

# AGRICULTURAL GUIDE

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Insect control

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## Grasshopper control in forage crops and pastures

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Grasshoppers are relatively large insects, capable of doing considerable damage to a number of crops. In early summer, they 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 years with dry weather.

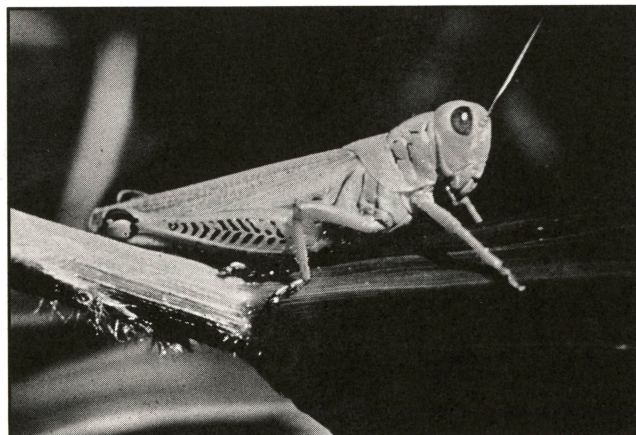
### Appearance

Grasshoppers are brown, green or gray insects that may be as long as 1¾ inches. They have large legs for jumping and prominent heads with large eyes. Adult grasshoppers have two pairs of wings. The front pair is characteristically narrow and leathery, while the hind wings are thinner and more triangular in shape.

Four species of grasshoppers are responsible for most crop damage in Missouri. The large **differential grasshopper** and the **redlegged grasshopper** appear to be the most common pests, while the **twostriped** 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. Twostriped and differential grasshoppers lay their eggs near the roots of bunch grasses and near alfalfa crowns that are covered with debris.



The differential grasshopper is one of four species causing crop damage in Missouri.

These sites are usually along field edges or roadsides. Some species will lay their eggs in specific *bed* areas.

Grasshoppers usually lay eggs in late summer or early fall in pods of 20 to 100 eggs. One female grasshopper may deposit eight to 25 of these egg masses. Generally, the eggs pass the winter, but in a few cases, some 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 fields, border vegetation is less abundant or dried out. As a result, nymphs move quickly and in higher numbers into crops. Once in the field, the grasshoppers soon become adults and 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.

The young nymphs are quite susceptible to adverse weather conditions and natural enemies. Cool, wet conditions during egg hatch reduce numbers of grasshoppers.

### 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.



**Table 1. Grasshopper control in alfalfa and clover.**

Insecticide	Formulation	Actual rate of insecticide per acre	Rate of formulation per acre	Required preharvest interval (days)
<i>carbaryl</i> ( <i>Sevin</i> )	5% bait	1.5 lb.	30 lb.	0
<i>carbofuran</i> (RU) ( <i>Furadan</i> )	4F (4 lb. per gal.)	0.13 to 0.25 lb.	¼ to ½ pt.	7 (Do not use on clover.)
<i>dimethoate</i> ( <i>Cygon, De-Fend, Rebelate</i> )	43% EC	0.25 to 0.5 lb.	½ to 1 pt.	10
<i>malathion</i>	57%EC	15 oz.	1½ pt.	0 (small grasshoppers)
<i>malathion</i>	57%EC	20 oz.	1 qt.	0 (adult grasshoppers)
<i>chlorpyrifos</i> ( <i>Lorsban</i> )	4E	.5 lb.	1 pt.	14 (Do not use on clover)

**Precautions:** Do not apply dimethoate to alfalfa during the bloom period and not more than one application per year. Do not apply carbofuran more than once per cutting nor more than twice per season. Apply carbofuran only to pure stands of alfalfa. Any insecticide followed by RU (Restricted Use) means that all or some uses of this product have been restricted by the EPA. Any applicator must be certified and licensed before purchasing restricted use products. All of the above materials are highly toxic to bees exposed to direct treatment or residue on crops. Do not apply chlorpyrifos more than four times per season.

## Control

The key to effective control of grasshoppers is early detection of the problem. Grasshoppers are easier to kill while still in the nymphal stage. In addition, they are usually still confined to the hatching area, and control may be accomplished by treating a small area. Do not mow grasses along field margins where high populations are found until grasshoppers are controlled. Mowing these feeding sites causes grasshoppers to move into crops.

In general, 10 or more grasshoppers per square yard constitutes a problem. 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 use in grasshopper control in alfalfa and clovers, and Table 2 lists those insecticides for use on pastures or range grasses. Because of the short residual activity of registered insecticides for use on alfalfa and clovers, don't expect more than temporary control of the present infestation, and reinfestation could occur in 10 to 14 days.

## 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. In general, at least 12 gallons of spray per acre are required 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 the use of malathion, apply only

when temperatures are 60 degrees F or above and are expected to remain so for one or two days after application.

## Precautions

Always handle insecticides with caution. Read, understand and follow directions on the label concerning use and safety measures. Wear the protective clothing and devices suggested on the label. Avoid breathing vapors, dust, or contact with skin. If the insecticide concentrate contacts or contaminates the skin, wash the affected area immediately with soap and plenty of water and change clothing.

Store insecticides in their original containers with legible label securely attached. The storage area should be dry and locked at all times when not actually in use.

Promptly and properly dispose of empty containers as directed on the label. Triple rinse all containers before disposal. Burn combustible containers, but do not stand in the smoke or breathe fumes from the fire. Crush containers that will not burn and bury them under 18 to 24 inches of soil in an area where drainage will not contaminate surrounding crops, water or wildlife habitat.

Missouri insect control recommendations are revised annually and are subject to possible change during the growing season. Therefore, this guide is intended for use during the **1985** season only.



**Table 2. Grasshopper control in pastures and range grasses.**

Insecticide	Formulation	Actual rate of insecticide per acre	Rate of formulation per acre	Required preharvest interval (days)
<i>While hoppers are small:</i>				
carbaryl	50%WP	1 lb.	2 lbs.	0
(Sevin)	80%WP		1¼ lb.	0
malathion	57%EC	15 oz.	1½ pt.	0
<i>When most hoppers are adults:</i>				
carbaryl	50%WP	1.0 to 1.5 lb.	2 to 3 lbs.	0
	80%WP		1¼ to 2 lbs.	0
Diazinon	AG500	0.5 lb.	1 pt.	21
acephate	75S	¼ lb.	¼ lb.	21
(Orthene)				

**Precautions:** Do not repeat diazinon application for 30 days. Remove livestock from pastures during the application of any of the above insecticides. Any insecticide followed by **RU** (Restricted Use) means that all or some uses of this product have been restricted by the EPA. Any applicator must be certified and licensed before purchasing restricted use products. All of the above materials are highly toxic to bees exposed to direct treatment or residue on crops.

Use 20 gallons of spray per acre for acephate if applied with ground equipment. Do not allow lactating dairy animals to graze or eat hay within 21 days of application. Remove meat animals from treated areas at least two days before slaughter if animals grazed areas treated with acephate within 21 days of application.

