

# Meadow Grasshopper

## *Chorthippus curtipennis* (Harris)

### Distribution and Habitat

The meadow grasshopper, *Chorthippus curtipennis* (Harris), is a widespread species in western and northern states and in provinces of Canada. Of the large number of species in the genus *Chorthippus*, only this one inhabits the Nearctic region. The other 70 to 80 species are Palaearctic.

Habitats of the meadow grasshopper include stands of tall lush grasses growing in hayfields, pastures, swales, roadsides, mountain meadows, and along edges of marshes, lakes, and ponds. In the mountains of Colorado this species is characteristic of moist areas dominated by sedges or rushes up to altitudes of 11,000 feet.

### Economic Importance

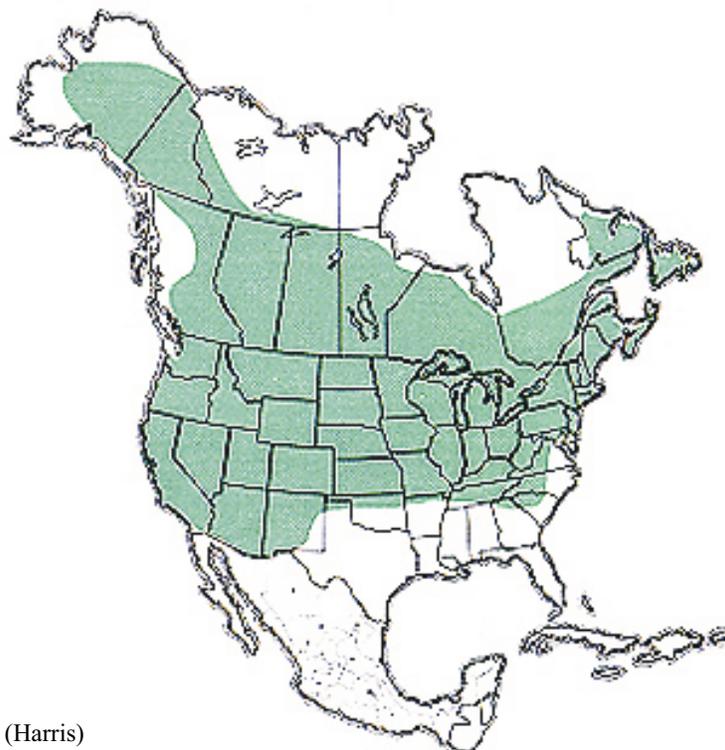
Although the meadow grasshopper feeds on valuable forage grasses, it has not been reported as causing significant damage. Yet, as part of an assemblage of species, this grasshopper undoubtedly contributes to the damage caused by a heavy infestation. In mountain meadows and parks it is often associated with the clearwinged and clubhorned grasshoppers. In the park belt of Alberta it is the most common species of grasshopper, and in the tallgrass prairie of eastern North Dakota it is one of the most frequent and abundant species.

### Food Habits

The meadow grasshopper feeds on grasses and sedges. Adults climb plants and while clinging head-down chew on the edges of leaves at various distances from the tip. A grasshopper eats a gouge one-eighth inch long into the edge and continues to take bites of the leaf at this level until nearly the entire width is consumed. Then it progresses in a similar way feeding toward the base of the leaf. If a leaf is severed, the grasshopper holds on to the cut section with the front tarsi and continues to feed on it. Sometimes, however, the segment is dropped and falls to the ground.

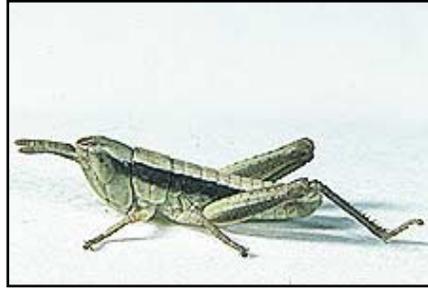
The diet of this grasshopper varies with the kinds of grasses and sedges growing in its habitat. In the tallgrass prairie of the Midwest, patches of little bluestem and big bluestem not only provide favored habitats but also preferred food plants. Kentucky bluegrass is also a preferred host plant in the Midwest and elsewhere. In Idaho the diet of this grasshopper was found to consist of 59 percent Idaho fescue, 19 percent western needlegrass, and 14 percent elk sedge.

A total of 16 species of grasses and 4 species of sedges have been found in crop contents. Undoubtedly this list of food plants is far from complete. Crop



Geographic range of  
*Chorthippus curtipennis* (Harris)

Instar 1



1. BL 5.7-6.6 mm FL 2.9-3.1 mm AS 13-14.

Instar 2



2. BL 6.8-8 mm FL 4.3-4.6 mm AS 17-18.

Instar 3



3. BL 9.5-10.4 mm FL 5.8-6.3 mm AS 20-21.

Instar 4



4. BL 12-16 mm FL 7.9-10.2 mm AS 22-24.

Figures 1-4. Appearance of the four nymphal instars of *Chorthippus curtipennis* - their sizes, structures, and color patterns. Notice progressive development of the wing pads. BL = body length, FL - hind femur length, AS = antennal segments number.

contents may also contain small amounts of forbs, pollen, fungi, and arthropod parts.

### Migratory Habits

Wings of the meadow grasshopper vary in length. Normally the females have short wings unsuited for flying, while the males have long wings that reach the end of the abdomen and are used for flight. Evasive flights of the male are straight, silent, low (6 inches), and short (2 to 3 feet). Males may also fly appetitively for somewhat longer distances (10 feet), and greater heights (12 inches). At the end of both kinds of flight, they land on vegetation. The females take evasive action by jumping 6 inches high for distances of 12 to 18 inches; they also land on grass stems. After landing they may drop to the ground and attempt escape by walking along on the ground under the vegetation.

In most years a small percentage of both males and females have long wings reaching beyond the abdomen. In Michigan's George Reserve, 2 percent of adults possess long wings. These adults are equipped to make extensive dispersal flights. Although direct observations of dispersal are lacking, females with long wings have been found in the center of cities several miles from breeding areas. A male and a female were found recently on the ice of Grasshopper Glacier in the Crazy Mountains of Montana.

### Identification

Adults of the meadow grasshopper are medium-sized (Fig. 5 and 6). The sides of their body are colored green, tan, or fuscous and the underside is yellow or tan. The head has a strongly slanted face; the antennae are filiform and become slightly thick and black toward the end; the lateral foveolae are oblong and visible when viewed from above. The pronotum has a low and distinct median carina and distinct lateral carinae, all of which are cut once behind middle of the disk (Fig. 7). Wings of the male are long, usually reaching the end of the abdomen; wings of the female are short, covering half to three-quarters of the abdomen. The medial area of the hind femur is tan or brown and unbanded, the knee is black; hind tibia is usually yellow, though sometimes orange or red.

The nymphs are identifiable by their shape, external structures, and color patterns (Fig. 1-4):

Figures 5-8. Appearance of the adult male and female of *Chorthippus curtipennis*, dorsal view of adult head and pronotum, and the egg pod and eggs.

1. Head with strongly slanted face; antennae filiform and flat; lateral foveolae indistinct in instars I and II, oblong and distinct in instars III and IV.
2. Brown stripe runs along side of body from behind compound eye to nearly end of abdomen in instars I and II; face, sides of head, and lobes of pronotum are usually solid green or yellow in instars III and IV.
3. Pronotum with lateral carinae nearly parallel in instars I and II; lateral carinae slightly converging on prozona in instars III and IV.
4. Hind femur with medial area light brown to brown.

### Hatching

The meadow grasshopper is a member of the intermediate-hatching group. First instars appear in late spring, about the same time as the redlegged grasshopper with which it is often associated in plains habitats. The eggs diapause during winter and usually hatch the following spring, but the eggs of populations residing in mountain meadows may require as long as three years of development before they hatch.

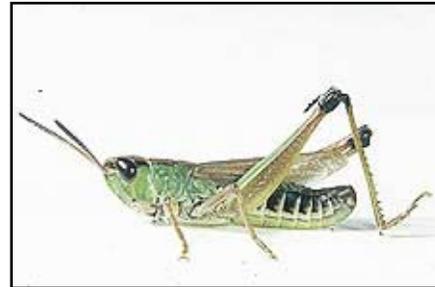
### Nymphal Development

Exposed to the warm temperatures of late spring and early summer, the nymphs grow rapidly and complete development in 30 days. The meadow grasshopper has four nymphal instars. In some regions (Idaho and Quebec), research suggests that they may also have five instars.

### Adults and Reproduction

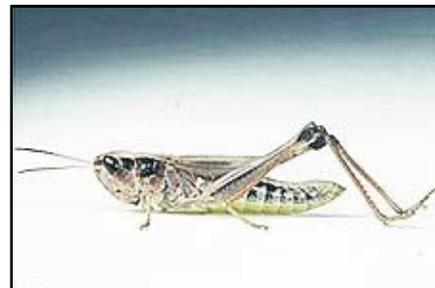
The majority of adults stay in the same area occupied earlier by the eggs and nymphs. The habitat usually remains favorable and food plants stay green and plentiful.

While sitting alone on a blade of grass, the males frequently stridulate to produce a calling song that attracts females. Receptive females respond by stridulating a soft answering song. Males have special songs for courtship of females (stationary, advancing, and mounting) and for aggression against other males. These songs are clearly audible to humans. The calling song has a slower pulse rate produced by first raising both hind femora 70 degrees from horizontal, then pressing them against the forewings and finally lowering the femora to produce each pulse of sound.



5. BL 15.3-16 mm FL 9.6-10 mm AS 23-26.

Male



6. BL 21.5-21.8 mm FL 11.5-12.1 mm AS 23-25.

Female



7. Dorsal view of head and pronotum of adult female.

Head  
Pronotum



8. Egg pod and four separate eggs.

Egg pod

The start of a successful mating begins with the male approaching a female 12 inches away and stopping several times to stridulate in courtship. When 1 inch from her, he changes his stridulation to produce an advancing song and then rushes to her side. As he mounts and attaches his genitalia, he again stridulates and produces a mounting song. After 30 minutes of copulation, he dismounts and crawls away. The affair is over.

A gravid female deposits a clutch of four to six eggs in the soil at a depth of three-quarters inch. The eggs are oriented vertically to 20 degrees from vertical at the bottom of the pod. She takes 25 to 30 minutes to complete oviposition. After extracting her ovipositor she brushes over the exit hole with her hind tarsi and walks away. No studies of the fecundity of the meadow grasshopper have been made. There is one generation annually in plains habitats.

Egg pods of the meadow grasshopper are bottle-shaped and 14 to 16 mm long and 4 mm in diameter at their greatest girth (Fig. 8). Eggs are brown and 4.0 to 4.4 mm long. A coffee-brown, hardened froth forms a 7 to 8 mm plug above the eggs and surrounds the egg mass and each egg.

### Population Ecology

Populations of the meadow grasshopper and other acridid species were followed over a period of ten years (1959 to 1968) in the sand prairie of eastern North Dakota.

Densities of the meadow grasshopper fluctuated between 0.1 and 1.4 individuals per square yard. The low point of the population occurred in 1962, when flooding of the habitat shortly after hatching destroyed many nymphs. The population then recovered at rates of two to three fold for three years, until the density peaked at 1.4 individuals per square yard in 1965. The density remained at this level in 1966, then decreased to 0.8 and 0.7 individuals per square yard the next two years.

Under favorable conditions in mountain meadows and parks of Idaho, the meadow grasshopper reaches densities of ten individuals per square yard.

### Daily Activity

The meadow grasshopper is a diurnal insect and is active during the day when temperatures have risen. Both nymphs and adults are very agile; they jump quickly and dodge behind vegetation to evade potential predators. To keep safe their escape, they eventually drop to the ground and crawl away under the vegetation. Normally they rest close to the tops of grasses.

When temperatures fall in the evening, the meadow grasshopper usually takes cover under vegetation and becomes hidden in a manner similar to the clearwinged grasshopper with which they may be associated. The details of their daily activity still require observation and study.

### Selected References

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