

Control Strategies – Treat crop borders when nymphs are small and numbers are moderate. Treat crop borders and grasshopper population production areas if nymph numbers are high early in the season. As nymphs get larger, move the treatment to the production site and enlarge the treated areas within cropping systems. When nymph numbers are very high (100+ / yd²), it is easier and safer to treat the production area than to allow the nymphs to enter the crop. Timing of grasshopper control depends on the potential for crop loss (esp. seedling dicots), size of grasshoppers present and whether hatching is completed. Grasshopper control is most effective before the insects become large nymphs or adults, these stages are more mobile and harder to kill.

Some registered pesticides are listed in the table on the back of the brochure. **ALWAYS** read and follow pesticide labels; registrations may change! Contact Information – For more information, contact your University of Minnesota Regional Extension Educator or:

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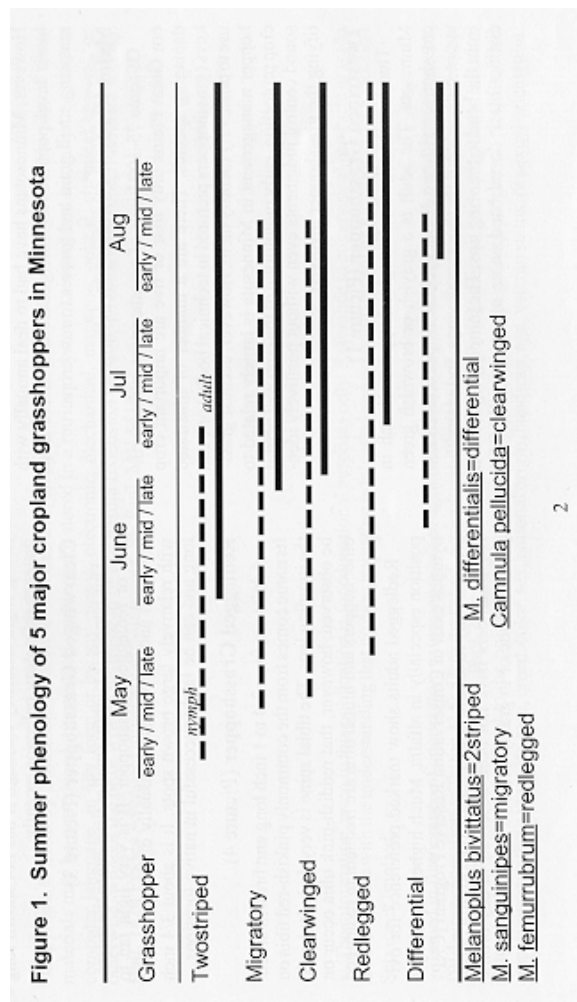
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Grasshopper Seasonal Occurrence



Minnesota Grasshopper Management

Corn & Soybeans

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Introduction – Grasshopper populations are heavily influenced by climate. Long, warm autumns, followed by warm, dry springs contribute to the building of grasshopper populations. A long, warm autumn favors egg-laying by grasshoppers well into September and even October in some Minnesota locations. In addition, if economically impacting populations of grasshoppers occurred the previous year in a variety of cropping systems, autumn populations will likely be high. In a warm, dry spring, many areas in the state that had elevated populations the previous year may face localized outbreaks. However, with early scouting and carefully applied management when necessary, grasshopper populations can be controlled and economic damage to cropping systems can be kept to a minimum.

Grasshopper populations generally do not reach outbreaks in one season, but rather build over years. Grasshopper populations also generally develop outside of cropping systems; grasshoppers prefer to lay eggs in undisturbed ground such as pastures or road ditches. When grasshopper populations become very high, the nymphs (immature grasshoppers) eat most of the available food where they hatch. They then disperse into neighboring cropping systems to eat the available food there. Although there are 75–100 species of grasshopper on the northern Great Plains, only 5 are likely to become important crop pests in Minnesota.

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Early monitoring of crops for feeding damage provides enough information to make sound control decisions. All 5 economically important grasshopper species overwinter as eggs, move readily and will feed on a variety of crops. They also tend to lay eggs in 'population production areas' outside of crops.

Twostriped Grasshopper – Normally the 1st grasshopper to hatch in Minnesota. Adults are grayish or brownish green and have two distinct yellow strips extending from the head to the wing tips. They are relatively large grasshoppers (adults are 1 1/4" – 2" long), and have a distinct black band on the top of the femur of the jumping leg. Nymphs will begin hatching in early May and be present through early July.



Migratory Grasshopper – The adult migratory grasshopper is about 1" long, brown to gray with a distinctive black streak behind its eye. It is a strong flier and disperses readily. It is



sometimes confused with the Redlegged Grasshopper but has a slight hump behind the spine on its underside, between the middle pair of legs.

Clearwinged Grasshopper – The smallest of the economically important grasshoppers in Minnesota, the Clearwinged Grasshopper adult is about 3/4" long. It is light tan to brownish and has clear wings, distinctly marked with large brown spots.

Redlegged Grasshopper – A medium sized grasshopper, the Redlegged grasshopper is 3/4" – 1" long and is brownish red. It has a pink to red (occasionally blue) tibia on the jumping leg. It



also has a line of distinct, black spines on the hind margin of the tibia. Although they will lay eggs and are often abundant in alfalfa, Redlegged grasshoppers cannot complete development on a diet entirely composed of alfalfa. CRP is a prime breeding and population production habitat for Redlegged grasshoppers.

Differential Grasshopper – A large grasshopper, adults are 1 1/2" – 1 3/4", and olive green to grey. The femur of the jumping leg is distinctly marked with black chevrons. They are the last economic species to hatch in spring and are most abundant in the southern part of Minnesota.



Scouting – It is essential to estimate grasshopper densities to see if populations are high enough to warrant treatment before initiating any control techniques. Scout for nymphs and adult in areas with historically high populations; last year's 'hotspots' may have high populations this year. The edges of cropping systems show the earliest grasshopper feeding. Start scouting for grasshoppers at the edge of fields in late April or early May and continue through late June or early July.

To scout for grasshoppers, walk a series of straight lines either through fields or along field margins. Grasshopper action thresholds are calculated as grasshopper numbers / yd². But grasshoppers are so active it's difficult to count how many individual insects are in a yd². An alternate method of estimating grasshopper populations has been developed. As you walk, look ahead and isolate a 1ft² area, as you approach that ft², count how many grasshoppers move in it. Observe at least 20 of these 1ft² sample areas. Calculate the average number of grasshoppers in these squares (total no. of grasshoppers counted in all squares / number of squares) and multiply this average by 9 to get the average number of grasshoppers / yd². The different species of grasshoppers hatch at different times throughout the growing season, so

scouting should be conducted for the entire period the crop is at risk.

Rating	Nymphs / yd ²		Adults / yd ²	
	Margin	Field	Margin	Field
Light	25-35	15-25	10-20	3-7
Threat	50-75	30-45	21-40	8-14
Severe	100-150	60-90	41-80	15-28
Very severe	200+	120+	80+	29+

Control is generally advisable when populations reach or exceed threatening levels (see table).

Grasshopper Movement – Grasshoppers move into crops from production areas, and between different crops. Small grains and sugar beet are probably the first crops at risk of grasshopper damage in Minnesota, but grasshoppers will eventually move into corn, alfalfa, and finally soybeans and dry beans as these crops emerge. E.g., as spring wheat matures and dries, grasshoppers will move to neighboring crops (such as corn). Agronomic practices in one crop can also initiate movement of grasshoppers (e.g. cutting alfalfa will move grasshoppers into neighboring crops if they are present).

These grasshoppers generally leave tilled fields to lay eggs, so grasshopper populations the following year arise outside of the field. Occasionally, Red-legged grasshoppers will lay eggs in alfalfa or soybean fields. All 5 economically damaging grasshoppers will lay eggs in soybean and dry bean fields. It is important to monitor fields that were in soybeans or dry beans the previous season.