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Grasshoppers and Their Control

Carl D. Patrick and Steven G. Davis *
Professor and Extension Entomologist,
and Extension Agent–Integrated Pest Management
The Texas A&M University System


Lubber grasshopper.

Grasshoppers are among the most widespread and damaging pests in Texas. There are about 150 species of grasshoppers in the state, but 90 percent of the damage to crops, gardens, trees and shrubs is caused by just five species. They are:

- Differential grasshopper, *Melanoplus differentialis*

  Black chevron markings on the hind femur help identify this species. Adults are 1⅛ to 1¾ inches long. They move into fields from weedy borders and can be very destructive to crops. They are seldom found in grassland.

- Red-legged grasshopper, *Melanoplus femurrubrum*

  Adults are ⅞ to 1¼ inches long with red hind tibia. This species is especially damaging to alfalfa and other legumes, but they can be a problem in other crops, too. They are not a problem in grassland.

- Migratory grasshopper, *Melanoplus sanguinipes*

  This species is very destructive to both grasslands and cultivated crops. Adults are ⅞ to 1⅛ inches long. These grasshoppers are strong fliers and may swarm over long distances.

- Two-striped grasshopper, *Melanoplus bivitattus*

  Adults are 1¾ inches long with two light stripes that extend from the eyes to the wing tips. They eat mostly weeds but will also move into cultivated crops.

- Packard grasshopper, *Melanoplus packardii*

  This species prefers sandy soils with light grass cover. They are the least damaging of the five species, but large numbers of them can be a problem in both grassland and cultivated crops.

A sixth species is not as damaging. It is the:

- Lubber grasshopper, *Brachystola magna*

  The lubber grasshopper prefers weedy areas but can be a problem in crops also, especially cotton. It is seldom a problem in grasslands. Adults are 1¾ to 2 inches long. These grasshoppers are flightless and their limited mobility makes them less damaging than the top five species. Lubber grasshoppers will feed on dead insects, even their own kind, in certain situations.

Grasshoppers cause some damage every year, but they become very destructive during outbreaks. The main factor affecting grasshopper populations is weather. Outbreaks, or exceptionally large populations, are usually preceded by several years of hot, dry summers and warm autumns. Dry weather increases the survival of nymphs and adults. Warm autumns allow grasshoppers more time to feed and lay eggs. Grasshoppers have a high reproductive capacity. The female lays an average of 200 eggs per season, and sometimes as many as 400 eggs. If favorable weather increases the number of eggs, nymphs and adults that survive, the grasshopper population may be dramatically larger the following year.

Biology

Grasshoppers deposit their eggs ½ to 2 inches below the soil surface in pod-like structures. Each egg pod consists of 20 to 120 elongated eggs cemented together. The whole mass is somewhat egg-shaped. Egg pods are very resistant to moisture and cold and easily survive the winter if the soil is not disturbed. Grasshoppers deposit eggs in fallow fields, ditches, fencerows, shelter belts and other weedy areas, as well as in crop fields, hay fields and alfalfa.

Eggs begin hatching in late April or early May. Hatching peaks about mid-June and usually ends by late June. If spring weather is cool and extremely dry, hatching may be delayed and continue into July.

Young grasshoppers are called nymphs. They look like adults, but are smaller and have wing pads instead of wings. Nymphs go through five or six developmental stages and become adults in 40 to 60 days, depending on weather and food supplies.

The adults of grasshopper species that damage crops become numerous in mid-July and deposit eggs from late July through fall. Usually only one generation of grasshoppers is produced each year.

Biological Control

Grasshoppers have many natural enemies that help control their populations. A fungus, *Entomophthora grylli*, often kills many grasshoppers when the weather is warm and humid. Infected grasshoppers strike a characteristic pose at the top of a plant or other object. The grasshopper grasps the plant in a death embrace with the front and middle legs, while the hind legs are extended. It dies in this position. Fungal spores develop in and on the grasshopper's body, then become airborne and infect other grasshoppers.

Another natural enemy is a protozoan, *Nosema locustae*. Its spores have been incorporated with bran to make insecticide baits such as Semaspore®, Nolo Bait® or Grasshopper Attack®. These baits kill some nymphs but almost no adults, though infected adults lay fewer eggs. Baits act too slowly and kill too few grasshoppers to be useful for immediate control.

Other natural enemies include nematodes called hairworms and insects that feed on grasshoppers, such as the larvae of blister beetles, bee flies, robber flies, ground beetles, flesh flies and tangle-veined flies. Birds (quail, turkey, larks, etc.) and mammals also eat grasshoppers, but have little effect on large populations.

Mechanical Control

One way to control grasshopper populations is to eliminate sites where they might deposit eggs. Grasshoppers prefer undisturbed areas for egg laying, so tilling cropland in mid- to late summer discourages females. Tilling may reduce soil moisture and contribute to erosion, but those disadvantages must be weighed against potential grasshopper damage to the next crop.

In Conservation Reserve Program (CRP) acreage, tillage is not an option. However, plant tissue can be shredded to reduce the grasshopper food supply. Any implement pulled across CRP fields will crush many insects, but the cost of fuel might outweigh the benefits.

Cultural Control

Controlling summer weeds in fallow fields has two benefits:

1) If grasshopper eggs are already in the field, there will be nothing for nymphs to feed on when eggs hatch.

2) Fields will not be attractive to egg-laying adults because there is nothing on which to feed.

Also eliminate tall grass and weeds from around any plants you wish to protect (crops, trees and gardens). This makes the area less attractive to grasshoppers and makes it easier for birds to prey on grasshoppers.

Monitoring Populations

Farmers and ranchers should start watching for grasshoppers early in the season and begin control measures while grasshoppers are still nymphs and still within the hatching sites (roadsides, fencerows, etc.). Treating grasshoppers early means 1) having to treat fewer acres and use less insecticide, 2) killing grasshoppers before they cause extensive crop damage, and 3) killing grasshoppers before they can fly, migrate and lay eggs. Also, smaller grasshoppers are more susceptible to insecticides than larger ones.

You can estimate the size of a grasshopper infestation by surveying for nymphs or adults with the "square foot method." Count the number of grasshoppers that hop or move within a square foot area. Then take 15 to 20 paces and sample another square foot area. Make 18 samples in all. Then add the numbers from each sample and divide the total by two to obtain the number of grasshoppers per square yard. If most grasshoppers you see are first to third instar (wingless and generally less than ½ inch long), divide the number by three to give the adult equivalent. Count fourth instar and older nymphs as adults.

Use Table 1 to determine different levels of threat posed by various population sizes.

Table 1. Control thresholds based on numbers of adult grasshoppers per square yard.

Rating	Adults per square yard	
	Margin	Field[a]
Non-economic	5 to 10	0 to 2
Light	11 to 20	3 to 7
Threatening	21 to 40	8 to 14
Severe	41 to 80	15 to 28
Very severe	80	28+

[a] Field ratings should be used for both rangelands and croplands.

When control is necessary, select a suitable insecticide from Tables 2, 3, 4 or 5. It may be necessary to apply insecticide several times to protect gardens, trees and crops, especially if weeds and grass have dried out or been eaten by grasshoppers.

Table 2. Conventional insecticides labeled (L) for grasshopper control in field crops.*

Trade names	Alfalfa	Corn[a]	Cotton	Peanuts	Small grains[b]	Sorghum	Soybeans	Sunflowers	Vegetables[c]
Asana XL	L	L	L	L			L	L	L
Baythroid 2	L	L	L			L		L	
Capture 2 EC		L							L
Dimethoate[d]	L	L			L	L	L		L
Di-Syston 15 G					L				L
Furadan 4F	L	L			L			L	
Fury	L	L	L		L	L	L		
Guthion 2 L									L
Guthion Solupak 50 WP									L
Imidan 70 W	L		L						L
Karate (Zeon Tech)				L		L	L		
Leverage 2.7			L						
Lorsban 4E-SG					L				
Lorsban 75 WG	L	L	L			L	L	L	
Lorsban 4 E		L	L		L	L			
Malathion ULV[e]	L	L	L[f]		L	L			
Malthion 8 - EC	L	L[g]			L				
Malathion 57 - EC	L	L[g]			L[g]				
Mustang	L	L	L		L	L	L		
Orthene 75 S and 97			L[h]						L
Orthene 90 S			L[h]						L
Sevin 4F, 80S, 80 WSP and XLR Plus[i]	L	L	L	L	L	L	L	L	
Tracer (Naturalyte)					L (suppression only)				L
Warrior (Zeon Tech)	L	L		L	L	L	L	L	

*Follow instructions for application and re-entry restrictions.

[a] Corn refers to field, sweet and popcorn. Consult label for different cultivar restrictions.

[b] Small grains includes wheat, rye, barley, triticale, etc. Consult label for specific crop.

[c] Vegetables includes a wide variety of crops. Consult the label before applying pesticides.

[d] There are 16 grasshopper labels for dimethoate from six manufacturers in six differing formulations; dimethoate labels vary considerably.

[e] Ultra low volume

[f] In cotton, may be used alone as a ULV concentrate spray or diluted in once-refined cottonseed or vegetable oil to make at least 1 quart of finished spray per acre.

[g] For small grasshoppers only.

[h] Orthene products must be tank-mixed with Lorsban 4E.

[i] Labeled for control of specific pests (grasshoppers) or multiple sites. Refer to individual site listings for use limitations and site restrictions.

Table 3. Conventional insecticides labeled (L) for grasshopper control in various sites.*

Trade names	Trees/shrubs[a]	Garden	Vineyard	Range	Non-cropland[b]
Asana XL	L				L
Danitol 2.4 EC			L		
Lorsban 75 WG	L (Citrus)				
Malathion ULV				L	L
Malathion 8 - EC				L	L
Malathion 57 - EC				L	L
Orthene 75 S	L (Nonbearing citrus)				L
Orthene 97	L (Nonbearing citrus)	L			L
Sevin 4F, 80S, 80 WSP and XLR Plus[c]	L	L		L	L

*Sites have different restrictions on application and re-entry. Always read and follow label directions.

[a] Fruit, nut, citrus, stone fruit, pome fruit and shade trees. Consult specific pesticide labels prior to use.

[b] Includes Conservation Reserve Program acres, set-aside acreage, wasteland, rights-of-way and ditch banks.

[c] Labeled for control of specific pests (grasshoppers) in multiple sites. Refer to individual site listings for use limitations and restrictions. Refer to Rangeland Use Directions for the Reduced Area Agent Treatments (RAATs) program should such a provision exist for the specific product chosen.

Table 4. Bio-insecticides labeled (L) for grasshopper control in various field crops.[a]

Trade names	Alfalfa	Corn[b]	Cotton	Peanuts	Small grains	Sorghum	Soybeans	Sunflowers	Vegetables[c]
Dimilin 25W			L				L		
Dimilin 2 L			L				L		
Neemix 4.5	L	L	L	L	L	L	L	L	L

[a] Sites have different restrictions on application and re-entry. Always read and follow label directions.

[b] Corn refers to field, sweet and popcorn. Consult label for different cultivar restrictions.

[c] Includes many different crops. Read and follow specific label directions for each crop.

Table 5. Bio-insecticides labeled (L) for grasshopper control in various other sites.[a]

Trade names	Trees/shrubs[b]	Garden	Vineyard	Range	Non-cropland[c]
Dimilin 2 L				L[d]	L[d]
Neemix 4.5	L	L	L	L	L

[a] Sites have different restrictions on application and re-entry. Always read and follow label directions.

[b] Includes fruit, nut, citrus, stone fruit, pome fruit and shade trees. Consult specific pesticide labels prior to use.

[c] Includes Conservation Reserve Program acres, set-aside acreage, wasteland, rights-of-way and ditch banks.

[d] Labeled for control of specific pests (grasshoppers) on multiple sites. Refer to individual site listings for use limitations and restrictions. Refer to Rangeland Use Directions for the Reduced Area Agent Treatments (RAATs) program.

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