

# Insect Management and Control

Janet J. Knodel,  
Extension Entomologist,  
and  
Pat Beauzay,  
Entomologist

Photographs of various insects  
can be found in the back of this field guide.

## Canola crop stage and insect pest scouting calendar.

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Seedling to Rosette	Rosette to Flowering	Flowering to Pod Development	Pod Development to Harvest
<b>May</b>	<b>June</b>	<b>July</b>	<b>August</b>
Cutworms Diamondback moths Flea beetles Grasshoppers	Cutworms Diamondback moths Grasshoppers Lygus bugs	Aphids Bertha armyworms Blister beetles Diamondback moths Grasshoppers Lygus bugs	Bertha armyworms Flea beetles Grasshoppers Lygus bugs

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## **Crucifer Flea Beetle** *(Phyllotreta cruciferae)* and

## **Striped Flea Beetle** *(P. striolata)*

### **Coleoptera: Chrysomelidae**

The crucifer flea beetle has a single generation per year. The striped flea beetle also feeds on canola in North Dakota. Adult flea beetles overwinter in shelterbelts and leaf litter near last year's canola fields. Adults start to emerge as temperatures warm to 58 F. Populations will emerge during a longer period of time with cool temperatures or during a shorter period of time with warm temperatures. The tiny, black flea beetles are about 1/10 inch long with a metallic bluish sheen. They move into the canola fields just as the seedlings are emerging. Adults feed on the cotyledons and first true leaves of seedlings and cause pitting and holes in the leaves. Damage is most serious to seedling plants and can cause seedling death and significant stand loss. Eggs are laid in the soil and hatch in 12 days into larvae that feed on the roots of the canola plant. The larvae feed for three to four weeks, pupate for one week and then emerge as the new generation of adult flea beetles in mid-July to early August. These beetles feed on maturing crops by chewing on the epidermis of green pods, stems and leaves for several weeks. Fortunately, populations of summer flea beetles usually are not high enough to cause serious damage. However, extremely high populations feeding on green pods can cause pod

shattering and seeds to remain green. After feeding, the adult beetles move into shelterbelts and other grassy overwintering sites. Large populations of the summer generation often indicate that flea beetle pressure may be high the following spring.

### **Pest Management**

Insecticides are the most effective control measure for flea beetles. The seedling stage is the most susceptible period, and insecticides need to be applied either as a seed treatment prior to planting or a foliar application to protect the crop from flea beetle damage. If growers use treated canola seed, seedlings should be protected from flea beetle feeding for most of the susceptible seedling stage. Seed treatments usually provide three to four weeks of protection against flea beetles.

Adult flea beetles emerge during a three- to four-week period in the spring. As a result, field monitoring is critical for any untreated or partially protected fields, or areas with a history of high flea beetle populations. Producers should inspect seedling fields daily for flea beetle injury. Check several locations in the field (for example, edges and center). Warm (greater than 58 F), calm, sunny weather increases feeding activity and movement, while cool, windy, damp weather slows feeding and favors crop growth. In some instances, flea beetles can move quickly and infest large fields by flying; in other instances, beetles invade slowly and walk from plant to plant in a field. Yellow sticky traps also may be used as monitoring tools to indicate when and how many flea beetles are moving into fields.

If the seed treatment did not provide adequate protection or was not used, an application of a foliar insecticide may be necessary. **Foliar insecticide applications are recommended when 25 percent defoliation occurs on the cotyledons and true leaves (economic threshold level).** When flea beetle populations are high, more than one application may be required due to the short residual of insecticides labeled for flea beetle control in North Dakota and the threat of reinfestation from surrounding areas. Foliar applications must be applied quickly for effective control. One of the problems producers face is not being able to cover a large acreage quickly when flea beetle populations are high. Canola usually can compensate for flea beetle feeding injury once it reaches the four- to six-true-leaf stage.

## **Occasional Insect Pests**

### **Diamondback Moth (*Plutella xylostella*)**

#### **Lepidoptera: Plutellidae**

The migratory diamondback moth usually arrives in late May or early June in North Dakota. The complete life cycle takes about 32 days from egg to adult. It has several generations during a single growing season, so all different life stages (eggs, larvae, pupae, adults) can be found in the field at the same time. The adult is small, about ½ inch long, and drab brown. At rest, the forewings of the male moth form three diamonds; hence the name diamondback moth. Females lay up to 160 eggs during the night. Eggs hatch in five to six

days into pale yellowish-green caterpillars with a forked posterior end. The newly emerged larvae burrow into the leaf and mine the leaf for several days to a week. Then, the larvae exit the leaf and feed externally for another seven to 14 days. When disturbed, the larvae thrash backward violently and often drop from the plant on a strand of silk. The larvae pupate for five to 15 days in a white netlike cocoon attached to the leaves, stems or pods.

Larvae feed on the leaves, buds, flowers, seed pods, the green outer layer of the stems and, occasionally, the developing seeds. The amount of damage will depend on the crop stage and larval density and size. Extensive feeding on the flowers will delay plant maturity and cause flowers to abort and the crop to develop unevenly, resulting in reduced seed yield. As leaves wilt and drop in late July to early August, larvae will feed on the stem, pods and developing seeds. Damaged pods will not fill completely and may shatter. Severely damaged pods appear whitish in contrast to the normal yellowing and browning of ripening undamaged pods.

### **Pest Management**

Sex pheromone traps are useful tools for detecting the flights of the adult diamondback moth. The recommended trap design is the wing trap or delta trap with sticky inserts used to capture moths. Traps should be suspended near the crop at the field's edge. Traps provide an early indication of a possible infestation. **This insect usually has two to three generations in North**

**Dakota. The second generation is the most important because it usually is present when the crop is most susceptible to damage (blooming to early pod).**

The third generation usually is too late to damage most canola, except for the very late-planted fields.

If high numbers of adults (greater than 100 moths per trap week) are being captured in the traps during bloom to early pod development, monitor fields for diamondback moth larvae by beating plants to dislodge the larvae from the plants. After beating the plants, count larvae on the ground or dangling from the plants on a silk thread. Again, check several locations per field. **The action threshold for canola at the pod stage is about 20 larvae per square foot (two to three larvae per plant). No threshold has been established for the early flowering stage. However, insecticide applications likely are required at larval densities of 10 to 15 larvae per square foot (one to two larvae per plant).** The best pest management strategies to avoid yield losses from diamondback moth include early monitoring of adults and larvae, and judicious use of insecticides only when fields are above thresholds. A number of natural factors also can affect diamondback moth populations negatively. For example, heavy rainfalls can drown many first-generation larvae. Humid conditions associated with rainfall also can favor the development of fatal fungal diseases such as Entomophthorales. In addition, several parasitic wasps and predators (flies, lacewings, minute pirate bugs, spiders and birds) prey on diamondback moth larvae.

# **Bertha Armyworm**

## **(*Mamestra configurata*)**

### **Lepidoptera: Noctuidae**

The adult moth is about 1½ inches long, mainly gray-black with a silvery-whitish kidney-shaped spot and with a silvery-whitish fringe on each forewing. Moths emerge from the overwintering pupae in mid to late June and emergence continues through early August. These night fliers are particularly attracted to blooming canola fields for their nectar and egg-laying sites. Eggs are laid on the lower side of leaves in honeycomblike clusters of 50 to 500 eggs, which hatch in about one week. The emerging larvae (1/10 inch) are usually green. Mature larvae are about 1½ inches long and vary from green to brown to velvety black. Larvae often hide underneath leaf litter and clumps of soil during the day, which makes them difficult to see. Larvae develop for six weeks and then drop to the ground in mid to late August to pupate. This insect has only one generation per year.

As the canola plant drops its leaves, the mature larvae (greater than ½ inch) begin to feed directly on the pods, which causes economically important yield losses and premature shattering. Feeding injury by the mature larvae also accounts for 80 to 90 percent of the plant material consumed during a larvae's life. Mature larvae even will continue to feed on pods in the swath. Fortunately, populations are kept low during most years due to natural environmental factors such as harsh winters and a number of biological control agents (diseases and parasites).

## Pest Management

### Monitoring and Economic Thresholds: Knowing When to Control

Sex pheromone traps can be used to detect bertha armyworms in a general area. The recommended trap design is the green unitrap or bucket trap suspended above the crop canopy near the field's edge. High trap catches generally indicate the level of larval populations that follow. Fields should be monitored about two weeks after peak trap catch and scouted regularly to minimize crop losses. Check several locations per field and continue scouting until an economic threshold is reached or the crop is swathed. **The economic threshold will range from one to three larvae per square foot.** Higher-priced canola will require fewer larvae to reach the economic threshold. The key to controlling bertha armyworm is:

- Detecting early the presence or absence of adult moths and their relative abundance in an area
- Monitoring fields for young larvae about ½ inch long
- Determining if fields are above economic thresholds
- Spraying fields above the economic threshold level once the hatch is complete and just before larvae move to the pods to feed. Apply a well-timed insecticide in the early morning or late evening when larvae are feeding actively.
- Using high volumes of water for good coverage of the dense canola canopy.

# Lygus Bugs

## (*Lygus species*)

### Hemiptera: Miridae

Lygus bugs consist of several species belonging to the genus *Lygus*. The tarnished plant bug, *Lygus lineolaris*, is one of the more common species and is known to feed on more than 200 host plants. Adult Lygus bugs are about ¼ inch in length, and pale green, light brown or dark brown with a distinctive triangular marking on the back. Lygus bugs overwinter as adults in weedy areas and move into canola fields throughout the season. Adults lay eggs in the stems, leaves and flowers of host plants and then die. Immature nymphs hatch from these eggs. Nymphs are small, green and sometimes confused with aphids, although Lygus nymphs are very active and move rapidly when disturbed, while aphids do not. Several generations occur each year, with the second generation occurring in late July to early August. Hot, dry weather favors the buildup of Lygus populations and increases the risk of damage to the canola crop. Both immature and adult Lygus bugs feed on growing points, buds, flowers and green pods. Lygus bugs inject a toxic saliva with their piercing-sucking mouthparts during feeding, causing blasting of flowers or buds and shriveled seeds. Blasted flowers turn white within 24 hours and quickly fall to the ground. The small seeds or damaged seeds are lost during harvest. In severe outbreaks in Canada, yield losses from bud blasting and damage to seed have been estimated at 20 percent.

## Pest Management

Scout for *Lygus* bugs just prior to bud formation until seeds within the pod have become firm. *Lygus* populations can increase suddenly. For example, when an alfalfa (preferred host) field is cut, *Lygus* bugs will migrate quickly into nearby canola fields and often in high numbers. Use a 15-inch sweep net and make 10 180-degree sweeps at several sampling sites.

**The economic thresholds developed in Canada are: 15 *Lygus* bugs per 10 sweeps during bud stage through petal fall, and 20 *Lygus* bugs per 10 sweeps after petal fall and through pod ripening.** However, if populations are large, control during the early pod ripening stage usually is the most economical.

## Cutworms

### **Lepidoptera: Noctuidae**

Several species of cutworms such as dingy cutworm, red-backed cutworm and pale western cutworm, create problems for agricultural crops in the northern Great Plains. Adult cutworms are moths, have dark wing colors (brown to gray) with markings and wings about 1½ inches long. Cutworms have one generation per year. They overwinter as eggs or young larvae, depending on the species. Species that overwinter as eggs hatch in April or early May, and young larvae (or caterpillars) feed at night on weeds and volunteer plants before the canola crop emerges. Larvae molt six times and grow larger with each instar. A mature cutworm larva is about 1½ inches long and the size of a pencil in width. Cutworms are most noticeable in

canola during late May through the first three weeks of June. After cutworms complete their development in late June, they burrow deeper into the soil and make a small pupal chamber. An adult moth emerges from the pupa in August to early September. Adults mate and lay eggs on or just below the surface of loose, dry soil; weedy stubble; or fallow fields, depending on the species.

Cutworm damage first appears on hilltops or south-facing slopes, or in areas of light soil, which warm earlier in the spring. Larvae will cut young canola plants in the seedling to rosette stages. Cut plants can be found drying and lying on the soil surface. As damage continues, fields will have areas of bare soil where the canola has disappeared. In a severe infestation, the entire field can be destroyed.

### **Pest Management**

Scout fields by looking for freshly damaged (cut off) plants. Dig 2 or more inches down around the cut-off plant and search for cutworm larvae. When disturbed, cutworms curl up or hide under soil debris. Canola is more susceptible to cutworm damage than small grains because cut plants do not grow back (grains compensate by tillering). **Three to four cutworms per square yard justifies an insecticide treatment.** Cutworm larvae are feeding actively at night, so an evening insecticide application is best. As a cultural control technique, weed-free fields and crusted summer fallow fields are less attractive to egg laying adults in late summer.

# Grasshoppers

## Orthoptera: Acrididae

Grasshoppers are generalists and feed on a wide range of agricultural crops, such as small grains, flax and sunflowers. Grasshoppers overwinter as eggs, and nymphs start to hatch and emerge from the soil in late April to early May, with peak egg hatch in mid-June. Nymphs (young grasshoppers) will go through five molts before transforming into adults. The length of time from egg to adult is 40 to 60 days. Adults of crop-damaging species become numerous in mid-July, with egg laying usually beginning in late July and continuing into the fall. Eggs are deposited in a variety of noncrop areas, including ditches, shelterbelts and weedy fall fields. Adults and nymphs feed on green plant material with their chewing mouthparts, creating holes on leaves or pods.

### Pest Management

Grasshopper outbreaks usually coincide with several years of low rainfall and drought periods. Cool, wet weather increases the diseases that infect and kill grasshoppers. Scout canola for feeding injury from nymphs in the seedling stage and from adults in the pod development stage. Grasshopper damage often is concentrated on field edges and only the field edges will need to be sprayed. Grasshopper thresholds are based on the number of grasshoppers per square yard. Four 180-degree sweeps with a 15-inch sweep net can estimate numbers for 1 square yard.

The infestation ratings are listed below in the table. A “threatening” rating would indicate a need to treat with an insecticide.

### Ratings for grasshopper nymphs and adults.

Rating	Nymphs per square yard		Adults per square yard	
	Margin	Field	Margin	Field
Light	25-35	15-23	10-20	3-7
Threatening	50-75	30-45	21-40	8-14
Severe	100-150	60-90	41-80	15-28
Very Severe	200+	120	80+	28+

## Blister Beetles

### Coleoptera: Meloidae

Several blister beetle species feed on canola, including *Lytta nuttalli*, a large purplish-green beetle; *Epicauta fabricii* or the ash-gray blister beetle; and *Epicauta ferruginea*, a smaller, rusty-colored pubescent beetle. Most blister beetle species have one generation per year. Adults become active in early to midsummer and lay eggs in the soil. Eggs hatch in about two weeks into larvae called triungulins, which actively prey on grasshopper egg pods (*Epicauta* spp.) or bee nests (*Lytta* spp.). Blister beetles overwinter as larvae. Adult blister beetles are attracted to blooming canola fields, where they are ravenous feeders, devouring leaves, stems, flowers and pods. Blister beetles are mobile and gregarious, and often congregate in certain spots in a field. In some instances, blister beetles feed for a short period of time and then migrate to other plants

or fields. Alfalfa is an alternative host of blister beetles, and they often move into canola fields when the alfalfa is cut. Blister beetles produce an extremely poisonous toxin (cantharidin) if ingested by horses and to a lesser degree by other livestock (sheep and beef cattle).

### **Pest Management**

The presence of large numbers of blister beetles in spots of a canola field often has concerned producers. However, adult feeding generally is not significant enough to warrant an insecticide treatment.

**The “High Plains Integrated Pest Management Guide” recommends treatment when fields have 10 adult blister beetles per plant feeding on the flowers or pods.** However, no economic threshold has been set in North Dakota. Spot treatment with foliar insecticides registered in canola is recommended.

## **Aphids (Cabbage Aphids, Turnip Aphid, and Green Peach Aphid)**

### **Hemiptera: Aphididae**

Several species of aphids (cabbage aphid, turnip aphid, green peach aphid) infest canola and other plants in the mustard family. Individual aphids are small, approximately 2 to 4 millimeters in length, with a pair of tubelike structures called cornicles protruding from the back. Aphids on canola usually are pale green to grayish green and found in large numbers near the top of individual plants. Infested plants often appear shiny from the honeydew they excrete.

Many aphids migrate into North Dakota from southern states; some species do overwinter in the region. Migrating aphids begin to arrive in late spring to first colonize canola. As a result, late-planted canola may be more susceptible to heavy aphid infestations. Females reproduce asexually and give birth to live young within seven days. As aphid populations build and become crowded, winged adults are produced and they disperse to begin new colonies. Multiple, overlapping generations of aphids occur within a season. Aphids suck out the plant's sap and inhibit terminal growth, stunting plant size and reducing seed yield. Aphid infestations often are localized within a field and usually cause little damage if the infestations occur after pod development.

### **Pest Management**

No thresholds have been established for aphids on canola. In most cases, spraying is not economical because aphids are on the top 2 to 3 inches of the plant where pods are the smallest and contribute little to the overall yield. However, **control may be justified when at least 20 percent of the stems are infested with a cluster of aphids in the late-flowering or early pod stages.** Scout field edges in upwind areas where aphids tend to be abundant. Note the presence of natural enemies as well as aphids. A treatment may be necessary when the following conditions are met: 1) canola was planted late; 2) plants are still in pod development; and 3) low populations of natural enemies, such as lady beetles, syrphid flies or lacewings, are present.

## Insecticides labeled for canola insect pests in North Dakota (sorted by insecticide class and active ingredient).

Insecticide Class	Active Ingredient	Product1	Preharvest Interval (days)	Targeted Insects
insect growth regulator	tebufenozide	Confirm 2F	14	bertha armyworm
microbial	<i>Bacillus thuringiensis</i>	Dipel DF	None	bertha armyworm
neonicotinoid	clothianidin	Poncho or Prosper (insecticide plus fungicide premix). <i>For commercial seed treaters only. NipsIT Inside. For seed treatment by commercial seed treatment equipment only.</i>	—	flea beetles
	imidacloprid seed treatment	Gaucht 600, Attendant 600, Dyna-Shield Imidacloprid 5, Senator 600, and generics. <i>For commercial seed treaters only.</i>	—	flea beetles
	thiamethoxam seed treatment	Helix (10.3% active) and Helix Xtra (20.7% active). <i>For commercial seed treaters only.</i>	—	flea beetles

organophosphate	methyl parathion	Methyl parathion*	28	diamondback moths, flea beetles
pyrethroid	bifenthrin	Bifenture 2E*, Brigade 2E*, Fanfare 2EC*, Tundra EC*, and generics	35	bertha armyworms, cutworms, diamondback moths, flea beetles, grasshoppers, Lygus bugs
	deltamethrin	Delta Gold*	7	bertha armyworms, cutworms, diamondback moths, flea beetles, grasshoppers, Lygus bugs
	gamma-cyhalothrin	Proaxis*	7	bertha armyworms, cutworms, diamondback moths, flea beetles, grasshoppers, Lygus bugs
	lambda-cyhalothrin	Warrior II*, Silencer*, Grizzly Z*, Kaiso 24 WG*, Lambda-Cy* and generics	7	bertha armyworms, cutworms, diamondback moths, flea beetles, grasshoppers, Lygus bugs
	zeta-cypermethrin	Mustang Max EC*	7	bertha armyworms, cutworms, diamondback moths, flea beetles, grasshoppers, Lygus bugs

\*Restricted-use insecticide

1 Always read and follow the manufacturer's directions before using the product and always use the labeled rates.

Please consult the current edition of the "North Dakota Field Crop Insect Management Guide," NDSU Extension Service publication E-1143 ([www.ag.ndsu.edu/pubs/plantsci/pests/e1143w1.htm](http://www.ag.ndsu.edu/pubs/plantsci/pests/e1143w1.htm)), for more information and restrictions on insecticides labeled for canola.

Follow safe pesticides practices when spraying flowering canola to protect honey bees and native pollinators. If spraying canola during bloom is necessary, apply insecticide during early morning or late evening hours when bee foraging activity is minimal and bees are back at the hive. Be sure to notify local beekeepers before the insecticide application.