

Redlegged Grasshopper

Melanoplus femurrubrum (DeGeer)

Distribution and Habitat

The redlegged grasshopper, *Melanoplus femurrubrum* (DeGeer), ranges over most of North America except for high mountain altitudes and the frigid north. It is the most widely distributed species of the major crop grasshoppers. Its favorite habitats include tall vegetation of grasslands, meadows, crop borders, reverted fields, Conservation Reserve Program lands, and roadsides. It favors low moist weedy areas where its host plants abound.

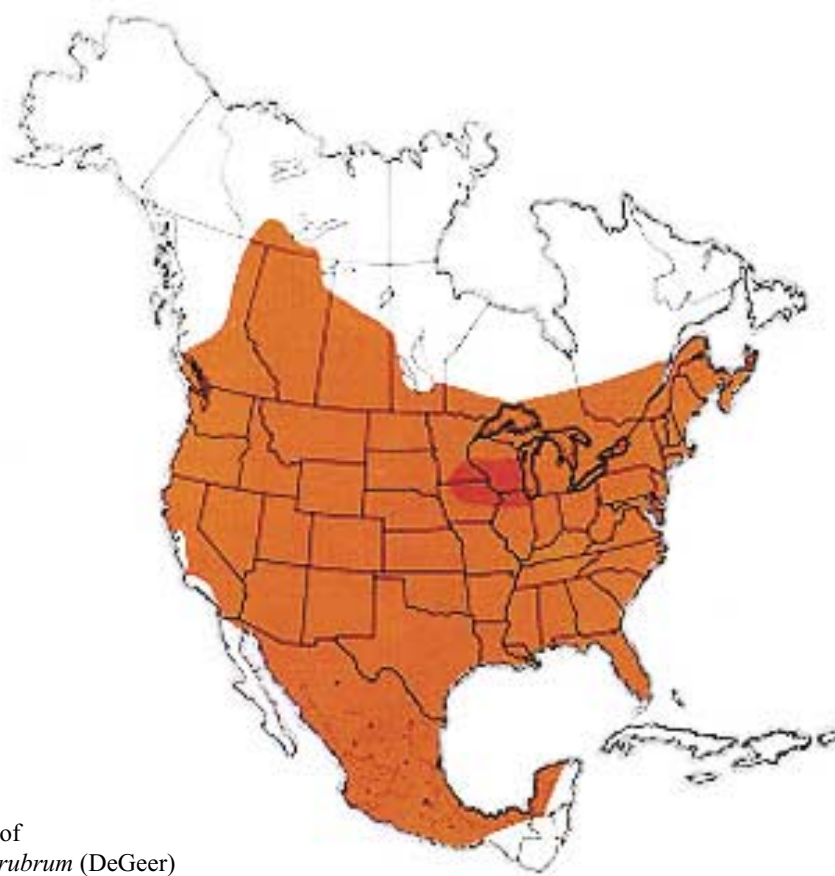
Economic Importance

The redlegged grasshopper is a crop pest. During outbreaks of the species, it may severely damage alfalfa, clover, soybeans, and small grains. It has destroyed second crops of clover and has caused losses of 20 to 25 percent to individual fields of oats. In the eastern United States and Canada, it is the most abundant species of grasshopper. It becomes a pest not only of legumes and small grains but also corn, tobacco, and vegetables - especially beans, beets, cabbage, and potatoes. Large numbers develop in meadows

and damage forage grasses. In laboratory tests the redlegged grasshopper ingested 25 percent of the foliage that it removed from six different host plants and wasted 75 percent. It is a medium-sized grasshopper. Collected from a roadside in Platte County, Wyoming, males averaged 289 mg live weight and females 389 mg (dry weight: males 87 mg and females 126 mg).

Food Habits

The redlegged grasshopper feeds on a wide variety of forbs and on several kinds of grasses. Depending on availability of host plants in the habitat, it may be either forbivorous or a mixed feeder ingesting significant amounts of both forbs and grasses. Known host plants consist of legumes (birdsfoot trefoil, white and yellow sweetclover, lespedeza, milkvetches, and alfalfa); composites (dandelion, chicory, Canada goldenrod, kochia, and western ragweed); and grasses (Kentucky bluegrass, barley, oats, wheat, smooth brome, Japanese brome, timothy, and reed canarygrass).



Geographic range of
Melanoplus femurrubrum (DeGeer)

Instar 1



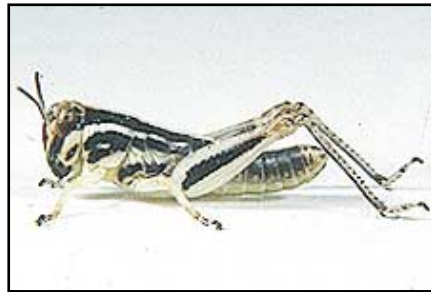
1. BL 4-5.6 mm FL 1.9-2.4 mm AS 12-14.

Instar 2



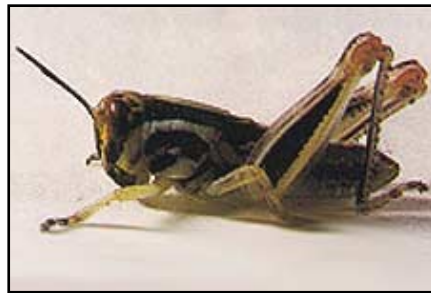
2. BL 6.2-7.2 mm FL 3.1-3.4 mm AS 15-16.

Instar 3



3. BL 7.4-9.7 mm FL 4.3-5.4 mm AS 17-19.

Instar 4



4. BL 10-15.5 mm FL 7.2-9.0 mm AS 22-24.

Instar 5



5. BL 16.5-22.5 mm FL 9.5-11.5 mm AS 24-26.

Figures 1-5. Appearance of the five nymphal instars of *M. femurrubrum* - their sizes, structures, and color patterns. Notice progressive development of the wing pads. BL = body length, FL = hind femur length, AS = antennal segments number.

Experiments show that host plants vary in their capacity to provide good nutrition. Although alfalfa is readily eaten, a sole diet of this plant causes a high nymphal mortality of 70 to 90 percent. Of three plants-corn, lettuce, and radish-tested for growth and performance of nymphs and adults, lettuce yielded the most favorable results which included high survival of nymphs, heavy weight of adults, and high egg production. A mixed diet of the three plants provided the best nutrition. This fact is significant because analyses of crop contents show that the majority of individuals collected from natural habitats consume two or more plant species in a single meal. Laboratory observation of the redlegged grasshopper has revealed that newly hatched nymphs do not begin to feed until three or more hours after eclosion. During the prefeeding time nymphs in the field climb nearby vegetation. Later they feed on a host plant that they have climbed and on which they have come to rest.

Migratory Habits

The redlegged grasshopper has strong powers of flight that allow the adults to disperse and find new habitats. In years of drought, the adults develop longer wings, fly more, and make lengthy flights often in company with the migratory grasshopper.

The flight of flushed individuals is swift, even, and 3 or 4 feet above the vegetation. The insects generally fly distances of 30 to 40 feet.

Identification

Adults of the redlegged grasshopper are medium size and have a bright yellow underside and bright red hind tibia (Fig. 6 and 7). Rarely, the hind tibia is colored yellowish-green or blue (Fig. 8). The bulbous subgenital plate and the shape of the cercus (Fig. 9) are diagnostic characters of the male. The nymphs (Fig. 1-5) are strikingly marked yellow and black. They are identifiable from their spots and color patterns:

- (1) Compound eye brown to burgundy with light yellow or tan spots, more spots on dorsal half than ventral; lacking transverse dark band.
- (2) Front of head with dark vertical band in center; light yellow band on each side of the center band; the two yellow bands come together below on the clypeus.

Figures 6-10. Appearance of the adult male and female, adult female of uncommon blue form, the male cercus, a diagnostic character, and the egg pod and several loose eggs.

- (3) Gena with broad pale yellow crescent continuing on pronotal lobe to first abdominal segment and fading along the rest of abdomen.
- (4) Dorsum of head to end of abdomen with median pale yellow stripe. Broad black stripe on either side of the median pale yellow stripe. Pronotal lobe with black band or markings below the yellow crescent.
- (5) Hind femur with black stripe entire, not interrupted by pale band. Stripe fills upper medial area of hind femur except at proximal end. Stripe encroaches a third or more on the lower medial area.
- (6) Hind tibia mainly pale yellow or pale gray, front black; tips of spines black.
- (7) General color contrasting yellow and black.

Hatching

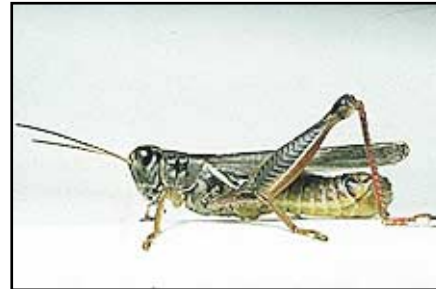
Eggs of the redlegged grasshopper begin to hatch three weeks after the eggs of the two-striped grasshopper. The period of hatching lasts approximately 52 days. Because females oviposit throughout the habitat in a scattered pattern, the eggs are subjected to a range of soil temperatures and moisture conditions.

Nymphal Development

Nymphal development begins in late spring and in early summer when host plants are usually green and succulent. In approximately 40 days the nymphs become adult, developing at rates approximately the same as the two-striped. When reared in cages at a constant temperature of 85°F, the redlegged requires a nymphal period of 28 days and the two-striped 29 days. Because of the extended period of hatching, some nymphal grasshoppers can be found nearly all summer long.

Adults and Reproduction

Adults of the redlegged grasshopper are active from early summer to the middle of fall. Although dispersal flights occur, most individuals stay close to where they hatch. There they feed, reproduce, and face many mortality factors throughout the summer. After fledging, caged females require a preoviposition period of 9 to 15 days at 86°F before beginning to lay eggs. In nature the females have been observed ovipositing into sod. The pods



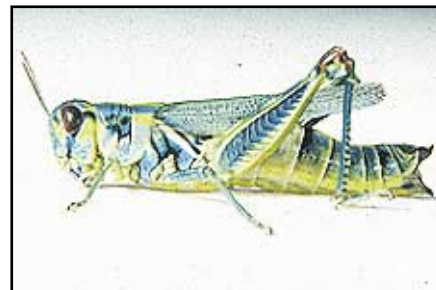
Male

6. BL 17.5-23 mm FL 10.5-13 mm AS 25-28.



Female

7. BL 24-28 mm FL 14-14.5 mm AS 26-27.



Female

8. Uncommon blue form of redlegged grasshopper.



Note cercus

9. Side view end of male abdomen.



Egg pod

10. Egg pod and several loose eggs.

are distinctly curved, three-quarters to one inch long and one-eighth to three-sixteenth inch in diameter (Fig. 10). The top third is dried froth, the bottom two-thirds contain 20 to 26 eggs. The eggs are 4.1 to 4.4 mm long and pale yellow. Caged redlegged grasshoppers fed a nutritious mixed diet of green leaves produced 336 eggs per female. Under similar conditions two-striped grasshoppers produced 412 eggs per female. The redlegged grasshopper has one generation annually.

Population Ecology

Historical records from the late 1800s till the 1980s indicate that a center of distribution of the redlegged grasshopper is present in a 78,000 square mile area composed of sections of Iowa, Illinois, Minnesota, and Wisconsin. A center is an especially favorable zone where the redlegged grasshopper is abundant and outbreaks are frequent. In such a distribution zone, populations respond quickly during spring and summer to reduced rainfall and warm temperatures. Within one to two years small populations may increase to outbreak numbers. Densities in these years reach peaks of 200 to 500 nymphs per square yard. Outbreaks last for two to three years until

normal rainfall and cool spring temperatures reduce populations back to low noninjurious numbers. The periods of low densities range from two years to over five years.

In western states densities of the redlegged grasshopper fluctuate widely, apparently in response to annual changes in weather. Large populations develop in irrigated fields of alfalfa and along roadsides, particularly in patches of sweetclover. This species may also add considerably to the density of outbreak assemblages of the migratory, two-striped, and differential grasshoppers.

Daily Activity

The redlegged grasshopper is active during the day. At night adults roost on the tops of grasses and weeds. Close to 6:30 a.m. they begin to move from their perches and begin feeding about 7 a.m. Between 4:30 and 5 p.m. they start crawling up vegetation to roost. By 5:30 p.m. the majority are roosting and have settled down for the night. In marshes this grasshopper has been observed at times to feed between 8 p.m. and midnight. Correlations of these activities with temperature have not been made.

Selected References

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