quarts/acre
Cyfluthrin (Tombstone)	0.025 to 0.044 lb. a.i./acre (1.6 to 2.8 fl. oz.)
Deltamethrin (Decis 1.5EC)	0.018 to 0.022 lb. a.i./acre (1.5 to 1.9 fl. oz.)
Dimethoate (Dimethoate or Dimate)	⅔ to 1 pint/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, Declare)	0.01 to 0.015 lb. a.i./acre (2.56 to 3.84 fl. oz.) (See label for Declare)
Indoxacarb (Steward EC)	0.06 to 0.11 lb. a.i./acre (6.0 to 11.3 fl. oz.)
Lambda-cyhalothrin (numerous products)	0.02 to 0.03 lb. a.i./acre
Lambda-cyhalothrin plus chlorantraniliprole (Besiege)	6.0 to 10.0 fl. oz./acre
Methomyl (Lannate SP)	0.25 to 0.5 lb. a.i./acre (12 to 24 fl. oz.)
Permethrin EC (Multiple Products)	0.1 to 0.2 lb. a.i./acre
Zeta-cypermethrin (Mustang MAXX, etc.)	0.017 to 0.025 lb. a.i./acre (2.72 to 4.0 fl. oz.)
Zeta-cypermethrin + Bifenthrin (Hero)	4 to 10.3 fl. oz./acre

Treatments are recommended within five to six days when the majority of the infestation is composed of eggs. Problematic European corn borer populations have NOT been observed in Kansas for at least 14 years.

Fall Armyworm

Damage from the fall armyworm occurs in midsummer. Larvae chew large holes in whorl-stage leaves. Later, large holes may be chewed into the stalks at the nodes. Control at the whorl stage usually is not practical and should not be attempted unless 75 percent of plants are infested. Control may be justified on silking-stage corn if small larvae are detected before they have tunneled into the shanks and ears. Where the label allows, the performance of some products may be improved by chemigation. Note that corn hybrids with Herculex I insect protection are advertised to be resistant to fall armyworm damage.

Garden Webworm

Damage occurs in early summer. These slender worms move backwards rapidly when disturbed and may skeletonize leaves on plants less than 18 inches high. Watch fields closely. Damage can be severe if large infestations develop.

Grasshoppers

Damage may occur at anytime during the growing season. Field margins should be sprayed early in the season while grasshoppers are small if they reach approximately 20 per square yard. Applying sprays before they move into the field greatly reduces the area that must be sprayed and the amount of insecticide needed. Field sprays may be justified where five to eight grasshoppers per square yard are present from just before pollination until anthesis is complete.

Southern Corn Leaf Beetle

A 3⁄16- to 1⁄5-inch long, little-known beetle destroyed large areas within isolated

European Corn Borer Management Options (Foliar Treatments)

Insecticide	Rate
Alpha-cypermethrin (Fastac CS)	2.7 to 3.8 fl. oz./acre
Bacillus thuringiensis* (various products) [1,2]	Formulations vary: See labels for application rates
Beta-cyfluthrin* (Baythroid XL) [1,2]	0.013 to 0.022 lb. a.i./acre (1.6 to 2.8 fl. oz.)
Bifenthrin* (numerous products) [2]	0.033 to 0.10 lb. a.i./acre (2.1 to 6.4 fl. oz.)
Bifenthrin plus chlorantraniliprole (Elevest)	0.098 to 0.167 lbs. a.i./acre (5.6 to 9.6 fl. oz.)
Chlorantraniliprole (Vantacor)	1.2 to 2.5 fl. oz./acre
Cyfluthrin (Tombstone)	0.025 to 0.044 lb. a.i./acre (1.6 to 2.8 fl. oz.)
Deltamethrin* (Delta Gold) [1,2]	0.018 to 0.022 lb. a.i./acre (1.5 to 1.9 fl. oz.)
Esfenvalerate* (Asana XL 0.66) [2]	0.04 to 0.05 lb. a.i./acre (7.8 to 9.6 fl. oz.)
Gamma-cyhalothrin* (Proaxis, Declare) [1,2]	0.01 to 0.015 lb. a.i./acre (2.56 to 3.84 fl. oz.) (See label for Declare)
Indoxacarb (Steward EC)	0.06 to 0.11 lb. a.i./acre (6.0 - 11.3 fl. oz.)
Lambda-cyhalothrin* (numerous products) [1,2]	0.02 to 0.03 lb. a.i./acre
Lambda-cyhalothrin plus chlorantraniliprole (Besiege)	6.0 to 10.0 fl. oz./acre
Methomyl (Lannate SP)	0.25 to 0.5 lb. a.i./acre (12 to 24 fl. oz.)
Methoxyfenozide (Intrepid 2F) [1,2]	0.06 to 0.25 lb. a.i./acre (4 to 16 fl. oz.)
Permethrin* EC (multiple products) [1,2]	0.15 to 0.2 lb. a.i. and 0.1 to 0.2 lb. a.i./acre
Permethrin (Pounce 1. 5G) [1,2]	0.1 to 0.2 lb. a.i./acre (6.7 to 13.3 lb.)
Spinosad* (Blackhawk) [1, 2]	1.67 to 3.3 fl. oz./acre
Zeta-cypermethrin* (Mustang MAXX, etc.) [1,2]	0.017 to 0.025 lb. a.i./acre (2.72 to 4.0 fl. oz.)
Zeta-cypermethrin+ Bifenthrin (Hero) [1,2]	4 to 10.3 fl. oz./acre

[1] First Generation – [2] Second Generation

* Several of these products are labeled for chemigation. Read and understand the entire chemigation section on the label before applying any product. In some cases, (Bacillus thuringiensis and microencapsulated methyl parathion) products have performed better for second generation European corn borer control when chemigated than when applied by ground or aerial equipment.

northeastern Kansas corn fields during 1997 and 1998. Before these reports, the insect had not been found damaging corn in Kansas for more than 80 years, nor has it been reported since. Adults are drab in color, grayish to brownish, and may be covered with soil particles. These insects fall readily to the ground when disturbed. Feeding damage can be easily mistaken for cutworms. Healthy stands can disappear in a few days if large numbers of beetles descend on a field.

Southwestern Corn Borer

As the name implies, the southwestern corn borer has been more of a pest in southwestern Kansas. It may also be a serious pest in parts of south central and north central Kansas after a mild winter.

First-generation infestations begin in late June and consist of dark-spotted white worms that feed for five to 10 days on leaf tissue in the plant whorl before moving down to begin tunneling in the stalk. Tunneling can extend far enough down to kill the growing point on small plants (deadheart), though this injury usually does not occur on plants taller than 30 inches. First-generation infestations have been insignificant in most fields in Kansas in recent years.

Treatment thresholds for first generation are not well established but are assumed to be close to those for European corn borer, except that there may be more of a need to watch smaller plants because of the greater likelihood of larvae causing deadheart.

The **second** (and most damaging) **generation** occurs in August. Adult moths begin emerging and ovipositing around July 15 to July 23, reaching a peak somewhere between August 1 and 15. The exact beginning and peak of oviposition is influenced by weather and geographic location. Eggs are deposited on leaves primarily in the ear region. Newly hatched larvae begin feeding on leaves but prefer ear shoots, husks, and silks. Within 10 to 12 days, this generation begins tunneling within the stalk, generally below the ear

Fall Armyworm Management Options

Insecticide	Rate
Alpha-cypermethrin (Fastac CS)	3.2 to 3.8 fl. oz./acre
Beta-cyfluthrin (Baythroid XL)	0.022 lb. a.i./acre (2.8 fl. oz.)
Bifenthrin (numerous products)	0.033 to 0.10 lb. a.i./acre (2.1 to 6.4 fl. oz.)
Bifenthrin plus chlorantraniliprole (Elevest)	0.098 to 0.167 lbs. a.i./acre (5.6 to 9.6 fl. oz.)
Chlorantraniliprole (Vantacor)	1.2 to 2.5 fl. oz./acre
Cyfluthrin (Tombstone)	0.044 lb. a.i./acre (2.8 fl. oz.)
Deltamethrin (Delta Gold)	0.018 to 0.022 lb. a.i./acre (1.5 to 1.9 fl. oz.)
Gamma-cyhalothrin (Proaxis, Declare)	0.01 to 0.015 lb. a.i./acre (2.56 to 3.84 fl. oz.) (See label for Declare)
Indoxacarb (Steward EC)	0.06 to 0.11 lb. a.i./acre (6.0 to 11.3 fl. oz.)
Lambda-cyhalothrin (numerous products)	0.02 to 0.03 lb. a.i./acre
Lambda-cyhalothrin plus chlorantraniliprole (Besiege)	6.0 to 10.0 fl. oz./acre
Methomyl (Lannate SP)	0.25 to 0.5 lb. a.i./acre (12 to 24 fl. oz.)
Spinosad (Blackhawk)	1.67 to 3.3 fl. oz./acre
Zeta-cypermethrin (Mustang MAXX, etc.)	0.02 to 0.025 lb. a.i./acre (3.2 to 4.0 fl. oz.)
Zeta-cypermethrin + Bifenthrin (Hero)	4 to 10.3 fl. oz./acre

Garden Webworm Management Options

Insecticide	Rate
Alpha-cypermethrin (Fastac CS)	2.7 to 3.8 fl. oz./acre
Beta-cyfluthrin (Baythroid XL)	0.013 to 0.022 lb. a.i./acre (1.6 to 2.8 fl. oz.)
Bifenthrin (Brigade 2EC)	2.1 to 6.4 fl. oz/acre
Bifenthrin plus chlorantraniliprole (Elevest)	0.098 to 0.167 lbs. a.i./acre (5.6 to 9.6 fl. oz.)
Carbaryl (Sevin)	1 lb. a.i./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.)
Gamma-cyhalothrin (Proaxis, Declare)	0.01 to 0.015 lb. a.i./acre (2.56 to 3.84 fl. oz.) (See label for Declare)
Lambda-cyhalothrin (numerous products)	0.02 to 0.03 lb. a.i./acre
Lambda-cyhalothrin plus chlorantraniliprole (Besiege)	6.0 to 10.0 fl. oz./acre
Zeta-cypermethrin (Mustang MAXX, etc.)	0.017 to 0.025 lb. a.i./acre (2.72 to 4.0 fl. oz.)
Zeta-cypermethrin + Bifenthrin (Hero)	4 to 10.3 fl. oz./acre

zone. Insecticide applications should be considered on susceptible corn hybrids when 20 to 25 percent of the plants are infested or if corn is planted in mite-prone areas. If mite populations are present check the spider mite section of this publication before selecting a product.

Spider Mites

In southwest Kansas fields where mites have historically been a problem, the presence of mites early in the season may justify pre-tassel treatments of a selective miticide. This is true particularly if weather is expected to be hot and dry, and corn borer pressure is expected to be significant enough to require a broad spectrum insecticide treatment.

Later in the season (after tassels have emerged) mite populations justify control only when large colonies of adult females with eggs and young infest extensive areas along the midribs of the bottom one or two leaves *and* mites are beginning to colonize other leaves on the plant in significant areas of the field. Like many crops, corn seems to be most susceptible to significant yield damage during the reproductive stages, from tasseling through soft dough.

Coverage is critical to achieving effective mite control. The easiest way to increase coverage is to increase the gallonage applied per acre. Aerial application studies in Texas and Colorado indicate significantly improved mite control at 3 gallons of spray per acre compared with 1 or 2 gallons, and noticeable improvement with up to 5 gallons per acre.

Common Stalk Borer

This insect overwinters as eggs in grassy areas or occasionally in high residue sites. Damage occurs in May and June and the growing point may be killed (deadheart). Plants along field margins typically suffer the most infestations. No-till or minimum tillage fields, particularly those having poor grassy-weed control, may have damage widely distributed over the field when planted to corn the next year. A prominent transverse purplish band in the region of the true legs can usually be used to identify the larger larval stages of this insect. Most Kansas infestations of note occur in the northeastern part of the state.

Western Bean Cutworm

This insect is an occasional problem in western Kansas. However, infestations seem to be becoming more perennial and moving into north central regions of Kansas. Begin field scouting at the first sign of tasseling and continue until silks turn brown. Look for round, white eggs in groups of 5 to 200 on the upper surface of upper leaves. Eggs gradually become darker in color, hatching in five to seven days. An average of eight plants with eggs or small larvae per 100 plants (when corn is 95 percent tasseled) is required to justify control measures.

Control is reduced if applications are delayed until all silks have emerged or if larvae have entered the ear tips. Typically, scouting should be concentrated between July 18 and 30 in southwest Kansas and about a week later in northwest Kansas. Some of the new Bt corn hybrids have some resistance to the western bean cutworm so take this into account when selecting hybrid seed.

Worker Protection Standard

The Worker Protection Standard (WPS) is a series of federal regulations pertaining to pesticides used in agricultural plant production on farms, forests, nurseries, and greenhouses. You must comply with these regulations if you are an agricultural pesticide user and/or an employer of agricultural workers or pesticide handlers. For details, consult the U.S. Environmental Protection Agency publication, *The Worker Protection Standard for Agricultural Pesticides—How to Comply, What Employers Need to Know.* This publication is available at your local K-State Research and Extension office.

Grasshopper Management Options

Field Sprays

Insecticide	Rate
Alpha-cypermethrin (Fastac CS)	2.7 to 3.8 fl. oz./acre
Beta-cyfluthrin (Baythroid XL)	0.017 to 0.022 lb. a.i./acre (2.1 to 2.8 fl. oz.)
Bifenthrin (numerous products)	0.033 to 0.10 lb. a.i./acre (2.1 to 6.4 fl. oz.)
Bifenthrin plus chlorantraniliprole (Elevest)	0.084 to 0.167 lbs. a.i./acre (4.8 to 9.6 fl. oz.)
Carbaryl (Sevin 4F, 80S, XLR)	0.5 to 1.5 lb. a.i./acre
Chlorantraniliprole (Vantacor)	0.7 to 1.7 fl. oz./acre
Cyfluthrin (Tombstone)	0.033 to 0.044 lb. a.i./acre (2.1 to 2.8 fl. oz.)
Deltamethrin (Delta Gold)	0.012 to 0.018 lb. a.i./acre (1.0 to 1.5 fl. oz.)
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, Declare)	0.01 to 0.015 lb. a.i./acre (2.56 to 3.84 fl. oz.) (See label for Declare)
Indoxacarb (Steward EC)	0.06 to 0.11 lb. a.i./acre (6.0 - 11.3 fl. oz.)
Lambda-cyhalothrin (numerous products)	0.02 to 0.03 lb. a.i./acre
Lambda-cyhalothrin plus chlorantraniliprole (Besiege)	6.0 to 10.0 fl. oz./acre
Zeta-cypermethrin (Mustang MAXX, etc.)	0.017 to 0.025 lb. a.i./acre (2.72 to 4.0 fl. oz.)
Zeta-cypermethrin + Bifenthrin (Hero)	2.6 to 6.1 fl. oz./acre

Grasshopper Management Options

Noncrop Area Treatments

Insecticide	Rate	Special Instructions
Acephate (Bracket 90 Orthene 75S)	0.25 lb. a.i./acre Bracket 90, 0.28 lb./acre (4 oz.); Orthene 75S, ⅓ lb.	Apply in 10 to 20 gallons by ground, or in one to five 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 for seed. PHI is 0 days.
Carbaryl (Sevin 4F, 80S, XLR)	0.5 to 1.5 lb. a.i./acre	Apply to non cropland (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.
Chlorantraniliprole (Vantacor)	0.7 to 1.7 fl. oz./acre	Active on grasshoppers with 14 to 21 days residual. Also labeled for control of nymphs and suppression of nymphs in grass forage and fodder and hay (rangeland and pasture grass). REI is 4 hours. PHI: 14 days for ears, 0 days for forage, fodder, silage, and stover.
Diflubenzuron* (Dimilin 2L)	2 fl. oz./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 XL)	0.015 to 0.03 lb. a.i./acre (2.9 to 5.8 fl. oz. of Asana XL)	This label is for non crop 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, Declare)	0.0075 to 0.015 lb. a.i./acre, 1.92 to 3.84 fl. oz. (See label for Declare)	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.
Indoxacarb (Steward EC)	0.06 to 0.11 lb. a.i./acre (6.0-11.3 fl. oz.)	Active on grasshoppers with 14 to 21 days residual. Make no more than two applications per crop. 12 hr REI. PHI of 14 days for grain or stover, one day for forage, fodder, silage.
Lambda-cyhalothrin* (Warrior II with Zeon Technology)	0.02 to 0.03 lb. a.i./acre or 1.28 to 1.92 fl. oz.	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 MAXX, etc.)	0.0175 to 0.025 lb. a.i./acre (2.8 to 4.0 fl. oz.)	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, and still allow treated areas to be grazed or hayed.

* Restricted Use Pesticide

Southern Corn Leaf Beetle Management Options

Insecticide	Rate
Alpha-cypermethrin (Fastac CS)	2.7 to 3.8 fl. oz./acre
Beta-cyfluthrin (Baythroid XL)	0.013 to 0.022 lb. a.i./acre (1.6 to 2.8 fl. oz.)
Bifenthrin (Capture 2EC)	0.033 to 0.10 lb. a.i./acre (2.1 to 6.4 fl. oz.)
Cyfluthrin (Tombstone)	0.025 to 0.044 lb. a.i./acre (1.6 to 2.8 fl. oz.)
Lambda-cyhalothrin (Lamdec)	0.03 lb. a.i./acre
Lambda-cyhalothrin plus chlorantraniliprole (Besiege)	10.0 fl. oz./acre
Zeta-cypermethrin (Mustang MAXX, etc.)	0.017 to 0.025 lb. a.i./acre (2.72 to 4.0 fl. oz.)
Zeta-cypermethrin + Bifenthrin (Hero)	4 to 10.3 fl. oz./acre

Southwestern Corn Borer Management Options

Insecticide	Rate
Alpha-cypermethrin (Fastac CS)	2.7 to 3.8 fl. oz./acre
Beta-cyfluthrin (Baythroid XL)	0.013 to 0.022 lb. a.i./acre (1.6 to 2.8 fl. oz.)
Bifenthrin plus chlorantraniliprole (Elevest)	0.098 to 0.167 lbs. a.i./acre (5.6 to 9.6 fl. oz.)
Chlorantraniliprole (Vantacor)	1.2 to 2.5 fl. oz./acre
Cyfluthrin (Tombstone)	0.025 to 0.044 lb. a.i./acre (1.6 to 2.8 fl. oz.)
Deltamethrin (Decis 1.5)	0.018 to 0.022 lb. a.i./acre (1.5 to 1.9 fl. oz.)
Esfenvalerate (Asana XL)	0.03 to 0.05 lb. a.i./acre (5.8 to 9.6 fl. oz.)
Gamma-cyhalothrin (Proaxis, Declare)	0.01 to 0.015 lb. a.i./acre (2.56 to 3.84 fl. oz.) (See label for Declare)
Indoxacarb (Steward EC)	0.06 to 0.11 lb. a.i./acre (6.0 to 11.3 fl. oz.)
Lambda-cyhalothrin (numerous products)	0.02 to 0.03 lb. a.i./acre
Lambda-cyhalothrin plus chlorantraniliprole (Besiege)	6.0 to 10.0 fl. oz./acre
Methoxyfenozide (Intrepid 2F)	0.06 to 0.25 lb. a.i./acre (4 to 16 fl. oz.)
Permethrin (Pounce WSB)	0.1 to 0.2 lb. a.i./acre
Spinosad (Blackhawk)	2.2 to 3.3 fl. oz./acre
Zeta-cypermethrin (Mustang MAXX, etc.)	0.017 to 0.025 lb. a.i./acre (2.72 to 4.0 fl. oz.)
Zeta-cypermethrin + Bifenthrin (Hero)	4 to 10.3 fl. oz./acre

*These products are labeled for chemigation. Read and understand the entire chemigation section on the label before applying any product.

Spider Mite Management Options

Insecticide	Rate
Bifenthrin (numerous products)	0.08 to 0.10 lb. a.i./acre (5.1 to 6.4 fl. oz.)
Bifenthrin plus chlorantraniliprole (Elevest)	0.134 to 0.167 lbs. a.i./acre (7.7 to 9.6 fl. oz.)
Etoxazole (Zeal SC)	4 to 6 oz./acre
Hexythiazox (Onager)	10 to 24 fl. oz./acre
Fenpyroximate (Portal)	2 pints/acre
Propargite (Comite II)	2.25 pints/acre
Spiromesifen (Oberon 4 SC)	0.09 to 0.25 lb. a.i./acre (2.85 to 8.0 fl. oz.)
Zeta-cypermethrin + Bifenthrin (Hero)	10.3 fl. oz./acre
The following product is listed because it is still useful for mite management in some areas of the state or when used in tank mixes; however, in many areas of southwest Kansas it may, at best, only temporarily suppress mite populations. Repeat applications are not recommended if the first failed to give reasonable control.	
Dimethoate (Dimethoate or Dimate)	0.33 to 0.5 lb. a.i./acre

Stalk Borer (Common Stalk Borer) Management Options

Insecticide	Rate
Alpha-cypermethrin (Fastac CS)	2.7 to 3.8 fl. oz./acre
Beta-cyfluthrin (Baythroid XL)	0.013 to 0.022 lb. a.i./acre (1.6 to 2.8 fl. oz.)
Bifenthrin plus chlorantraniliprole (Elevest)	0.098 to 0.167 lbs. a.i./acre (5.6 to 9.6 fl. oz.)
Cyfluthrin (Tombstone)	0.025 to 0.044 lb. a.i./acre (1.6 to 2.8 fl. oz.)
Deltamethrin (Decis 1.5EC)	0.018 to 0.022 lb. a.i./acre (1.5 to 1.9 fl. oz.)
Esfenvalerate (Asana XL)	0.03 to 0.05 lb. a.i./acre (5.8 to 9.6 fl. oz.)
Gamma-cyhalothrin (Proaxis, Declare)	0.01 to 0.015 lb. a.i./acre (2.56 to 3.84 fl. oz.) (See label for Declare)
Lambda-cyhalothrin (numerous products)	0.02 to 0.03 lb. a.i./acre
Lambda-cyhalothrin plus chlorantraniliprole (Besiege)	6.0 to 10.0 fl. oz./acre
Permethrin (multiple products)	0.1 to 0.2 lb. a.i./acre
Zeta-cypermethrin (Mustang MAXX, etc.)	0.017 to 0.025 lb. a.i./acre (2.72 to 4.0 fl. oz.)
Zeta-cypermethrin + Bifenthrin (Hero)	2.6 to 6.1 fl. oz./acre

Western Bean Cutworm Management Options

Insecticide	Rate
Alpha-cypermethrin (Fastac CS)	1.8 to 3.8 fl. oz./acre
Beta-cyfluthrin (Baythroid XL)	0.013 to 0.022 lb. a.i./acre (1.6 to 2.8 fl. oz.)
Bifenthrin (numerous products)	0.033 to 0.10 lb. a.i./acre (2.1 to 6.4 fl. oz.)
Bifenthrin plus chlorantraniliprole (Elevest)	0.084 to 0.167 lbs. a.i./acre (4.8 to 9.6 fl. oz.)
Carbaryl (Carbaryl 4L)	2 quarts/acre
Chlorantraniliprole (Vantacor)	1.2 to 2.5 fl. oz./acre
Cyfluthrin (Tombstone)	0.025 to 0.044 lb. a.i./acre (1.6 to 2.8 fl. oz.)
Esfenvalerate (Asana XL)	0.015 to 0.03 lb. a.i./acre (2.9 to 5.8 fl. oz.)
Gamma-cyhalothrin (Proaxis, Declare)	0.0075 to 0.0125 lb. a.i./acre (1.92 to 3.20 fl. oz.) (See label for Declare)
Indoxacarb (Steward EC)	0.06 to 0.11 lb. a.i./acre (6.0 to 11.3 fl. oz.)
Lambda-cyhalothrin (Warrior II with Zeon Technology)	0.015 to 0.025 lb. a.i./acre (0.96 to 1.60 fl. oz.)
Lambda-cyhalothrin plus chlorantraniliprole (Besiege)	5.0 to 10.0 fl. oz./acre
Methoxyfenozide (Intrepid 2F)	4 to 16 fl. oz./acre (0.06 to 0.25 lb. a.i.)
Permethrin (Pounce 25WP)	0.05 to 0.1 lb. a.i./acre (3.2 to 6.4 oz.)
Spinosad (Blackhawk)	2.2 to 3.3 fl. oz./acre
Zeta-cypermethrin (Mustang MAXX, etc.)	0.011 to 0.025 lb. a.i./acre (1.76 to 4.0 fl. oz.)
Zeta-cypermethrin + Bifenthrin (Hero)	2.6 to 6.1 fl. oz. /acre

Corn Insecticide Use Instructions*

Insecticide	Special Instructions
Alpha-cypermethrin* (Fastac CS)	Do not apply within 30 days of harvest for grain and stover or 60 days for forage. Do not apply more than 11.4 fl. oz. product (0.075 lb. a.i.) per acre per season. Do not use any products containing cypermethrin and zeta-cypermethrin during a crop season when using Fastac EC. REI is 12 hours.
Bacillus thuringiensis (Biobit, Deliver, Dipel, Lepinox, XenTari and possibly others)	Biological-based products act as stomach poisons and are effective against some caterpillars, generally causing death within two to four days. Signal word on label: CAUTION. These products do not harm beneficial insects, so using them should not enhance mite outbreaks. Do not apply through irrigation systems. Fourteen-day REI with an exception made for the last 12 days of REI with proper personal protective equipment (PPE). (See label.) Do not apply on seed corn less than 14 days before detasseling or rogueing. Do not apply within 30 days of harvest.
Beta-cyfluthrin* (Baythroid XL)	Pyrethroid insecticide. Toxic to fish and aquatic organisms. Signal word on label: WARNING. Causes substantial but temporary eye injury. Do not get into eyes or on clothing. 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 two gallons of water for aerial application and 10 gallons by ground. Chemigation applications are allowed by label. REI is 12 hours. PHI is 21 days. However, green forage may be fed 0 days after last application.
Bifenthrin* (numerous products)	Pyrethroid insecticide. Toxic to fish and aquatic organisms. Signal word on label: WARNING. May be applied via air or ground equipment. Apply in a minimum of two gallons of finished spray per acre or in a minimum of 10 gallons per acre with ground equipment. Revised label now allows chemigation in Kansas. Do not apply within 30 days of harvest. Do not graze livestock in treated areas or cut treated crops for feed within 30 days of the last application. REI is 12 hours.
Bifenthrin plus chlorantraniliprole* (Elevest)	Make no more than three applications per acre per year. Minimum interval between treatments is seven days. Apply in a minimum of two to five gallons by aircraft or a minimum of 10 gallons per acre with ground equipment. Do not apply more than a total of 0.2 lb a.i./acre of chlorantraniliprole and 0.3 lb a.i./acre of bifenthrin per year, including Elevest. PHI is 30 days and REI is 12 hours.
Broflanilide (Nurizma)	Do not apply more 0.0445 lb active ingredient per acre per application and/or per year total, including seed treatment (when applicable) and soil application. REI 12 hours
Carbaryl (Sevin XLR, 80S, 80WSP, Sevimol 4, etc.)	This carbamate insecticide is sold by several companies in a number of different formulations. Signal word on label: CAUTION or WARNING depending on formulation. Observe BEE CAUTION. Applications may cause increased problems with spider mites later in the season. REI is 12 hours. Do not apply within 48 days of harvest of grain and fodder or within 14 days of harvest or grazing of foliage or silage.
Chlorantraniliprole (Vantacor)	Make no more than four applications per acre per crop. Minimum interval between treatments is seven days. Do not apply more than 5.1 fl. oz./acre. PHI for grain is 14 days; 0 days for forage, fodder, and silage stover. REI is four hours.
Chlorethoxyfos + bifenthrin (Index and SmartChoice HC)	Organophosphate and pyrethroid insecticide labeled restricted use due to human, avian and aquatic invertebrate toxicity. Signal words on label: WARNING or DANGER-POISON depending on formulation. REI 48 hours or 72 hours in areas where rainfall is less than 25 inches per year except if product is soil-injected or soil-incorporated and there will be no contact with anything treated. (See label.)
Cyfluthrin* (Tombstone)	Pyrethroid insecticide. Signal word on label: WARNING. PHI is 21 days and REI is 12 hours. Maximum number of applications per season is four. Three applications may be applied up to early dent and one application may be made between early dent and 21 days before harvest. Maximum allowed per crop season is 11.2 fl. oz./acre.
Deltamethrin* (Delta Gold)	Pyrethroid insecticide. Toxic to fish and aquatic organisms. Signal word on label: DANGER. Fatal if swallowed. Corrosive. Causes irreversible eye and skin damage. 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 two gallons of water for aerial application and five gallons by ground. See label for chemigation directions. REI is 12 hours. PHI is 21 days for grain or fodder. Do not cut or graze field corn for forage within 12 days of application.
Dimethoate (Dimethoate or Dimate)	This organophosphate insecticide is available from various suppliers and in several formulations. Signal word on label: WARNING or DANGER depending on formulation. Do not make more than three applications per year. REI is 48 hours. Do not apply within 14 days of harvest, feeding or grazing.

Corn Insecticide Use Instructions*

Insecticide	Special Instructions
Esfenvalerate* (Asana XL 0.66)	Pyrethroid insecticide. Toxic to fish and aquatic organisms. Signal word on label: WARNING. See label for chemigation instructions. Extremely toxic to fish. Do not apply when weather conditions make drift to fish-containing water possible. Applications may cause increased problems with spider mites later in the season. REI is 12 hours. Preharvest waiting interval is 21 days.
Gamma-cyhalothrin* (Proaxis, Declare)	This microencapsulated pyrethroid insecticide is labeled restricted use due to toxicity to fish and aquatic organisms. Signal word on label: CAUTION. Apply by ground or air in sufficient gallonage to obtain full coverage of target location. Apply in a minimum of two gallons of water per acre by air. Do not apply more than 0.06 lb. a.i. (0.96 pint) per acre per season. Do not apply more than 0.03 lb. a.i. (0.48 pint) after silk initiation. Do not apply more than 0.015 lb. a.i. (0.24 pint) after corn has reached the milk stage. Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment area. Do not allow meat or dairy animals to graze treated area within one day after treatment. Do not feed treated corn fodder or silage to meat or dairy animals within 21 days of harvest. REI is 24 hours and PHI is 21 days.
Indoxacarb (Steward EC)	New and unique insecticide mode of action in corn: IRAC group 22, sodium channel blocker. CAUTION signal word. Provides alternative MOA for corn rootworm adults and other pests (especially lepidoptera) showing resistance to pyrethroids, organophosphates or carbamates in corn. Indoxacarb is a 'proinsecticide' with low contact toxicity. It works by ingestion, so only pests feeding on treated foliage are affected. It has relatively little effect on beneficial arthropods which has been shown to reduce spider mite flaring associated with other insecticide treatments. REI is 12 hours. PHI is 14 days grain and stover, one day for forage, fodder or silage. Make no more than two applications per crop.
Hexythiazox (Onager)	This miticide is active on eggs and immature stages, it does not kill adult mites, but reduces egg laying in treated females. Since it does not kill adult mites it needs to be applied before mite populations reach damaging levels, usually while corn is in mid to late whorl stage. Application after the V15 crop growth stage is prohibited. Use is limited to western Kansas (west of Rt. 281). For ground application the boom should be equipped with 16-inch drop nozzles with nozzles directed to spray up and under the canopy at 10 to 20 GPA. For aerial application the label recommends a minimum of 5 GPA and to use the higher rates when foliage is dense. Onager is labeled for use on field corn, silage corn, and seed corn. Do not make more than one application per year. Signal word on label is CAUTION. REI is 12 hours. 45 Day PHI.
Lambda-cyhalothrin* (numerous products)	Pyrethroid insecticide labeled restricted use because it is toxic to fish and aquatic organisms. Signal word on label: WARNING. Apply by ground or air in sufficient gallonage to obtain full coverage of target location. Use a minimum of two gallons of water per acre by air. Do not apply more than 0.12 lb. a.i. (0.96 pint) per acre per season. Do not apply more than 0.06 lb. a.i. (0.48 pint) after silk initiation. Do not apply more than 0.03 lb. a.i. (0.24 pint) after corn has reached the milk stage. Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment area. Do not allow meat or dairy animals to graze treated area within 1 day after treatment. Do not feed treated corn fodder or silage to meat or dairy animals within 21 days of harvest. REI is 24 hours and PHI is 21 days.
Lambda-cyhalothrin plus chlorantraniliprole* (Besiege)	Check application restrictions on label which include: Do not exceed a total of 31.0 fl. oz./acre per year. Do not apply more than 18.0 fl. oz./acre after silk initiation. Do not apply more than 10 fl. oz./acre after the milk stage. PHI is 21 days for field corn and popcorn and one day for sweet corn.
Methomyl* (Lannate SP)	Carbamate insecticide classified as a restricted use pesticide because of high acute toxicity to humans. Signal words on label: DANGER — POISON. Toxic to fish and wildlife. Do not graze or feed forage within 3 days of treatment. REI is 48 hours. PHI of 21 days before grain can be harvested.
Methoxyfenozide (Intrepid 2F)	An insect growth regulator effective against many species of Lepidopteran insects. Product must be ingested by larvae to be effective. Signal word on label: CAUTION. 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. REI is four hours. Do not harvest within 21 days of application.
Permethrin (Artic EC, Pounce EC and Pounce 1.5 G)	Pyrethroid insecticide. Toxic to fish and aquatic organisms. Signal word: CAUTION or WARNING depending on formulation. May be used on popcorn and corn grown for seed. Up to 0.6 lb. a.i./acre per season. Applications may increase problems with spider mites later in the season. REI is 12 hours. Do not make treatments less than six days apart or apply less than 30 days before harvest of grain or fodder. Forage may be harvested on the day of application.
Phorate (Phorate and Thimet 20G)	Organophosphate insecticide labeled restricted use because of acute oral and dermal toxicity and avian hazards. Signal words on label: DANGER — POISON. REI is 48 hours, except if product is soil injected or soil incorporated and if there will be no contact with anything that has been treated.
Phosphorothionate + cyfluthrin (Defcon 2 .1 G)	This insecticide is labeled restricted use because of toxicity to aquatic invertebrates. Signal word on label is WARNING. REI is 48 hours or 72 hours where average rainfall is less than 25 inches per year.

Corn Insecticide Use Instructions*

Insecticide	Special Instructions
Propargite (Comite II)	Cyclodiene insecticide. Signal word on label: DANGER. Special precaution is needed when spraying near aquatic environments. Do not make aerial applications during temperature inversions, if heavy rainfall is imminent, or when wind speeds exceed 10 mph. Do not apply through any type of irrigation system. REI. is 13 days. Exception can be made after first 48 hours with proper PPE. See label. Do not apply within 30 days of harvest.
Spinosad (Blackhawk)	Spinosad, a mixture of spinosyn A and spinosyn D, is a fermentation-derived insect control agent. REI is 4 hours. Highly toxic to bees exposed to direct treatment on blooming crops or other vegetation. Avoid use when bees are foraging. Do not apply where surface water is present. Signal word on label: CAUTION. Apply in a minimum of 5 gallons of water per acre (ground application) or two to five gallons of water per acre (aerial application). See label for chemigation rules. Do not deliver through chemigation equipment at more than 0.25 inches of water per acre. Do not apply more than 6 fl. oz. of Blackhawk (0.188 lb. spinosad) per acre per year. Do not apply within 28 days of grain or fodder harvest or within seven days of forage harvest.
Spiromesifen (Oberon 4 SC)	This non-systemic insecticide/miticide is a tetronic acid derivative that acts as a lipid biosynthesis inhibitor. It carries the signal word CAUTION on the label. REI is 12 hours. PHI is five days on green forage and 30 days on grain or stover. Label claims efficacy against egg and nymphal stages.
Tebupirimomphos + cyfluthrin (Aztec 4.67G or HC)	Organophosphate + pyrethroid insecticide. Toxic to aquatic invertebrates. Signal word on label: WARNING. REI of 48 hours; 72 hours where rainfall is less than 25 inches per year.
Tefluthrin (Force 6.5G and 10G HL)	Pyrethroid insecticide. Toxic to fish and aquatic organisms. Signal word on label: CAUTION or WARNING depending on formulation. REI is 48 hours, except if product is soil injected or soil incorporated, and if there will be no contact with anything that has been treated.
Terbufos (Counter 20G)	Organophosphate insecticide classified restricted use due to acute oral and dermal toxicity. Signal words on label: DANGER — POISON. Do not apply Beacon to Counter-treated corn, and do not apply Accent to corn treated with an in-furrow application of Counter. REI is 48 hours; 72 hours in areas where rainfall is less than 25 inches per year.
Zeta-cypermethrin** (Mustang MAXX, etc.)	Pyrethroid insecticide. Signal word on label CAUTION. Extremely toxic to fish and aquatic invertebrates. Apply in a minimum of two 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. REI is 12 hours. Do not apply within 30 days of harvest for grain and fodder (stover) and 60 days for forage (silage).
Zeta-Cyfluthrin + Bifenthrin* (Hero)	Combination of two pyrethroid insecticides. Signal word on label CAUTION. Can be chemigated; see label for more information. REI is 12 hours. PHI is 30 days for grain and 60 days for forage. Do not graze livestock for 30 days. Do not apply more than 41.2 ounces of product per acre per season including at-plant plus foliar applications.

* Insecticides listed in this table are intended to provide a guide to products labelled for use against the pest(s) listed. These lists are intended as guides only and are not a substitute for the actual product label. For questions or specific information relative to any insecticide always refer to the actual label on the product.

** Restricted Use Pesticide

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