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Grasshopper control

in Missouri forage crops and pastures

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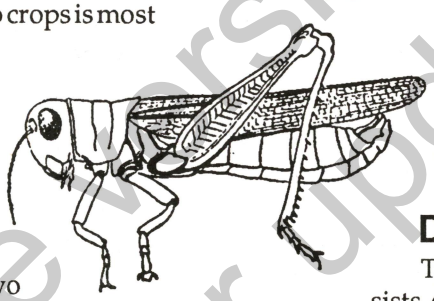
Grasshoppers are relatively large insects, capable of doing considerable damage to many crops. In early summer, grasshoppers normally feed on grasses and weeds in non-crop areas, and later in the season, they move into fields. Grasshopper populations in Missouri are sporadic. In general, damage to crops is most severe in dry years.

Description



Grasshoppers are brown, green or gray insects that may be as long as 1-3/4 inches. They have large hind legs for jumping and prominent heads with large eyes. Adult grasshoppers have two pairs of wings. The front pair is characteristically narrow and leathery, whereas the hind wings are thinner and more triangular. Although more than 100 species of grasshoppers occur in Missouri, four species are responsible for most crop damage. The large **differential grasshopper** and the **redlegged grasshopper** appear to be the most common pests, while the **two striped** and **migratory grasshoppers** also occasionally cause problems.

Life Cycle

Grasshoppers usually lay eggs in uncultivated soil, in areas such as ditch banks, field margins, roadsides, as well as pastures, alfalfa and clover fields. Two-striped and differential grasshoppers lay their eggs near the roots of bunch grasses or alfalfa crowns covered with debris. These sites are usually along field edges or roadsides. Some species lay their eggs in specific bed areas.

Most kinds of grasshoppers lay eggs during late summer or early fall in pods of 20 to 100 eggs. One female grasshopper may deposit 8 to 25 egg pods. Generally, the eggs pass the winter, but in some instances, eggs may hatch and the emerging nymphs overwinter. Eggs hatch from May to June and, as the food source becomes scarce, the nymphs move to nearby fields. In drought-stressed fields, border vegetation is less abundant or dried out, causing nymphs to move quickly and in higher numbers into crops. Once in the field, grasshoppers may do serious damage to the forage crop or pasture. In Missouri, there is usually one generation per year, except for the migratory grasshopper, which has two.

Young nymphs are quite susceptible to weather and natural enemies. Cool, wet conditions during egg hatch reduce grasshopper numbers.

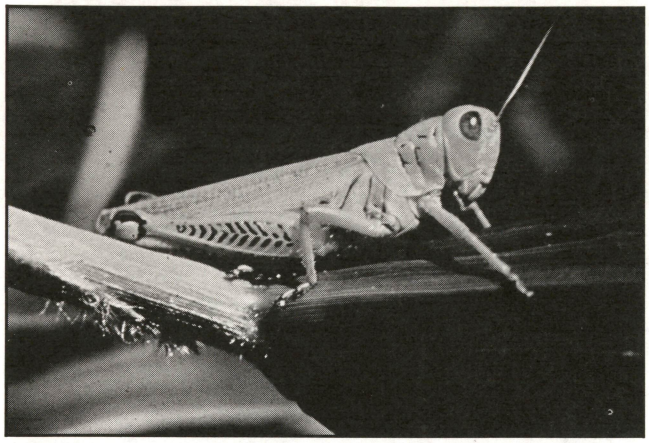
Damage

Typically, grasshopper damage consists of large irregular holes extending from the margin to the center of the leaf. The growing tips of alfalfa and other plants may also be injured. Grasshoppers are capable of doing considerable damage in a very short time.

Control

Control-Biological: The biological control agent, *Nosema locustae,* is a naturally occurring microsporidian protozoan which is now being placed on various baits and marketed for grasshopper control under such names as NOLO Bait, Grasshopper Attack, Hopper Stopper, and others. Although a promising biological, *Nosema* does not generally produce rapid control of grasshoppers, but rather is a slower, long-term method of grasshopper and cricket control. A major limitation of this control method is that grasshoppers must eat the *Nosema* treated bait as 2nd or 3rd instar hoppers. This requires both early season scouting and treatment of grasshopper populations in border areas of the field.

Control-Insecticides: The key to effective control of grasshoppers is early detection of the problem. Grasshoppers nymphs are easier to kill, party because of their small size and also because they are usually confined to the hatching area. Do not mow grasses



The differential grasshopper is one of four species that damage Missouri crops.

along field margins where high populations are found until grasshoppers are controlled. Mowing these feeding sites causes grasshoppers to move into adjacent crops.

In general, control is justified if 3-7 or more grasshoppers per square yard are present in alfalfa and clover fields or if 11-20 or more grasshoppers per square yard are present in pasture, range or non-crop lands. Keep in mind that the time of day, temperature and vegetation can influence the grasshopper's activity and can affect the number you find.

Table 1 lists insecticides for controlling early-season infestations of grasshopper nymphs when confined to non-crop land areas.

Table 2 lists insecticides available for grasshopper control in alfalfa and clovers, and Table 3 lists insecticides for use on pastures or range grasses. Because of the short residual activity of insecticides registered for use on alfalfa and clovers, don't expect more than temporary control of the present infestation. Reinfestation could occur in 10 to 14 days, at which time a second application may be required.

Table 1. Grasshopper control in non-cropland areas.

Insecticide (Formulation)	Actual rate of insecticide per acre (a.i.)	Rate of formulation per acre	Preharvest interval (days)
acephate (Orthene 75S)	0.25	0.33 lb.	Do not use for forage
(RU)* **carbaryl** (Sevin XLR Plus)	1.0 - 1.5	2 - 3 pts.	14
diazinon (D.Z.N. **diazinon** AG500)	0.375 - 0.5	0.75 - 1.0 pt.	21
(RU) **esfenvalerate** (Asana XL)	0.015 - 0.03	2.9 - 5.8 oz.	Do not use for forage
phosmet (Imidan 50 WP)	1.5 - 3.0	3 - 4 lbs.	Do not use for forage
malathion (57%) (Cythion 57%)	0.938 - 1.250	1.5 - 2.0 pts.	0
(RU) **methyl parathion** (Penncap-M)	0.25 - 0.75	1 - 3 pts.	15

***(RU):** Any insecticide preceded by **RU (Restricted Use)** means that all or some uses of this product have been restricted by the EPA. **Precautions:** Any applicator must be certified and licensed before purchasing restricted use products. Do not graze or harvest acephate treated areas. Do not graze carbaryl treated areas for 14 days. Do not treat public lands with esfenvalerate and do not exceed more than 0.5 lbs. a.i. per acre per year. Do not graze livestock in phosmet treated areas. Do not allow workers to re-enter methyl parathion treated fields for 48 hours without protective clothing. Do not graze methyl parathion treated areas for 15 days following application. Diazinon treated fields may be grazed immediately following application. Malathion treated areas may be grazed or harvested the day of application.

Table 2. Grasshopper control in alfalfa and clover.

Insecticide (Formulation)	Actual rate of insecticide per acre (a.i.)	Rate of formulation per acre	Preharvest interval (days)
carbaryl (Sevin XLR Plus)	0.5 - 1.5	1 - 3 pts.	7
chlorpyrifos (Lorsban 4E)	0.25 - 0.5	0.5 - 1 pt.	7-14
(RU)* **carbofuran** (Furadan 4F)	0.125 - 0.25	0.25 - 0.5 pt.	7
diazinon (D.Z.N. diazinon AG 500)	0.5	1 pt.	7
dimethoate (Cygon 400)	0.25 - 0.5	0.5 - 1 pt.	10
malathion (57%) (Cythion 57%)	0.938 - 1.250	1.5 - 2.0 pts.	0
(RU) **methyl parathion** (Penncap-M)	0.25 - 0.75	1 - 3 pts.	15

***(RU):** Any insecticide preceded by **RU (Restricted Use)** means that all or some uses of this product have been restricted by the EPA.

Precautions: Any applicator must be certified and licensed before purchasing restricted use products. Do not graze carbaryl treated areas for 7 days. Do not apply chlorpyrifos more than 4 times per year. Do not apply carbofuran more than once per cutting nor more than twice per season and apply only to pure stands of alfalfa. Do not apply dimethoate within 10 days of pasturing. Do not allow workers to re-enter methyl parathion treated fields for 48 hours without protective clothing. Do not graze methyl parathion treated areas for 15 days following application. Diazinon treated fields may be grazed immediately following application. Malathion treated areas may be grazed or harvested the day of application.

Missouri insect control recommendations are revised annually and are subject to possible change during the growing season. No discrimination is intended and no endorsement is implied.

How To Spray

For effective control of any insect pest, calibrate the sprayer to apply sufficient gallonage at a speed that will give good coverage. Gallonage varies with the height and density of the foliage. Most situations require at least 12 gallons of spray per acre for effective coverage.

Don't spray when wind velocities exceed 10 to 12 miles per hour and avoid drift into nearby gardens and fields. For best control, especially with malathion, apply only when temperatures are 60 degrees F or above and are expected to remain this warm for one or two days after application.

Precautions

Always handle insecticides with caution, irrespective of whether or not they are restricted-use compounds. Read, understand and follow the directions on the label concerning use and safety measures. Wear the protective clothing and devices suggested on the label.

Avoid breathing vapors or dust, and direct contact with skin. If the insecticide concentrate contacts or contaminates the skin, immediately wash the affected area with soap and plenty of water, then change and discard clothing.

Store insecticides in their original container with legible labels securely attached. The storage area should be dry and locked at all times when not actually in use. To prevent contamination of surrounding crops, water or wildlife habitat, promptly and properly dispose of empty containers as directed on the label.

Table 3. Grasshopper control in pasture and range grasses.

Insecticide (Formulation)	Actual rate of insecticide per acre (a.i.)	rate of formulation per acre	Preharvest interval (days)
acephate (Orthene 75S)	0.094 - 0.125	0.125 - 0.167	21
carbaryl (Sevin XLR Plus)	0.5 - 1.5	1 - 3 pts.	14
diazinon (D.Z.N. diazinon AG500)	0.375 - 0.5	0.75 - 1.0 pt.	21
malathion (57%) (Cythion 57%)	0.938 - 1.250	1.5 - 2.0 pts.	0
(RU)* **methyl parathion** (Penncap-M)	0.25 - 0.75	1 - 3 pts.	15

***(RU):** Any insecticide preceded by **RU (Restricted Use)** means that all or some uses of this product have been restricted by the EPA.

Precautions: Any applicator must be certified and licensed before purchasing restricted use products. Do not graze acephate treated areas for 21 days. Do not graze carbaryl treated areas for 14 days. Do not allow workers to re-enter methyl parathion treated fields for 48 hours without protective clothing. Do not graze methyl parathion treated areas for 15 days following application. Diazinon treated fields may be grazed immediately following application. Malathion treated areas may be grazed or harvested the day of application.

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