

Three Common Kentucky Grasshoppers and Their Natural Enemies

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Grasshoppers are familiar to most people; their large "jumping legs" easily identify them. Worldwide, grasshoppers are some of the most serious agricultural pests, most often due to their direct feeding on the harvestable portion of the crop. However, in the United States, pest outbreaks occur most often in the western U. S., or following drought in other, generally wetter regions, including Kentucky.

Grasshoppers are insects in the Order Orthoptera. They have an incomplete life cycle, i.e. there are only three stages in its life cycle: the egg, the nymph, and the adult. The nymphal stage can be distinguished from the adult by the nature of the wings. Nymphs have nonfunctional wing pads whereas adults have fully developed, functional wings. The adult wings are folded over the back when not in use. Most adults have two pairs of wings: parchment-like front wings, and membranous, fan-like hind wings. Mouthparts are the typical chewing type, and a pair of short cerci (appendages) are present at the end of the abdomen.

There are 3 species of grasshoppers that are the most common in Kentucky: the redlegged, the two-striped, and the differential grasshopper.

Ranging in size from 1/2 to 1-3/4 inches, all three common species are from the Family Acrididae. They all have threadlike antennae that are shorter than the body. The ovipositor of females is short and the tarsi (feet) are three-segmented. Acrididae generally have a median spine or tubercle (raised area) on the prosternum (area behind the head), and most have a vertical face or nearly so.

In Kentucky, the impact grasshoppers have on the health and economics of the crops grown in the state varies with the crop, and within the season. Generally, in Kentucky, small grains such as wheat are harvested in the early summer long before grasshoppers are large enough to do much damage.

In the fall, grasshoppers have disappeared before the small grains emerge. However, corn and soybeans may have localized problems with this pest.

Tillage, be it conventional, minimum, or no-till, is an important factor. In conventional tillage situations, grasshoppers are usually not a problem until midsummer, and usually occur along field edges. In no-till, the grasshoppers may occur early in the season, but may be distributed across the field, especially if the field was in pasture or fallow before planting.

Kentucky's three common grasshopper species overwinter in the egg stage. Laid in masses of 20 to 130 eggs, they are placed in packets below the soil surface. Generally, eggs are laid in uncultivated ground in the fall and begin to hatch the following spring. There is typically only one generation per year.

REDLEGGED GRASSHOPPER *Melanoplus femurrubrum* (DeGeer)

Redlegged grasshopper's upper surface is red-brown to brown in color, with a dull yellow-green under surface. The wings are colorless, and **the hind legs are red with black stripes**. They are approximately 1 inch long when full grown.

The eggs begin hatching in early spring. Nymphs molt five to six times (40-60 days). Although solitary, it is generally the most prevalent of the grasshoppers. When disturbed they either hop vigorously to one side or fly swiftly and noiselessly straight ahead, suddenly dropping to the ground.

Distribution and abundance of this insect is impacted greatly by climatic conditions, primarily humidity. It occurs in pastures and meadow, along roadsides, and borders of cultivated fields. It is rarely found on dry hillsides. Under climatic conditions where rainfall is low (less than 30 inches/year), the redlegged grasshopper can be a very destructive pest of clover, alfalfa, and

soybeans. Its feeding can completely defoliate legumes, or expose seeds to pathogens. When populations are high, it attacks almost any plant.

TWO-STRIPED GRASSHOPPER *Melanoplus bivittatus* (Say)

The two-striped grasshopper's upper surface is dull olive brown and a pale under surface that is pale yellow to green. **A narrow yellow stripe extends from behind each eye to nearly the tip of the wing covers.** When full-grown this grasshopper is a little more than 1 inch long. It is the most common of the early summer grasshoppers. When disturbed, it usually leaps vigorously and noiselessly for a short distance.

The red locust mite, a natural enemy of all life stages of grasshoppers, causes a great deal of mortality in the two-striped grasshopper because it is one of the first species to emerge in the spring and it matures more quickly than other grasshoppers (see Natural Controls).

Similar to the redlegged and differential grasshopper, the two-striped grasshopper is found upon bottom lands, along the edges of cultivated fields, at the margins of woodlands, and on shaded mountain slopes. Unlike the redlegged grasshopper, the two-striped are found in both moist and dry locations. The female seems to prefer compacted soil, such as that found along roadsides, as a site for egg laying.

DIFFERENTIAL GRASSHOPPER *Melanoplus differentialis* (Thomas)

The differential grasshopper's upper surface is dark brown to olive green, the under surface is yellow. It has clear, glossy hindwings. **The chevron-like black stripes on the large portion (femur) of the hind legs are very distinct.** This species is the largest of the three; adults are 1-1/2 to 1-3/4 inches long.

The differential grasshopper avoids very dry habitats, and shows a preference for cultivated lands. Alfalfa and clover are particularly suitable for its development; the eggs are often oviposited on field margins. It has reported to injure grass, alfalfa, Indian corn, beets, orchard trees, mulberry, poplar, and catalpa trees, and even grape vines. Preference for cultivated lands make the differential grasshopper of concern to farmers.

SCOUTING FOR GRASSHOPPERS

Corn - Grasshoppers are found in nearly all fields, but are seldom a problem. They are more common during the mid to late summer. To determine whether grasshoppers may become a problem, the question one needs to ask is: **ARE THEY FEEDING ON THE FOLIAGE OR ON THE EAR?** Corn plants can tolerate a considerable amount of leaf feeding (>35%) before economic losses occur.

Tobacco - Grasshoppers are found in many fields, but are seldom a problem. **IS THE FEEDING THROUGHOUT THE FIELD, and ARE THE GRASSHOPPERS STILL PRESENT?**, are two questions to ask before spraying the entire field.

Vegetable Crops - While they are commonly found in most crops, they are rarely a problem. When scouting vegetables for grasshoppers, it is important to determine if they are attacking the **marketable** portion of the crop.

In general, grasshoppers are a problem along field margins, near areas of recent mowing, etc. The USDA-APHIS program in rangelands considers at least 8 adult or an equivalent number of nymphs per square yard as an economic infestation level that warrants control. Synthetic insecticides such as Asana, Sevin, Malathion, and Diazinon are recommended for control. Flaky wheat bran treated with Sevin, or *Nosema locustae* is recommended when control is needed near water or near threatened and/or endangered wildlife. *Nosema locustae* (Noloc), is a naturally occurring bioinsecticide which has been developed for grasshopper control. It is a registered protozoan microbial insecticide.

NATURAL CONTROLS

Natural enemies (living organisms which use grasshoppers as a nutrient source) are the reason why we generally see only localized outbreaks of grasshoppers. Many natural enemies are specialists on orthopterans, while others are generalists, using grasshoppers as one of many hosts.

Fungi attack grasshoppers. A diseased grasshopper body may be soft, with fungal bodies evident to the naked eye.

The red locust mite, *Trombidium locustarum* Riley is an important natural enemy. This mite feeds on the egg stage, and will also attach itself on various parts of nymphs and adults. The red locust mite uses

its mouthparts to suck up the fluid from its host. A mite-infested grasshopper drags itself around, eats little, and dies early.

Horsehair worms, a type of nematode, are a notable natural enemy also. Infested grasshoppers rarely produce young (see [ENTfact 613, Horsehair Worms](#)). Other types of nematodes are natural enemies too. Nematode eggs are laid on plants, and are eaten by grasshoppers. The young nematodes burrow through the wall of the stomach, and with high levels of infection/infestation they can cause death, primarily due to desiccation.

There are several dipterous parasites of grasshoppers, including Tachinidae and Sarcophagidae fly species. Tachinidae flies oviposit eggs on the nymph or adult, and the emerging tachinid larvae eat their way into the body of the grasshopper. Parasitized grasshoppers have soft, flabby bodies, and are slow moving. Generally, parasitized grasshoppers die earlier and do not reproduce. *Sarcophaga* sp., flesh flies, attack in a manner similar to Tachinidae flies, although the maggots do not kill the host.

Egg predators such as bee flies, blister beetles (*Epicauta pennsylvanica*), and Scelionid wasps are important natural enemies, too. Ground beetle adults and larvae feed upon the eggs. Vertebrate predators such as skunks, shrews, moles, salamanders, toads, and snakes feed upon grasshopper eggs too.

Predation of nymphs and adults by toads, snakes, and birds (hawks, blackbirds, crows, bluejays, prairie chicken, mockingbirds, and bluebirds), have an impact on the population too, although they feed primarily during the summer season.

SPECIES DESCRIPTION and FAVORED HABITAT

REDLEGGED - hind leg is red with black stripes
- prefers humid environments

TWO-STRIPED - narrow yellow stripe extends from behind each eye to nearly the tip of the wing covers - prefers humid environments

DIFFERENTIAL - chevron-like black stripes on the large portion (femur) of the hind legs - prefers humid environments and cultivated fields

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