# HPIPM:Grasshoppers SG



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Photo by Whitney Cranshaw, Colorado State University, Bugwood.org

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## Identification (and life cycle/seasonal history)

There are many different species of grasshoppers, with some having a greater pest potential than others. Correctly identifying a species is important because (1) species vary in their biotic potential and in their capacity for causing damage; (2) depending on their food habits, species may be either pests or beneficial; (3) certain species of pest grasshoppers are highly migratory and often pose a serious threat to distant crops; (4) species vary in their seasonal cycle (period of hatching, development, and reproduction), which, in turn, affects the timing of control treatments; (5) because current chemical and biological methods of controlling grasshoppers are more sophisticated, their effective use requires greater knowledge of the pests' life histories and habits; and (6) as environmental impacts of control are more finely evaluated, identification of species is important in the selection of management strategies. Common crop-damaging species include: differential grasshopper, Melanoplus differentialis; migratory grasshopper, Melanoplus sanguinipes; twostriped grasshopper, Melanoplus bivitattus; redlegged grasshopper, Melanoplus femurrubrum; and clearwinged grasshopper, Camnula pellucida. These prefer areas with a mix of grasses and broadleaf weeds. This includes wheat with adjacent or nearby undisturbed areas such as roadside ditches, crop borders, abandoned cropland, and over-grazed pastures or rangeland. Well-managed rangeland or pasture is usually not a source.

Most grasshoppers overwinter as eggs enclosed in a pod laid in the top few inches of undisturbed soil. These elongate pods may contain from 8 to 30 eggs, and females may produce up to 100 eggs during the season. Grasshoppers hatch earlier in a warm spring, with the two-striped grasshopper being the earliest. It hatches from mid to late May, while the other species will from one to three weeks later. Hatching will continue well into June. Nymphs start feeding immediately and have the same host range as adults. Nymphs will mature into winged adults in five to six weeks. Adults can start dispersing from nymphal feeding areas by late June and early July. Few nymphs will be present by August. Grasshoppers feed during the day and rest during the afternoon and night on vegetation.

The following website provides a comprehensive source of information on grasshopper biology, ecology, identification and management of grasshoppers and crickets in North America:[2] (http://www.sidney.ars.usda.gov/grasshopper/)

## Plant Response and Damage

Grasshoppers are defoliators and damage wheat during two periods. First, wheat establishment can be impacted when grasshoppers move into the emerging crop in the fall. Also, grasshoppers can move into wheat in late spring when wheat is headed and cause serious damage.

Early-seeded winter wheat has the greatest probability of emerging while adults are still active. Light frosts may increase feeding by killing nearby broadleaf hosts, such as sunflower, and causing the grasshoppers to move into wheat. Newly emerged winter wheat can be damaged to the point of stand loss.

Grasshoppers can move into and defoliate wheat in spring and early summer, as well. The most serious damage occurs when they enter the maturing crop and the only available green tissue is the stem just below the head. Feeding at this time results in severed stems and complete loss of the heads.

## Monitoring

Survey for nymphs after hatching because the problem starts outside the crop. A sweep net can be used to collect local grasshoppers to determine their age for treatment timing and to verify that they belong to one of the crop-damaging species.

If a crop damaging species is present, the grasshoppers need to be counted in order the determine the need for treatment, which is done by the square foot method. Imagine an area of one square foot area several feet in front of you and count the grasshoppers in or jumping out of this area. When first learning this method, it may be helpful to use a square foot frame to help estimate the sample area. Make 18 separate counts at randomly selected sites that are 50-75 ft. apart. Try to include all the plant species present and try to make counts on both north- and south-facing slopes.

## Management Approaches

### Cultural Methods

Make abandoned or weedy areas less attractive to cropland grasshoppers by planting dense grass stands and reducing broadleaf plants. Delayed seeding of winter wheat where grasshoppers are a concern can reduce the potential for damage, but may not be effective if the first heavy frost occurs later in the fall. Doubling the seeding rate on the first and second passes with the drill may allow some plant survival in the field borders.

### Chemical Control

Once the number of grasshoppers per square yard has been estimated, use the tables below to determine if treatment is necessary. This is a general table for use in most field crops. Since adults rapidly consume a great deal of leaf material and the wheat plant has very little leaf area at this time, light to moderate infestations in the field and borders can result in stand loss in field margins.

Carbaryl-based bran baits can be applied in the crop pre- or post-emergence, or in adjacent areas with short, dry vegetation. The bait must be applied uniformly and reapplication may be necessary after rain or heavy dew.

Foliar insecticides applied to the crop margins and surrounding border areas to control nymphs will, in most years, provide adequate control. Treating 150 feet beyond the crop edge should be usually sufficient. Timing of fall border treatments is critical for optimum grasshopper control. The best time to spray the borders is just before the wheat emerges. If an application is made too early, there will be no residual insecticide activity in the borders when the wheat emerges, and grasshopper populations may build back up too quickly. If it is applied too late, some of the earliest emerging wheat may already be damaged. Treating a 150 foot border should be adequate under most conditions, however, season-long control when grasshoppers are abundant may require as much as a 1/4 mile border treatment. Retreatment may be necessary, so monitor border areas and crop margins to insure that adults are not reentering the field.

Using insecticide-treated seed in the field margins can help control moderate grasshopper infestations in emerging wheat. Some damage still will occur, the rate of feeding will be reduced noticeably. Do not expect complete control if grasshoppers are abundant.

Table 1. Spring treatment guidelines for immature and adult grasshoppers in winter wheat (modified from University of Minnesota information).

| | Immatures/yd2 | | | Adults/yd2 | | |
|---|---|---|---|---|---|---|
| **Rating** | **Margin** | **Field** | **Treat?** | **Margin** | **Field** | **Treat?** |
| Nonthreatening | <25 | <15 | No | <10 | <3 | No |
| Light | 25-35 | 15-25 | No | 10-20 | 3-7 | Yes, if there is potential for head clipping |
| Threatening | 50-75 | 30-45 | Depends on prices, crop condition | 21-40 | 8-14 | Yes, if there is potential for head clipping |
| Severe | >100 | >60 | Yes, monitor for retreatment | >41 | >15 | Yes, consider wider border treatments and monitor for retreatment |

Table 2. Fall treatment guidelines for adult grasshoppers in winter wheat (modified from University of Minnesota information).

| | Adults/yd2 | | |
|---|---|---|---|
| **Rating** | **Margin** | **Field** | **Treat?** |
| Nonthreatening | <10 | <3 | No |
| Light | 10-20 | 3-7 | Yes |

| | | | |
|---|---|---|---|
| Threatening | 21-40 | 8-14 | Yes, consider wider border treatments |
| Severe | >41 | >15 | Yes, use wider border treatments and monitor for retreatment |

*Product List for Grasshoppers:*

| Insecticide | Product Per Acre (Fl oz. or oz. product) | Preharvest interval, remarks |
|---|---|---|
| Baythroid XL[R,1] | 1.8 - 2.4 | 30 days to grain. 3 days graze. 12 hour REI. Do not apply more than 0.076 lb a.i. (4.8 oz) per season. W,B,R,T[3] |
| chlorpyrifos 4E[R,1,2] | 8 - 16 | 28 days. 14 days graze. 24 hour REI. Not more than 2 applications per season. W[3] |
| Cobalt[R,1,2] | 7 - 13 | 28 days. 14 days graze. 24 hour REI. Not more than 2 applications per season. W[3] |
| dimethoate[1,2] | See labels | 35 days grain. 14 days graze. 48 hour REI. Not more than two applications per season. W[3] |
| gamma cyhalothrin[R,1,2] | See labels. | 30 days. 24 hour REI. Not more than 0.06 lb ai/A/season. Best control before insects roll leaves. After boot stage, suppression only. W,T[3] |
| lambda cyhalothrin[R,1,2] | See labels. | 30 days. 24 hour REI. Not more than 0.06 lb ai/A/season. Best control before insects roll leaves. After boot stage, suppression only. W,T[3] |
| Mustang Max [R,1] | 3.2 - 4.0 | 14 days. See label. W,T[3] |
| Stallion[R,1] | 5.0 - 11.75 | 14 days forage and hay, 28 days grain and straw. 24 hr REI. Extremely Hazardous to Bees! No more than 11.75 oz per application, 23.5 oz per season. W[3] |
| [R]Restricted use pesticide [1]Labeled for chemigation [2]Generic active ingredient, several formulations. [3]Labeled on W (wheat), B (barley), O (oats), R (rye), T (triticale). | | |

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