



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. Users 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. 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 your local K-State Research and Extension office or on our Web site 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.

Using Insecticides Safely

All insecticides are capable of causing injury to man and animals. Injury or death can result from swallowing, inhalation, or skin absorption. Handle with care and use only when needed. Follow label directions and heed all precautions. Store in original containers away from food products in a dry place where children, unauthorized persons, livestock, and pets are not allowed.

Avoid spilling insecticides on the skin, mucous membranes (mouth, nose, and eyes), and clothing when mixing or applying. If spilled on the body, wash immediately and change clothing. Wash face and

hands thoroughly after applying any insecticide – especially before eating, drinking, or smoking. If in the eyes, flush with water for 15 minutes and seek prompt medical attention. If medical treatment is necessary, take the insecticide container label with you. It contains valuable information the physician will need. For poison control information call 1-800-332-6633.

Always wear adequate protective equipment (respirators, clothing, etc.) as specified on the label. Bathe and change clothing after applying insecticides. Always wash clothes separately after applying pesticides and before wearing them again.

Protect fish and wildlife. Do not contaminate streams, lakes, ponds, or marshes. Do not clean spray equipment or dump excess spray near such sites. Avoid drift of sprays or dusts. Do not allow poultry, dairy, or meat animals to feed on plants or drink insecticide-contaminated water.

Waiting intervals refer to the time that must elapse between application and harvest. The waiting interval in no way signifies how long the insecticide will remain active in controlling insects. Re-entry intervals (REI) specify the minimum time that special protective gear (specified on the label) must be worn when entering the field after treatment.

Insecticide Use Classification

Growers must be certified by the Kansas Department of Agriculture before they can legally purchase or use restricted use pesticides. General use pesticides can be purchased or used by anyone; however, commercial applicators must obtain a business license in order to apply any pesticide commercially.

Commercial applicators must also be certified under the appropriate commercial category in order to use restricted use pesticides.

Sunflower Insects

Cultivated sunflowers in Kansas host a variety of insects. Most are not damaging, and many are beneficial. Harmful species are not always present in sufficient numbers to cause economic loss. However, when certain pest species are abundant, serious yield losses may result from flower and seed feeding that is often compounded by fungal infection. In addition, significant losses can occur from lodging caused by stem weevils and stem girdlers. Color pictures and more detailed information on many of the insects mentioned here are available online: www.entomology.ksu.edu/DesktopDefault.aspx?tabindex=193&tabid=404

Rules For Sound Insect Management

- Accurately identify the pest and interpret the situation. Ask your local K-State Research and Extension agricultural agent for help if you have questions.
- Proper timing of control measures cannot be emphasized enough. Detect the problem before damage reaches an advanced stage (scout each field at least once a week).
- Realize that preventing all insect damage should not be your objective. Treatments are seldom justified unless expected losses equal or exceed the cost of control.
- In some situations pest problems can be prevented or alleviated without the use of insecticides.

Cutworms

Several species of cutworms – including dingy, dark-sided, sandhill, and black – damage young sunflowers at or soon after emergence. Small, transparent windows appearing in young leaves may be caused by small larvae, which are not capable of eating through the entire leaf. Notches in the leaves or cotyledons may appear if sunflowers are planted into fields with existing infestations. Older larvae inflict more obvious damage in the form of wilted, severed, and dying seedlings. Excessively cool,

wet soils slow plant development relative to pest feeding, and tend to reduce stands.

Larger larvae of most cutworms feed nocturnally and remain concealed during the day, staying within a few inches of damaged plants. The discovery of cut plants and one or more larva per square foot warrants rescue applications of insecticides if the majority of larvae are less than 1¼ inches long and continued feeding may cause plant stands to decline below 85 percent of recommended levels.

Dry soil conditions will reduce the probability of achieving control by spraying.

Grasshoppers

Several grasshopper species can defoliate sunflowers. Grasshopper populations exceeding eight per square yard probably justify control. Rarely is damage severe enough to justify field-wide controls. Often damage can be reduced by treating border areas while nymphs are small and before they begin migrating to sunflower fields.

Cutworm Management Options

Insecticide	Rate
Beta-cyfluthrin (Baythroid XL)	0.0065 to 0.0125 lb. a.i./a (0.8 to 1.6 fl. oz.)
Chlorpyrifos (numerous products)	Check label, but generally 2 pints/acre
Chlorpyrifos plus gamma-cyhalothrin (Cobalt)	19 to 38 fl. oz. /a
Chlorpyrifos plus zeta-cypermethrin (Stallion)	3.75 to 11.75 fl. oz./acre
Esfenvalerate (Asana XL)	0.03 to 0.05 lb. a.i./a (5.8 to 9.6 fl. oz.)
Deltamethrin (Delta Gold)	0.012 to 0.018 lb. a.i./a (1.0 to 1.5 fl.oz.)
Gamma-cyhalothrin (Proaxis)	0.0075 to 0.0125 lb. a.i./a (1.92 to 3.20 fl. oz.)
Lambda-cyhalothrin (numerous products)	0.015 to 0.025 lb. a.i./a
Zeta-cypermethrin (Mustang MAX EC)	0.014 to 0.025 lb. a.i./a (2.24 to 4.0 fl. oz.)

Grasshopper Management Options

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 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.

* Restricted Use Pesticide

Loopers, Painted Lady Caterpillar, and Woollybear Caterpillars

Various foliage-feeding caterpillars can cause economic damage if defoliation becomes significant. Insecticides may be warranted if defoliation reaches 25 percent during reproductive stages and larvae are still small.

Seed Weevils

Two weevil species attack sunflower seeds in Kansas and may reduce yields. The gray seed weevil, *Smicronyx sordidus*, is about ¼-inch long, and the red seed weevil, *Smicronyx fulvus*, is ⅛-inch long.

The gray seed weevil has an adult emergence peak five to 10 days earlier than the red seed weevil most seasons. Both weevils produce one generation per year and feed on plant tissue under bracts of developing flowers, causing little damage.

Gray seed weevils begin to oviposit (lay eggs) on sunflowers in the bud stage. Larvae penetrate the seed at its base and destroy the ovary. Red seed weevil females must feed on pollen to mature their eggs and therefore do not oviposit in flowers before pollen release. Flowers at stage R-5.5 are preferred, and oviposition is concentrated in the developing seeds along the outer edges of flowers.

Larvae of both species feed within seeds. At maturity, an exit hole is cut and the larva drops to the ground, burrows into the soil, and overwinters. It pupates and emerges as an adult in the spring. Treatments targeting gray seed weevils are normally not justified because larvae gall the seeds causing ‘pops’ and these are normally removed during threshing. In contrast, red seed weevil larvae do not significantly change seed weight and many

may remain in seeds post-harvest, leading to downgrades.

Insecticide treatments for the red seed weevil must be timed to prevent adults from laying their eggs. Treatments should be timed early in the flowering period when about 30 percent of plants have reached the R-5.1 stage. Count the weevils on the heads of five of the most mature plants. Repeat five times at different locations in the field and away from the margins. The treatment threshold can vary from 2 to 15 weevils per flower for oilseed varieties depending on the plant population, projected value, and cost of treatment. The threshold drops to one weevil per head for confection varieties because of the lower tolerance for larval contamination. Because adults emerge over an extended period, follow early treatment with continued scouting to determine the need

Grasshopper Management Options

Field Sprays	
Insecticide	Rate
Beta-cyfluthrin (Baythroid XL)	0.0155 to 0.022 lb. a.i./a (2.0 to 2.8 fl. oz.)
Chlorpyrifos (numerous products)	Check label, but generally 1 pint/acre
Chlorpyrifos plus gamma-cyhalothrin (Cobalt)	7 to 13 fl. oz. /a
Chlorpyrifos plus zeta-cypermethrin (Stallion)	5.0 to 11.75 fl. oz./acre
Deltamethrin (Delta Gold)	0.012 to 0.018 lb. a.i./a (1.0 to 1.5 fl.oz.)
Esfenvalerate (Asana XL)	0.03 to 0.05 lb. a.i./a (5.8 to 9.6 fl. oz.)
Gamma-cyhalothrin (Proaxis)	0.01 to 0.015 lb. a.i./a (2.56 to 3.84 fl. oz.)
Lambda-cyhalothrin (numerous products)	0.02 to 0.03 lb. a.i./a
Zeta-cypermethrin (Mustang MAX EC)	0.014 to 0.025 lb. a.i./a (2.24 to 4.0 fl. oz.)

Looper Management Options

Insecticide	Rate
Bacillus thuringiensis (Dipel® 2X and other labeled products)	See label
Deltamethrin (Delta Gold)	0.012 to 0.018 lb. a.i./a (1.0 to 1.5 fl.oz.)
Gamma-cyhalothrin (Proaxis)	0.01 to 0.015 lb. a.i./a (2.56 to 3.84 fl. oz.)
Lambda-cyhalothrin (numerous products)	0.02 to 0.03 lb. a.i./a

Painted Lady Caterpillar Management Options

Insecticide	Rate
Chlorpyrifos plus gamma-cyhalothrin (Cobalt)	19 to 38 fl. oz. /a
Chlorpyrifos plus zeta-cypermethrin (Stallion)	3.75 to 11.75 fl. oz./acre
Gamma-cyhalothrin (Proaxis)	0.01 to 0.015 lb. a.i./a (2.56 to 3.84 fl. oz.)
Lambda-cyhalothrin (numerous products)	0.02 to 0.03 lb. a.i./a

Woollybear Caterpillar Management Options

Insecticide	Rate
Chlorpyrifos (numerous products)	Check label, but generally 1 to 1.5 pints/acre
Chlorpyrifos plus gamma-cyhalothrin (Cobalt)	19 to 38 fl. oz. /a
Chlorpyrifos plus zeta-cypermethrin (Stallion)	5.0 to 11.75 fl. oz./acre
Gamma-cyhalothrin (Proaxis)	0.01 to 0.015 lb. a.i./a (2.56 to 3.84 fl. oz.)
Zeta-cypermethrin (Mustang Max)	2.6 to 4.0 fl. oz./acre

for a second treatment. Treatments applied for sunflower moth also may provide some seed weevil control.

Stem Weevils

Two species of weevils occur in stems of sunflowers in Kansas. The most important of these is the sunflower stem weevil, *Cylindrocopturus adspersus*. It is 1/8- to 3/16-inch long and mottled gray-brown with irregular white spots. Antennae, snout, and eyes are black.

Emergence of sunflower stem weevil adults occurs mid-May to early June, and females begin laying eggs at two weeks of age. Stem weevil adults feed on foliage, and females insert their eggs in the base of stalks.

Larger plants are preferred for oviposition, and single stalks may accumulate more than 200 larvae. Larvae feed in the stem cortex, descending to lower portions of the stalk as they mature, finally forming overwintering chambers in the lower stalk near ground level. Pupation occurs the following spring or early summer.

The direct impact of stem weevil feeding on yield appears to be minimal, but heavy larval infestations can reduce stalk strength and cause pre-harvest lodging. These insects also vector the fungus causing Phoma black stem disease, which can exacerbate lodging problems.

Non-rotated fields, or fields planted next to where sunflowers were planted the

previous year are more likely to have significant stem weevil populations, especially where infestations were serious the previous year. Double-crop sunflowers or those planted after the first week of June are not at risk. Some evidence suggests that plant resistance to stem weevil larval development is reduced under drought conditions, so stem weevil damage may be more of a concern under dryland production. In addition, several years of successive drought seem to favor the development of large populations. When significant populations are present, insecticide applications may be warranted at the 8- to 10-leaf stage. Systemic materials are effective against larvae within stalks but are best when followed by irrigation to ensure uptake by the plants. Seed treatments do not appear to provide control.

Economic thresholds based on counts of adults are not well defined; adults are cryptic in appearance and behavior and difficult to observe, and numbers often do not correlate with larvae developing within stalks. Because stem weevils are relatively difficult to scout for but easy to control with most registered materials, consider treatment at the 8- to 10-leaf stage for fields planted before the first week of June in regions with a history of problems.

Sunflower Beetle

Adults are slightly smaller, but similar in shape to Colorado potato beetles with

a light yellow background and dark brown stripes on the wing covers. Larvae are yellowish and humpbacked. Adults occur in late May and early June. Adults and larvae chew holes in leaves. Economic damage is rare in Kansas. Treat if one adult is present per seedling or larvae reach 10 to 15 per plant on upper leaves, 25 percent defoliation occurs, and pupation has not begun.

Sunflower Moth (Head Moth)

The sunflower moth, *Homoeosoma electellum*, is the most damaging sunflower pest in Kansas. Adults are whitish, 3/8 to 5/8 inch long and rest with wings clasped to the body, giving the moth a cigar shape.

Flowers in the early stages of bloom are favored for oviposition, and females lay eggs at the base of the florets. Newly hatched larvae are pale yellow, but darken to shades of brown or purple with longitudinal white stripes. Early instars feed on pollen and florets. Later instars bore into the head and consume receptacle tissue and seeds. This damage enables infection by *Rhizopus* fungus that can lead to even greater yield loss than larval feeding, especially under humid conditions.

Start scouting fields for head moth as the first flowers begin to open (stage R-4 to R-5.1). Scouting must be done frequently because migratory moths can appear in large numbers virtually overnight. When populations are high, moths may be detected by walking through fields

Seed Weevil Management Options

Insecticide	Rate
Beta-cyfluthrin (Baythroid XL)	0.0155 to 0.022 lb. a.i./a (2.0 to 2.8 fl. oz.)
Chlorpyrifos (numerous products)	Check label but generally 1 to 1.5 pints/acre
Chlorpyrifos plus gamma-cyhalothrin (Cobalt)	19 to 38 fl. oz. /a
Chlorpyrifos plus zeta-cypermethrin (Stallion)	5.0 to 11.75 fl. oz./acre
Deltamethrin (Delta Gold)	0.012 to 0.018 lb. a.i./a (1.0 to 1.5 fl.oz.)
Gamma-cyhalothrin (Proaxis)	0.01 to 0.015 lb. a.i./a (2.56 to 3.84 fl. oz.)
Lambda-cyhalothrin (numerous products)	0.02 to 0.03 lb. a.i./a
Parathion, methyl (Cheminova Methyl 4EC)	1 lb. a.i./a
Zeta-cypermethrin (Mustang MAX EC)	0.014 to 0.025 lb. a.i./a (2.24 to 4.0 fl. oz.)

Stem Weevil Management Options

Insecticide	Rate
Beta-cyfluthrin (Baythroid XL)	0.0125 to 0.019 lb. a.i./a (1.6 to 2.4 fl. oz.)
Chlorpyrifos (numerous products)	Check label but generally 1 to 1.5 pints/acre
Chlorpyrifos plus gamma-cyhalothrin (Cobalt)	19 to 38 fl. oz. /a
Chlorpyrifos plus zeta-cypermethrin (Stallion)	5.0 to 11.75 fl. oz./acre
Deltamethrin (Delta Gold)	0.012 to 0.018 lb. a.i./a (1.0 to 1.5 fl. oz.)
Esfenvalerate (Asana XL)	0.03 to 0.05 lb. a.i./a (5.8 to 9.6 fl. oz.)
Gamma-cyhalothrin (Proaxis)	0.01 to 0.015 lb. a.i./a (2.56 to 3.84 fl. oz.)
Lambda-cyhalothrin (numerous products)	0.02 to 0.03 lb. a.i./a
Zeta-cypermethrin (Mustang MAX EC)	0.014 to 0.025 lb. a.i./a (2.24 to 4.0 fl. oz.)

at any time of day and watching for moths to fly up as plants are approached. When populations are low it may be best to scout fields after dark with a flashlight and look for moths resting on the opening blooms. Moth activity on flowers peaks around one hour after sunset. The treatment threshold is one to two moths per five plants, depending on the projected value of the crop. After treatment, scouting should continue every two to three days until plants reach the R5.9 stage.

Sunflower moth activity can be monitored with commercially available pheromone traps that attract and capture male moths. These traps should be placed on T-posts above canopy level at least 10 rows into the field on north and south sides. Use at least four traps per field.

Trapping should begin as the first flowers reach the R-4 stage (buds beginning to open) and trap catches should be monitored daily until flowering is nearly complete (R-5.9 stage). Insecticide applications should be considered when pheromone traps have four moths per trap per day from the R-5.1 to R-5.9 stages. Economic implications are not well established for trap catches of less than four moths per day. If trap catches average less than four per day, field scouting is justified. Trap catches averaging less than one per day are usually non-economic infestations.

Early planted fields typically suffer the most damage from sunflower moths. Fields planted in early July that bloom after August 10 are less likely to develop economic infestations, but should be monitored for later generation moths that can immigrate from wild sunflowers or earlier planted fields.

A preventive insecticide treatment is best applied as blooms begin to open. If moths are above the threshold, treatments should be applied as 20 to 40 percent of the plants begin to flower (stage R-5.1). When populations are low, treatments can be delayed until 90 to 100 percent of the plants have reached stage R-5.1. Most failures to obtain control result from delayed treatment. Flowers remain at risk until all pollen has been shed, so there is a need for continued scouting.

Early insecticide applications target adults and small larvae, and the objective is to kill females before eggs are laid in the flowers, or kill larvae before they feed deep in the head. Additional applications, applied at five- to seven-day intervals, may be required for heavy moth pressure.

Once flower disks are fully expanded, treatment will be more effective if it is applied directly into the face of the flowers. Various pyrethroids may irritate larvae and cause them to leave the heads, but only when deposited on the flower face. Factors

such as gallage, wind direction, flight direction and height will probably all affect the success of later applications.

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! at <http://www.epa.gov/espp/bulletins.htm>

Bee Caution

Many of the insecticides used on sunflowers are highly toxic to bees and carry statements similar to the following: *This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment area.*

Because many sunflower pests require treatment during bloom, producers should reduce the chance of applying chemicals while bees are actively visiting the flowers and warn local beekeepers before applying insecticide.

Sunflower Beetle Management Options

Insecticide	Rate
Beta-cyfluthrin (Baythroid XL)	0.0065 to 0.0125 lb. a.i./a (0.8 to 1.6 fl. oz.)
Carbaryl (Sevin XLR 80S, 50W or 4F)	1 to 1½ lb. a.i./a
Chlorpyrifos (numerous products)	Check label but generally 1 to 1.5 pints/acre
Chlorpyrifos plus gamma-cyhalothrin (Cobalt)	19 to 38 fl. oz. /a
Chlorpyrifos plus zeta-cypermethrin (Stallion)	5.0 to 11.75 fl. oz./acre
Deltamethrin (Delta Gold)	0.012 to 0.018 lb. a.i./a (1.0 to 1.5 fl. oz.)
Esfenvalerate (Asana XL)	0.015 to 0.03 lb. a.i./a (2.9 to 5.8 fl. oz.)
Gamma-cyhalothrin (Proaxis)	0.0075 to 0.0125 lb. a.i./a
Lambda-cyhalothrin (numerous products)	0.015 to 0.025 lb. a.i./a
Zeta-cypermethrin (Mustang MAX EC)	0.014 to 0.025 lb. a.i./a (2.24 to 4.0 fl. oz.)

Sunflower Moth (Head Moth) Management Options

Insecticide	Rate
Beta-cyfluthrin (Baythroid XL)	0.0155 to 0.022 lb. a.i./a (2.0 to 2.8 fl. oz.)
Chlorpyrifos (numerous products)	Check label, but generally 1 to 1.5 pints/acre
Chlorpyrifos plus gamma-cyhalothrin (Cobalt)	19 to 38 fl. oz. /a
Chlorpyrifos plus zeta-cypermethrin (Stallion)	5.0 to 11.75 fl. oz./acre
Deltamethrin (Delta Gold)	0.012 to 0.018 lb. a.i./a (1.0 to 1.5 fl. oz.)
Esfenvalerate (Asana XL)	0.03 to 0.05 lb. a.i./a (5.8 to 9.6 fl. oz.)
Gamma-cyhalothrin (Proaxis)	0.01 to 0.015 lb. a.i./a (2.56 to 3.84 fl. oz.)
Lambda-cyhalothrin (numerous products)	0.02 to 0.03 lb. a.i./a
Parathion, methyl (Cheminova Methyl 4EC)	1 lb. a.i./a
Zeta-cypermethrin (Mustang MAX EC)	0.014 to 0.025 lb. a.i./a (2.24 to 4.0 fl. oz.)

Sunflower Insecticide Use Instructions

Insecticide	Special Instructions
Bacillus thuringiensis (Dipel® 2X and other labeled products)	Larvae must be actively feeding. Only effective against certain caterpillars. No preharvest restriction. No use restriction.
Beta-cyfluthrin* (Baythroid XL)	A total of 0.0655 lb. a.i./a (8.4 fl.oz.) may be applied per season. 30-day preharvest interval. REI is 12 hours.
Carbaryl (Sevin XLR 80S, 50W or 4F)	Do not apply within 30 days of grazing or harvest for forage or within 60 days of harvest for seed. REI is 12 hours.
Chlorpyrifos* (Numerous products: Including, Chlopyrifos, Eraser, Govern, Lorsban, Nufos, Pilot, Warhawk, Whirlwind and Yuma)	Broadcast spray by air or ground equipment. Do not make a second application of chlorpyrifos within 10 days of the first application. 42-day preharvest restriction. Do not graze or feed treated forage. REI is 24 hours.
Chlorpyrifos plus gamma-cyhalothrin* (Cobalt)	Do not apply within 45 days before harvest. Do not apply more than 114 fl. oz. of Cobalt per acre per season. Do not make more than 3 applications per season of Cobalt or other products containing chlopyrifos. Do not make a second application of Cobalt or other product containing chlorpyrifos within 10 days of the first application. Do not allow meat or dairy animals to graze in treated areas. REI is 24 hours.
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 42 days.
Esfenvalerate* (Asana XL)	Repeat as necessary to maintain control. Do not exceed 0.2 lb. a.i./a per season. 28-day PHI. REI is 12 hours.
Deltamethrin* (Delta Gold)	REI is 12 hours. Do not apply within 21 days of harvest. Do not graze or feed treated sunflower foliage to livestock.
Gamma-cyhalothrin* (Proaxis)	Apply with ground or air equipment, using sufficient water and application methods to obtain full coverage of foliage. When applying by air, apply in a minimum of 2 gallons of water per acre. Do not apply more than 0.06 lb. a.i. (0.96 pint) per acre per season and do not apply more than 0.045 lb a.i. (0.72 pint) per acre preseason after bloom initiation. PHI is 45 days and REI is 24 hours.
Lambda-cyhalothrin* (Numerous products: Including, Lambda T, Silencer, Taiga Z, and Warrior II with Zeon Technology)	Apply by ground or air in sufficient gallonage to obtain full coverage. Use a minimum of 2 gallons of water per acre by air. Do not apply more than 0.12 lb. a.i. (0.96 pt.) per acre per season and do not apply more than 0.09 lb. a.i. (0.72 pt.) per acre per season after bloom initiation. PHI is 45 days. REI is 24 hours.
Parathion, methyl* (Cheminova Methyl 4EC)	Up to three applications at five-day intervals are permitted. 30-day preharvest restriction. Do not feed seeds to birds. Five-day REI in areas where average rainfall is less than 25 inches per year and four days where rainfall is 25 inches or greater.
Zeta-cypermethrin* (Mustang MAX EC)	Do not apply more than 0.125 pound active ingredient per acre per season. Do not make more than five applications at the maximum application rate per season. Do not graze livestock in treated areas or cut treated crops for feed. Avoid applications when honey bees are actively foraging by applying during the early morning or evening hours. PHI is 30 days. REI is 12 hours.
* Restricted Use Pesticide	

J.P. Michaud, Ph.D., Associate Professor
R. Jeff Whitworth, Ph.D., Associate Professor
Holly N. Davis, Insect Diagnostician
Department of Entomology

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