

Home and Horticultural

PESTS

Grasshoppers in the Lawn and Garden

There are many different grasshopper species in Kansas. Each species has its own ecological and physiological adaptations that allow it to grow, survive and reproduce in its ecological niche. Only a few of the approximately 115 grasshopper species pose serious threats to grass and vegetable crops in Kansas. While turfgrasses are seldom attacked, damage can occur if preferred host plants are scarce, depleted or absent.

Description

Differential, two-striped and redlegged grasshoppers are the three most common and recognized grasshopper species in Kansas. Differential and two-striped grasshoppers are robust and average 1½ to 2 inches in length. Adults of each species are identified by body color and markings. Differential grasshoppers are mostly yellow with black markings. They have black V-shaped chevron markings on their hind femurs (Figure 1).



Figure 1. Differential grasshopper



Figure 2. Two-striped grasshopper

Two-striped grasshoppers are tan or brown (Figures 2 and 3) with two distinct white or yellow stripes on each side of the body. The stripes begin at the head and continue along the thorax and wings until they meet at the end body, forming a triangle (Figure 3). Black markings are confined to the upper half of the hind femur (Figure 2).

Redlegged grasshoppers are smaller, measuring between ¾ to 1 inch in length. While they appear to be a dull brown color, their underside is bright yellow and their hind tibia are bright red (Figure 4).

Seasonal Life History

No single seasonal life history applies to all grasshopper species. However, some similarities exist. For example, all grasshoppers undergo incomplete metamorphosis. There are three



Figure 3. Two-striped grasshopper

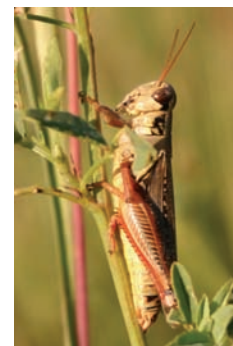


Figure 4. Redlegged grasshopper

life stages: egg, nymph and adult. Most grasshoppers overwinter underground as fall-laid, banana-shaped eggs in pods.

The development of individual grasshoppers and their overall populations are greatly influenced by weather conditions, such as interactions between moisture and temperature levels and patterns. Most grasshopper species produce a single generation each year.

Individual Life History

Egg Development and Hatch

Immediately after being deposited, eggs begin to develop until diapause. Diapause is a state of low metabolic activity that helps some insects survive winter. When spring soil temperatures reach 50 to 55°F, embryonic development resumes. All grasshoppers within an individual pod emerge from their eggs simultaneously. They tunnel up and emerge from the soil where feeding begins.

Nymphs of different species do not necessarily appear at the same time in the spring of the year. For instance, if a differential and two-striped female each deposited eggs at the same time during a previous summer, the two-striped grasshopper nymphs would emerge earlier in the spring because their embryonic development is quicker than that of differential grasshoppers. When both species enter diapause, the two-striped would be more advanced. The gap would continue to widen during the spring. These differences help explain why the majority of two-striped grasshoppers hatch in midspring while differentials hatch approximately three weeks later.

Because egg production is prolonged, two-striped grasshoppers have a four- to six-week hatching period the following spring. Conversely, differential grasshoppers deposit their eggs over a shorter time and have a shorter hatching period.

Nymphal Development

Newly emerged first instar nymphs resemble adult grasshoppers in shape while being smaller and lacking wings. As nymphs develop, they periodically shed their skins in a process called molting. Eventually, wing pads become apparent. Body size and wing pads increase in size in each instar, which is the time between molts. After a final molt, full-size winged adults appear.

Two-striped grasshoppers are in the nymphal stage for nearly 75 days. However, each individual requires only 40 days to complete five nymphal instars. In contrast, differential grasshoppers require only 32 days to pass through six nymphal instars. Given the shorter and later ovipositional period the previous year, differential nymphs appear to be present for a briefer overall period of time and the emergence of adults is more synchronous.

Adults and Oviposition

Grasshoppers deposit their eggs among the roots of grasses and weeds growing in undisturbed areas. They prefer to lay eggs near field margins, fence rows, roadside areas, ditch banks and weed patches.

Initiation and length of oviposition vary by species. Two-striped grasshoppers mate immediately upon attaining adult status, but females undergo a two-week preovipositional period before depositing eggs. Differential grasshoppers feed for several weeks before reaching sexual maturity and subsequently mating and laying eggs.

Damage

Most grasshoppers feed on a variety of host plants. Some primarily feed on different grasses while others prefer broadleaf plants. Grasshoppers remain in hatching areas as long as host plants provide an adequate food source. When drought limits plant growth or where large populations consume all vegetation, grasshoppers seek new food sources. Because immature grasshoppers lack wings, they have a limited migratory range. They satisfy themselves with whatever vegetation they encounter. Winged adults are capable of covering greater distances in search of new feeding sites.

Home gardeners and vegetable producers can experience extremes in grasshopper encounters depending on conditions. Gardens and production fields may be spared from grasshopper infestations when grasshopper populations are down and when plentiful precipitation has fostered the growth of natural vegetation. In these instances, grasshopper appetites are satisfied and populations will stay in and around hatching areas. However, when grasshopper populations are extreme and drought conditions limit natural vegetation growth, grasshoppers move to the lush growth of gardens and production fields.

Population Level Fluctuations

Grasshopper populations vary depending on environmental factors. Favorable factors include warm, dry summers to facilitate egg production followed by warm, moist springs to promote hatching and nymphal emergence. Several consecutive favorable seasons will result in large populations.

Several environmental factors can limit grasshopper population buildups. An early spring warm-up causes premature hatching and nymphal emergence, while cool, moist conditions slow nymphal development and increase fungal and bacterial pathogens. Hot, dry weather causes egg desiccation and hard soil surfaces trap newly emerged nymphs beneath the soil surface.

In addition to the bacterial and fungal pathogens, parasitization and predation aids can reduce grasshopper populations. Various life stages are attacked by blister beetles, ground beetles, certain fly species, threadworms, birds and mammals.

Grasshopper Management

Grasshopper management begins at their source – the hatching bed. There are several advantages of attacking this point. Because nymphs are concentrated and confined to these areas, a spray treatment will limit the size of a migrating population later in the season. Insecticides are most effective against nymphs. Wingless immature grasshoppers are unable to flee from the treatment area due to their inability to fly.

Failure to locate and eliminate nymphs allows grasshoppers to mature. After depleting local food sources, adults will take flight in search of new feeding sites. Home gardeners and farmers become alarmed when grasshoppers suddenly appear and begin feeding on garden and field crops as well as flowers and ornamentals.

Continued grasshopper activity a day or two after insecticide application can cause frustration. It may appear that the initial treatment did not kill the intruders. In these situations, the grasshoppers were likely killed, but their bodies are overlooked because of the activity of newly arrived grasshoppers.

Insecticides currently registered for use against grasshoppers have short residual effectiveness. This requires repeated treatments against grasshoppers for as long as necessary.

Direct contact with insecticides is essential to grasshopper control. Whether spraying grasshoppers in hatching areas or in areas of invasion, overall effectiveness might be increased if applications are made just before or at sunrise. Grasshoppers often crawl onto plants and are less active at night when temperatures are cooler. Grasshoppers remain in place and are more likely to be exposed to fatal treatments before sunrise.

Temperatures rise quickly after sunrise, and grasshoppers become more active. They settle down again when they move to nearby shaded sites midday.

Insecticides

Insecticides are chemical products which, when applied to target pests, disrupt normal physiological activities and cause death. The active ingredient is the actual component or “killing

agent” contained in an insecticidal product. Many companies purchase the same active ingredient that they subsequently formulate into a product or line of products marketed by their respective companies. The multitude of available products makes it impossible to list each and every product registered for use in Kansas. For instance, one specific active ingredient is contained in 669 products currently registered with the Kansas Department of Agriculture.

Further complicating the task of insecticide selection is the fact that an individual company may use a single active ingredient in various formulations including dusts, granules, baits, emulsifiable concentrates, ready-to-use (RTUs) or hose-end applicators. Not all products are marketed at all retail outlets. Thus, users may have to search for specific products they wish to use for grasshopper control.

The following chart lists active ingredients found in various insecticide products that can be purchased by the general public for grasshopper control.

After locating a product-of-choice, it is imperative to read the product label (product labels are considered legal documents) to ensure the insecticide is used properly and legally against the intended pest at a listed use site.

Active Ingredient	Use Sites*		
	Vegetables**	Turf	Ornamentals
acephate			X
<i>Beauveria bassiana</i>		X	
bifenthrin			X
carbaryl	X	X	X
cyfluthrin	X	X	X
deltamethrin		X	X
esfenvalerate	X		X
lambda-cyhalothrin	X	X	X
permethrin	X	X	X

**Check individual product label*

***For insecticides applied to vegetables, it is important to observe the post-harvest intervals listed on product labels.*

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Entomologist

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned.

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