



HOME & GARDEN

Grasshopper Control in Gardens & Small Acreages

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Quick Facts...

Grasshoppers are the most difficult insect to control because they are highly mobile.

All grasshoppers lay their eggs in soil.

There are over 100 species of grasshoppers in Colorado.

During periods when local outbreaks are developing, control usually involves using sprays or baits.

Grasshoppers can be the most noticeable and damaging insects to yards and fields. They also are among those most difficult to control, since they are highly mobile. For many reasons, grasshopper populations fluctuate greatly from year to year, and may cause serious damage during periodic outbreaks. Problems tend to increase beginning in early summer and can persist until hard frosts.

Over 100 species of grasshoppers occur in Colorado and their food habits vary. Some primarily feed on grasses or sedges, while others prefer broadleaved plants. Other grasshoppers restrict their feeding to plants of no great economic value and a few even feed primarily on weed species (e.g., snakeweed). However, others will readily feed on garden and landscape plants (Table 1).

Among vegetable crops certain plants are favored, such as lettuce, carrots, beans, sweet corn, and onions. Squash, peas, and tomatoes (leaves, not fruit) are among the plants that tend to be avoided.

Grasshoppers less commonly feed on leaves of trees and shrubs. However, during outbreak years even these may be damaged. Furthermore, grasshoppers may incidentally damage shelterbelt plantings when they rest on twigs and gnaw on bark, sometimes causing small branches to die back.

Grasshopper Life History

All grasshoppers lay their eggs in soil, in the form of tight clustered pods. Relatively dry soils, undisturbed by tillage or irrigations, are preferred. Egg laying may be concentrated at certain sites with favorable soil texture, slope, and orientation, producing 'egg beds'.

The egg stage is the overwintering stage of most, but not all, grasshoppers. For the majority of species the eggs hatch in mid- to late-spring, varying with soil temperatures. At egg hatch the tiny first stage nymphs move to the surface and seek tender foliage on which to feed. The first few days are critical to survival. Adverse weather or absence of suitable foods can cause high mortality. Surviving grasshoppers continue to develop over the next several weeks, usually molting through five or six stages, before ultimately reaching the adult form.

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Figure 1. Differential grasshopper.



Figure 2. Migratory grasshopper.



Figure 3. Twostripped grasshopper.



Figure 4. Redlegged grasshopper.



Figure 5. Clearwinged grasshopper.



Figure 6. Grasshopper egg bed.

For identification of many grasshoppers found in Colorado and images of the various developmental stages, the University of Wyoming has prepared a series of fact sheets, accessible through the USDA-ARS website: www.sidney.ars.usda.gov/grasshopper/ID_Tools/F_Sheets/index.htm.

Table 1: Primary grasshoppers that damage gardens and small acreage pasture areas in Colorado.		
Common Name	Scientific Name	Comments
Differential grasshopper	<i>Melanoplus differentialis</i>	Often one of the first grasshoppers found moving into gardens and one of the largest in the genus <i>Melanoplus</i> .
Migratory grasshopper	<i>Melanoplus sanguinipes</i>	Often the most damaging species to croplands. Any early hatching species and capable of long migration flight.
Twostriped grasshopper	<i>Melanoplus bivittatus</i>	Often the most common species damaging gardens, it migrates from empty lots, roadsides, and other undisturbed sites. It often hatches in late spring, a few weeks later than many grasshoppers.
Redlegged grasshopper	<i>Melanoplus femurrubrum</i>	A widely distributed grasshopper that feeds on many garden plants. It tends to be most abundant in moist sites and is one of the later hatching species.
Clearwinged grasshopper	<i>Camnula pellucida</i>	The primary species present in recent outbreaks reported in areas of the West Slope and around Steamboat Springs. An early hatching grasshopper that restricts feeding to grasses.

Adult grasshoppers may live for months, interspersing feeding with mating and egg laying. Species that winter in the egg stage die out in late summer and early fall. A few species, perhaps most conspicuously the speckledwinged grasshopper, spend winter as a nymph, remain active during warm periods, and may develop to the adult form by late winter.

Grasshopper Control

Natural Controls

The most important factors are weather related, particularly around the time of egg hatch. For example, cold, wet weather is very destructive to newly hatched grasshoppers. However, very dry winter and spring conditions also can be harmful to survival since required tender new plant growth is not available. Some insects commonly feed on grasshoppers. Many species of blister beetles (see fact sheet 5.524, *Blister Beetles in Forage Crops*) develop on grasshopper egg pods and blister beetle abundance cycles along with their grasshopper hosts. Adult robber flies are common predators of grasshoppers during summer and other flies develop as internal parasites of grasshoppers. Many birds, notably horned larks and kestrels, feed heavily on grasshoppers. Grasshoppers are also frequently eaten by coyotes.

Grasshoppers are also subject to some unusual diseases. A fungus (*Entomophthora grylli*) infects grasshoppers causing them to move upwards and cling to plants shortly before they kill the insect host. Stiff, dead grasshoppers found stuck to a grass stem or twig indicate infection with this disease. A very large nematode (*Mermis nigriscens*) also sometimes develops in grasshoppers. Both the fungus disease and nematode parasite are favored by wet weather.

Managing Grasshoppers with Baits and Sprays

During periods when a local outbreak develops, control usually involves using sprays or baits. To be successful these need to be applied to developing stages of grasshoppers and concentrated at sites where egg laying occurs. Ability to control grasshoppers declines as grasshoppers develop and migrate. Surveys of grasshoppers can be very useful in anticipating problems and treating appropriately. Numbers of grasshoppers present in late summer and early fall can be a good indicator of problems the subsequent year. Follow-up surveys

Table 2: Insecticides used to control grasshoppers.

Common Name	Trade Name(s)	Labeled Uses, Comments
carbaryl	Sevin	Most formulations allow use on a wide variety of fruits and vegetables (1-14 day preharvest interval). Available for use as sprays, dust and in baits.
acephate	Orthene	Has systemic activity in plants and may persist longer than most other insecticides. Uses are limited to non-edible crops.
permethrin	Many trade names.	Widely available for garden use and most formulations allow use on a wide variety of fruits and vegetables. Fairly short persistence of effect for grasshopper control.
diflubenzuron	Dimilin	Growth regulator that affects chitin formation as grasshopper nymphs molt. Effective only on immature insects but has long residual activity. Restricted Use insecticide. Most use will be by licensed pesticide applicators on pastures.
<i>Nosema locustae</i>	NOLO Bait, Semaspore	A biological control that produces infection from a protozoan. It is relatively slow acting and only effective against young grasshoppers. Use allowed in Certified Organic crop production.



Figure 7. Specklewinged grasshopper.

Other Controls

If insecticides are not used, some protection of a garden may be possible by watering grasshopper breeding areas to promote plant growth. This may retard migrations of grasshoppers to areas of more desirable plants. Mowing or other activities that deny food plants in breeding sites should be avoided.

Susceptible plants may be protected by screening or cheesecloth barriers. However, grasshoppers can chew through most fabrics.

Repellents do not appear to be effective. Some materials used as repellents, such as vegetable oils and garlic-based preparations, may instead increase grasshopper feeding on plants.

Poultry may feed heavily on grasshoppers. Turkeys, guinea hens, and chickens have all been used to help control grasshoppers. However, garden areas may need to be fenced since scratching by chickens can be harmful to young plants.

the following spring to detect young nymphs can determine when eggs have hatched. Area-wide surveys may locate egg beds and other sites where early season activity originates.

Treatments should be directed at the young grasshoppers and nearby vegetation present in these breeding sites. At lower altitudes, this often occurs in May; early June may be the optimal time for grasshoppers at higher elevations. Sprays of insecticides are most effective at this time and several insecticides are effective (Table 2). Insecticide options are

greater for larger acreages and unit costs are less expensive. The addition of canola oil to insecticide sprays can improve control by making treated foliage more attractive to feeding grasshoppers.

Alternately, baits containing carbaryl (Sevin) can be broadcast. Bait formulations are made by mixing the insecticide with bran or some other carrier and kill grasshoppers that feed on the bait. These treatments limit application effects on other insects present in the treated area. However, availability of Sevin baits is frequently limited, or prohibitively priced for use on large areas. Baits must be reapplied after rain.

Insecticide treatments do not need to completely cover the area since grasshoppers are mobile. Insecticides applied as bands covering 50 percent of the area, or even less, have proved very effective for control of grasshoppers in rangelands. Backpack sprayers and application equipment modified for use on ATVs can be used in larger acreages. A review of this method, known as Reduced Area Acreage Treatments (RAATS) has been prepared by the University of Wyoming at: www.sdvc.uwyo.edu/grasshopper/atvraats.htm

Where grasshoppers develop over large areas and impact several properties, coordinated area-wide control is very useful. As this requires some additional preparations in planning, early surveys are even more important. Grasshopper control often is much more successful as a community effort.

Once grasshoppers have reached the adult stage and migrations occur, some insecticides may be applied directly to plants. Such applications have only short effectiveness and damage can occur before individual grasshoppers are killed. Furthermore, the choice of insecticides is more limited since few allow direct application to garden fruit and vegetables.

Nosema locustae Baits

Baits containing the protozoan *Nosema locustae* is a biological control option that may be considered for treating grasshopper breeding sites. This is sold under the trade names NOLO Bait or Semaspore and can produce infection of many species of grasshoppers. Because it is selective in effects, only affecting grasshoppers, its use is sometimes considered desirable.

There are some limitations to *Nosema locustae* baits. Only young grasshoppers are susceptible, and it can not be used effectively after adult migrations have occurred. It is also fairly slow acting and does not equally infect all grasshopper species. Often it is most effectively used in a long-term grasshopper management program, in combination with other controls.



Figure 8. A mating pair of plains lubber grasshopper.



Figure 9. Carolina grasshopper.



Figure 10. Barber pole grasshopper, late stage nymph.



Figure 11. Mormon cricket female.
(Photo courtesy John Capinera.)

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Colorado State University, U.S. Department of Agriculture, and Colorado counties cooperating. CSU Extension programs are available to all without discrimination. No endorsement of products mentioned is intended nor is criticism implied of products not mentioned.

Nosema locustae baits are also perishable. They are best kept refrigerated before use. Expiration dates are usually printed on packages and should be checked.

Some Interesting and Unusual Grasshoppers

Among the 100-odd species of Colorado grasshoppers are some that may attract attention because of unusual size, coloration or habit (Table 2). None of these are damaging to gardens and croplands because they do not develop outbreak populations or limit their feeding to plants that are not economically important.

Speckledwinged grasshopper (*Arphia conspersa*) - This is the grasshopper most commonly observed during warm days of winter and early spring. Eggs of the speckledwinged grasshopper hatch in mid-late summer and they spend winter as nymphs and, later, adults. The adults have colored hindwings, often with a yellow or reddish spot and in flight they make a crackling noise. They limit their feeding to grasses and sedges.

Plains lubber/Homesteader (*Brachystola magna*) - This is the largest grasshopper found in the region, and may exceed 3 to 4 grams in weight. It has stubby wings and it is flightless, but can be often seen in midsummer slowly hopping across rural roads in eastern Colorado. The body is colorful, with a mixture of green, pink and brown. The plains lubber will feed on many plants, but is most commonly associated with patches of sunflowers.

Carolina grasshopper (*Dissosteira carolina*) - A grasshopper commonly disturbed to flight when walking along open areas of bare earth. The hindwings are dark with a light band along the edge and in when flying may hover and produce a faint audible noise. Overall color ranges from light greyish yellow to reddish brown and they often blend well with soil background. They feed on a variety of kinds of plants but rarely become abundant enough at a site to cause any serious damage.

Barber pole grasshopper/Pictured grasshopper (*Dactylotum bicolor*) - This is the most colorful grasshopper found in the state with markings of reddish orange, black and yellow. It occurs in areas of the eastern plains and adults are present in late summer. They feed on broadleaf plants, but usually only those of low forage value and it is not considered a pest species.

Greenstreaked grasshopper/Snakeweed grasshopper (*Hesperotettix viridis*) - A bright green, colorful grasshopper found throughout much of the state but most common on the eastern plains. It feeds on a limited number of plants, including many that are considered rangeland weeds (e.g., snakeweed, ragweed).

Red shanks (*Xanthippus corallipes*) - A large grasshopper active earlier in the year than most species. The body color is irregularly splotched and banded, allowing it to camouflage on bare soil. However, the hindwings are bright pink, orange or yellow. It is a grass feeder found in dry, prairie areas.

Spotted bird grasshopper/Lined bird grasshopper (*Schistocerca alutacea*) - A very long grasshopper (ca. 2-inch long) and strong flier. The lined bird, *S. a. shoshone*, is found along riverways and moist ravines where it feeds on various shrubs. The Great Plains/sandhills subspecies, *S. a. lineata*, is found in dry, shrubby areas with large weeds. Adults are present in late summer and early fall but are never very abundant.

Mormon cricket (*Anabrus simplex*) - This large insect is neither a cricket nor a true grasshopper, but a longhorned grasshopper (Tettigoniidae family), related to a katydid. It lives on the open sagebrush/grassland rangelands of the Colorado Plateau and Great Basin at elevations between 6,500 and 11,000 ft. It attracts attention because of periodic massive migrations of millions of individuals that may devour significant amounts of vegetation. Mormon crickets prefer broadleaf plants, but will also eat range grasses and many crop plants.