

## SUNFLOWER INSECTS

### BANDED SUNFLOWER MOTH

Banded sunflower moths (BSM) were a major concern in recent seasons. Heavy infestations occurred in the southeast quarter of the state in 2001 and 2002, large moth flights were observed and treated by producers.

BSM begin to emerge from the soil about mid-July. Peak activity normally occurs about the last week of July or the first week of August. Moths fly from last year's field to the current year's field. At this time moths congregate around field margins. The moths move to fields during the bud stage, with a preference for the mid-bud stage. Eggs are laid on the back of the bud and the outside of the bracts. The newly hatched larvae move from these sites to the face of the flower and begin feeding on bracts and florets.

In the past, the procedure for determining infestation potential is based on surveying for moths in the field early in the morning or evening. Count the number of moths found on 20 plants from each of 5 sites in the field. Observing moth activity around field margins was used by many growers and consultants during 2000.

In 1995, a new sampling strategy based on scouting for adult moth during daylight hours was published in the extension bulletin E823 - Banded Sunflower Moth. Please obtain a copy of this publication for complete details for determining the economic threshold, scouting, and timing of treatments based on this method.

**Threshold:**

When 1 moth for every 2 plants inspected can be found, treatments should be considered. Because the moths initially congregate around field margins prior to flowering, treatment of the field margins has reduced the adult population.

The **banded moth**, **seed weevil**, and the **Lygus bug** have all impacted quality of **confection sunflowers** the past three to four seasons. It is recommended at this time, that **sunflowers grown for these markets be treated a minimum of two times**, once at early flowering and again 5 to 7 days later. With this type of program, a window of protection should be provided to minimize impact from all three of these seed damaging insect pests.

INSECTICIDE	DOSAGE IN LB AI/ACRE	PRODUCT PER ACRE	RESTRICTIONS ON USE
Asana XL <i>RUP</i>	0.03 - 0.05	5.8 - 9.6 fl oz	Do not apply within 28 days of harvest.
Baythroid <i>RUP</i>	0.031 - 0.044	2.0 - 2.8 fl oz	Do not apply within 30 days of harvest.
Furadan 4F <i>RUP</i>	0.5	1 pt	Do not apply within 28 days of harvest.
Lorsban 4E <i>RUP</i>	0.5 - 0.75	1 - 1.5 pts	Do not apply within 42 days of harvest. Do not allow livestock to graze in treated areas.
Scout X-TRA <i>RUP</i>	0.014 - 0.0164	2 - 2.33 fl oz	Do not apply within 21 days of harvest.
Warrior <i>RUP</i>	0.02 - 0.03	2.56 - 3.84 fl oz	Do not apply within 45 days of harvest.

*RUP* - Restricted use pesticide

## SUNFLOWER MOTH

The sunflower moth migrates to North Dakota from southern states. Because of the migratory nature of the insect, it has not been a major problem in North Dakota in recent years. This grayish-tan moth moves into fields in early bloom. It deposits its eggs on the face of the flower. Damage is similar to that caused by the banded moth. The same monitoring strategies are recommended for sunflower moth as those for the banded moth.

**Threshold:**

When 1 to 2 moths are found for every 5 plants inspected, treatments should be considered.

INSECTICIDE	DOSAGE IN LB AI/ACRE	PRODUCT PER ACRE	RESTRICTIONS ON USE
Asana XL <i>RUP</i>	0.03 - 0.05	5.8 - 9.6 fl oz	Do not apply within 28 days of harvest.
Baythroid <i>RUP</i>	0.031 - 0.044	2.0 - 2.8 fl oz	Do not apply within 30 days of harvest.
Endosulfan 3EC (Phaser, Thiodan)	1	1.33 qts	Make first application at early bloom; 1 - 2 repeat applications may be necessary at 4 to 7 day intervals. No preharvest interval. Do not enter treated fields within 48 hours after application. Fields must be posted.
Furadan 4F <i>RUP</i>	0.5	1 pt	Do not re-enter treated fields within 14 days of application without wearing protective clothing. Do not harvest within 28 days of last application.
Lorsban 4E <i>RUP</i>	0.5 - 0.75	1 - 1.5 pts	Do not apply within 42 days of harvest. Do not allow livestock to graze in treated areas. Do not apply more than 9 pints per acre per season.
Methyl parathion 4EC <i>RUP</i>	1	2 pts	First application at onset of bloom. Make no more than 3 applications at 5 day intervals. Do not apply within 30 days of harvest. Do not feed seeds to birds. Do not enter treated fields within 48 hours of methyl parathion or 3 days ethyl parathion. Fields must be posted.
Scout X-TRA <i>RUP</i>	0.014 - 0.0164	2 - 2.33 fl oz	Do not apply within 21 days of harvest.
Warrior <i>RUP</i>	0.02 - 0.03	2.56 - 3.84 fl oz	Do not apply within 45 days of harvest.

*RUP* - Restricted use pesticide

## SUNFLOWER SEED WEEVIL

The red sunflower seed weevil begins to emerge in early July and continues until mid-August. Peak emergence occurs in late July. Start counting adult seed weevils when the yellow ray petals are just beginning to show. Counts should continue until the economic threshold level has been reached or most plants have reached 70 percent pollen shed. A plant that has reached 70 percent pollen shed has few seeds still suitable for red seed weevil egg laying. Fields where most plants are at the 70 percent pollen shed stage should no longer be susceptible to further significant damage.

When sampling, use the X pattern and begin counting at least 70 to 100 feet into the field to avoid field margin effects. Count the number of weevils on five plants at each site for a total of 25 plants. The ideal plant stage for treatment is when most individual plants are at 40 percent pollen shed. However, we recommend that treatment be considered when three out of 10 plants are just beginning to shed pollen.

### Threshold:

**Oilseed Sunflower** . . . The threshold can be calculated using the following formula.

$$\text{Threshold (Weevils per head)} = \frac{\text{Cost of Insecticide Treatment}}{(\text{Market Price} \times 21.5) (0.000022 \times \text{Plant Population} + 0.18)}$$

*example for calculating threshold: Price for Oilseed Sunflowers = \$0.12*

Plant Population	Treatment Cost (\$)					
	6.00	7.00	8.00	9.00	10.00	11.00
17,000	4	5	6	6	7	8
18,000	4	5	5	6	7	7
19,000	4	5	5	6	6	7
20,000	4	4	5	6	6	7
21,000	4	4	5	5	6	7
22,000	4	4	5	5	6	6
23,000	3	4	5	5	6	6
24,000	3	4	4	5	5	6
25,000	3	4	4	5	5	6

Estimation of absolute red sunflower seed weevil adults when sampling using a commercial formulation of mosquito repellent.					
Number counted in the field	Absolute number	Number counted in the field	Absolute number	Number counted in the field	Absolute number
1	1.4	7	12.4	13	23.1
2	2.9	8	14.2	14	24.9
3	4.4	9	16.0	15	26.6
4	5.8	10	17.8	16	29.3
5	7.3	11	19.5	17	31.1
6	10.7	12	21.3	18	32.9

**Confection or Hulling Sunflower Market** . . . red sunflower seed weevil control on confection sunflower is based on a need to keep seed damage below 3 or 4 percent due to industry standards. Treatment is recommended when 1 to 2 weevils are found per plant.

The **banded moth**, **seed weevil**, and the **Lygus bug** have all impacted quality of these sunflowers the past three to four seasons. It is recommended at this time that **sunflowers grown for these markets be treated a minimum of two times**, once at early flowering and again 5 to 7 days later. With this type of program, a window of protection should be provided to minimize impact from all three of these seed damaging insect pests.

Growers should plan treatment schedules early. When flowers begin blooming across the region, competition for access to aerial applicators increases.

INSECTICIDE	DOSAGE IN LB AI/ACRE	PRODUCT PER ACRE	RESTRICTIONS ON USE
Asana XL <i>RUP</i>	0.03 - 0.05	5.8 - 9.6 fl oz	Do not apply within 28 days of harvest.
Baythroid <i>RUP</i>	0.031 - 0.044	2.0 - 2.8 fl oz	Do not apply within 30 days of harvest.
Furadan 4F <i>RUP</i>	0.5	1 pt	Do not re-enter treated fields within 14 days of application without wearing protective clothing. Do not harvest crop within 28 days of application.

INSECTICIDE	DOSAGE IN LB AI/ACRE	PRODUCT PER ACRE	RESTRICTIONS ON USE
Lorsban 4E <i>RUP</i>	0.5 - 0.75	1 - 1.5 pts	Do not apply within 42 days of harvest. Do not allow livestock to graze in treated areas.
Methyl parathion 4EC <i>RUP</i>	1	2 pts	Do not apply within 30 days of harvest. Do not feed seeds to birds. Do not enter treated fields within 48 hours after application. Fields must be posted.
Scout X-TRA <i>RUP</i>	0.014 - 0.0164	2 - 2.33 fl oz	Do not apply within 21 days of harvest.
Warrior <i>RUP</i>	0.02 - 0.03	2.56 - 3.84 fl oz	Do not apply within 45 days of harvest.

*RUP* - Restricted use pesticide

## SUNFLOWER MIDGE

The midge is a small fly, 3/32 inch in length, that is tan colored. The midge emerges in early July. They prefer to lay eggs on developing buds, 1 to 2 inches in diameter. The cream to yellowish-orange larvae feed on bract tissue at first and later on the flowers and seeds. When populations are low and feeding is confined to the bracts, damage results in little economic loss. At higher populations, seed production is reduced or prevented. This type of injury appears as twisted and gnarled flowers. Often, infestations will be limited to field margins. When populations are large, damage may extend into the field and significant field losses may be observed. Historically, infestations and losses have increased with increased sunflower production. Also, environmental conditions contribute to midge outbreaks. Good soil moisture in the month of June promotes survival and emergence of midge.

### Threshold:

There are no effective chemical controls currently recognized for this pest. The best management strategy has been **rotation** to crops other than sunflower in the vicinity of large infestations. Staggering **planting dates** to promote different budding periods between fields, aids in reducing risk of damage to all fields in the same geographic areas. Sunflower hybrids have recently been evaluated for their tolerance to sunflower midge. **Selecting hybrids** for their ability to tolerate infestations should be considered when choosing seed for the upcoming season. Contact your Agricultural Extension Agent for information which summarizes the midge tolerance ratings for evaluated hybrids.

## LYGUS BUG / TARNISHED PLANT BUG

Concerns have been raised during the past three seasons about damage to **confection sunflower seeds**. The damage has been named "kernel brown spot" because of the dark spot on the kernel. All evidence suggests the problem is due to feeding by Lygus on the developing seed.

Lygus are noted for being a pest of seed production to many crops. Their feeding preference is meristematic tissue, embryonic tissue, or new growth of any kind. Lygus insert their mouthparts into the host, start a "pre-digestion pump" to inject saliva and start digestion, then suck the fluid into the stomach. This is where the seed injury originates. The saliva is toxic to plant tissue, helping reduce the plant fluid into a digestible source. The result in sunflower seeds is the brown to black spot resulting from tissue death at that feeding site.

There is still much to learn about Lygus and sunflowers in the region. In the mean time, to minimize the damage which result in a quality reduction, a general approach to protecting sunflower from Lygus and other seed feeding insects is being recommended.

Sunflower is susceptible to Lygus damage during flowering, from anthesis through seed hardening. A number of insecticides labeled for controlling head feeding insects in sunflower are available. Of these, the organophosphate (Lorsban, Methyl Parathion, Parathion) and pyrethroid (Asana XL, Baythroid, Scout X-Tra, Warrior) insecticides are labeled for control of Lygus on numerous other crops. Lygus can be treated at the same time confection sunflower is treated for other insects, such as the seed weevil and banded sunflower moth.

### Treatment Guideline:

**Confection** . . . Currently, NDSU Entomologists are suggesting two treatments are needed to sufficiently protect confection sunflower heads from insect feeding: One application at the onset of pollen shed, or approximately 10% bloom, followed by a second treatment 7 days later. This program should adequately control insects on confection sunflower throughout flowering, minimizing the potential feeding damage.

**Oilseed** sunflower are not believed to be at risk to damage from Lygus feeding at this time.

INSECTICIDE	DOSAGE IN LB AI/ACRE	PRODUCT PER ACRE	RESTRICTIONS ON USE
Lorsban 4E <i>RUP</i>	0.5 - 1.0	1 - 2 pts	Do not apply within 42 days of harvest. Do not allow livestock to graze in treated areas.

*RUP* - Restricted use pesticide

## SUNFLOWER STEM WEEVIL

The sunflower stem weevil can cause serious stalk breakage. This occurs when 25 to 30 larvae are present in a stalk, weakening the stalk when larvae make their overwintering cells in the stalk's base. Breakage is most likely to occur during drought stress or high winds.

The sunflower stem weevil is 3/16 inches in length, and grayish-brown with varying shaped white spots on the wing covers. The weevils emerge in mid to late June. Eggs are deposited in epidermal tissue of the stem. If controls are directed at the adults in order to minimize egg laying, treatments should be initiated during the first few days in July. About 50% of the eggs will be deposited by this weevil by mid-July.

Scouting for these insects is difficult due to their size, coloration, and habit of "playing dead". Examine 5 plants each at 5 locations and keep record of the number of weevils found. Approach plants carefully to avoid alarming the weevils, causing them to drop to the ground. Scout from late June to mid-July.

### Threshold:

Treat for sunflower stem weevils when scouting determines that an average of 1 adult per three plants is found.

INSECTICIDE	DOSAGE IN LB AI/ACRE	PRODUCT PER ACRE	RESTRICTIONS ON USE
Asana XL <i>RUP</i>	0.03 - 0.05	5.8 - 9.6 fl oz	Do not apply within 28 days of harvest.
Baythroid <i>RUP</i>	0.025 - 0.0375	1.6 - 2.4 fl oz	Do not apply within 30 days of harvest.
carbaryl (Sevin)	1 - 2	rate varies by formulation	Do not apply within 60 days of harvest. Do not allow livestock to graze on treated forage.
Furadan 4F <i>RUP</i>	0.5	1 pt	Restrictions same as indicated in seed weevil section.
Lorsban 4E <i>RUP</i>	0.5	1 pt	Treat about 5 to 7 days after adult stem weevils begin to appear. Do not apply within 42 days of harvest. Do not allow livestock to graze in treated areas. Do not apply more than 9 pints per acre per season.
Scout X-TRA <i>RUP</i>	0.014 - 0.0164	2 - 2.33 fl oz	Do not apply within 21 days of harvest.
Warrior <i>RUP</i>	0.02 - 0.03	2.56 - 3.84 fl oz	Do not apply within 45 days of harvest.

*RUP* - Restricted use pesticide

## SUNFLOWER BEETLE

Sunflower beetles begin feeding shortly after they emerge from overwintering. Emergence starts in mid-May. Most feeding by the adults is concentrated on the true leaves. When beetles are numerous, as in 1994 and 1995, fields may be severely defoliated. Adults quickly begin laying pale yellow eggs singly on stems and the underside of leaves. Eggs hatch in about 8 days. The pale green, humpbacked larvae begin feeding, eating holes throughout the leaf. Larvae do not feed during the day, resting in the plant tops where they are easily observed.

### Threshold:

**Adults** . . . Treatment is recommended when scouting determines that an average of 1 to 2 beetles per plant can be found throughout the field.

**Larvae** . . . When an average of 10 to 15 larvae per plant is found, defoliation levels of 25 to 30% would be expected. Treatment is suggested when damage levels reach this point and most larvae are 1/4 inch in size.

INSECTICIDE	DOSAGE IN LB AI/ACRE	PRODUCT PER ACRE	RESTRICTIONS ON USE
Asana XL <i>RUP</i>	0.015 - 0.03	2.9 - 5.8 fl oz	Do not apply within 28 days of harvest. A <b>reduced rate</b> has been issued as a state 2 (ee) label. These lower rates are for control of SF beetle larvae ONLY. The reduced rate application has a range of 1.45 - 5.8 fl oz.
Baythroid <i>RUP</i>	0.0125 - 0.025	0.8 - 1.6 fl oz	Do not apply within 30 days of harvest.
carbaryl (Sevin)	1.5 - 2	rate varies by formulation	Do not apply within 60 days of harvest. Do not allow livestock to graze on treated forage.

INSECTICIDE	DOSAGE IN LB AI/ACRE	PRODUCT PER ACRE	RESTRICTIONS ON USE
Furadan 4F <i>RUP</i>	0.125 - 0.5	0.25 - 1 pt	Restrictions same as indicated in seed weevil section.
Lorsban 4E <i>RUP</i>	0.5 - 0.75	1 - 1.5 pts	Do not apply within 42 days of harvest. Do not allow livestock to graze in treated areas.
Scout X-TRA <i>RUP</i>	0.005 - 0.01	0.71 - 1.42 fl oz	Do not apply within 21 days of harvest.
Warrior <i>RUP</i>	0.01 - 0.02	1.28 - 2.56 fl oz	Do not apply within 45 days of harvest.

*RUP* - Restricted use pesticide

## CUTWORMS

Most damage by cutworms occurs when plants are in the early stage of development. Damage consists of young plants being chewed off slightly below or at ground level. Some cutworm feeding injury may occur on foliage. Cutworms primarily feed at night. When checking fields for cutworms during the day, dig down into soil an inch or two around recently damaged plants; there you can find the gray to gray-brown larva.

### Threshold:

Treatment is warranted when one cutworm or more is found per square foot or there is a 25 to 30% stand reduction observed.

INSECTICIDE	DOSAGE IN LB AI/ACRE	PRODUCT PER ACRE	RESTRICTIONS ON USE
Asana XL <i>RUP</i>	0.03 - 0.05	5.8 - 9.6 fl oz	Do not apply within 28 days of harvest.
Baythroid <i>RUP</i>	0.0125 - 0.025	0.8 - 1.6 fl oz	Do not apply within 30 days of harvest.
Lorsban 4E  Lorsban 15 G <i>RUP</i>	1 - 2	2 - 4 pts  8 oz/1,000 ft of row (band at planting)	If ground is dry, cloddy or crusty at time of treatment, worms may be protected from the spray and effectiveness may be reduced. If such conditions exist, shallow cultivation using a rotary hoe or equivalent equipment before or soon after treatment may improve control. Restrictions same as for stem weevil and sunflower moth control.
carbaryl Sevin 20% Bait Sevin XLR	1 - 2	20 - 40 lbs 1.5 qts	Broadcast applications may be made with either aerial or ground equipment. Do not apply within 60 days of harvest. Do not allow animals to graze on treated crops.
Warrior <i>RUP</i>	0.01 - 0.02	1.28 - 2.56 fl oz	Do not apply within 45 days of harvest.

*RUP* - Restricted use pesticide

## GRASSHOPPERS

In the northern plains, grasshopper egg hatch normally begins in late April to early May. Most grasshoppers emerge from eggs deposited in uncultivated ground. Sunflower growers should expect to find grasshopper feeding first along field margins adjacent to these sites. Later infestations may develop when grasshopper adults migrate from harvested small grain fields.

### Threshold:

Grasshopper control is advised whenever 20 or more adults per square yard are found in field margins or 8 to 14 adults per square yard are occurring in the crop. (For more information on infestation ratings, see the discussion under Grasshoppers in Small Grain Insects).

INSECTICIDE	DOSAGE IN LB AI/ACRE	PRODUCT PER ACRE	RESTRICTIONS ON USE
Asana XL  <i>RUP</i>	0.03 - 0.05	5.8 - 9.6 fl oz	Do not apply within 28 days of harvest. A <b>reduced rate</b> has been issued as a state 2 (ee) label. These lower rates are for control of first and second stage grasshoppers, ONLY. The reduced rate application has a range of 3.9 - 5.8 fl oz.
Baythroid <i>RUP</i>	0.031 - 0.044	2.0 - 2.8 fl oz	Do not apply within 30 days of harvest.
Furadan 4F <i>RUP</i>	0.125 - 0.5	0.25 - 1 pt	Restrictions same as listed in seed weevil section.

<b>INSECTICIDE</b>	<b>DOSAGE IN LB AI/ACRE</b>	<b>PRODUCT PER ACRE</b>	<b>RESTRICTIONS ON USE</b>
Lorsban 4E <i>RUP</i>	0.5	1 pt	Do not apply within 42 days of harvest. Do not allow livestock to graze in treated areas. Do not apply more than 9 pints per acre per season.
6-3-methyl parathion <i>RUP</i>	1	0.88 pt	Do not apply within 30 days of harvesting, pasturing, cutting or foraging. Do not apply more than 3 times at 5 day intervals per season. Do not feed seeds to birds. Do not enter treated fields for 48 hours after application. Fields must be posted.
carbaryl (Sevin)	0.5 - 1.5	rate varies by formulation	Do not apply within 60 days of harvest. Do not allow animals to graze on treated crops.
Scout X-TRA <i>RUP</i>	0.014 - 0.0164	2.0 - 2.33 fl oz	Do not apply within 21 days of harvest.
Warrior <i>RUP</i>	0.02 - 0.03	2.56 - 3.84 fl oz	Do not apply within 45 days of harvest. Warrior may be used in bordering, non-crop areas that are not hayed or grazed (24 c label).

*RUP* - Restricted use pesticide

## WIREWORMS

Currently the only insecticide registered for wireworm in sunflower that provides seedling protection is thiamethoxam. To decide whether wireworms are a potential problem, refer to the discussion in the corn insects section.

<b>INSECTICIDE</b>	<b>DOSAGE IN LB AI/ACRE</b>	<b>PRODUCT PER ACRE</b>	<b>RESTRICTIONS ON USE</b>
Cruiser (thiamethoxam)	refer to recommended label rate		Follow all applicable directions, restrictions and precautions on the EPA registered label.