

## Grasshopper Survey Protocol

### Purpose

- Estimates of the average grasshopper densities in an area are done in late-summer (when grasshoppers are adults and laying eggs). This helps forecast the risk of grasshoppers being at problem levels the next growing season.
- Collecting annual survey data shows trends in grasshopper populations over a number of years.
- This forecast can be used to prepare seeding strategies for the following year, as well as to plan for cultural or chemical forms of control.
- Monitoring grasshopper numbers in late summer during routine field visits will indicate locally areas where egg laying is likely to be highest. These areas are where grasshopper hatch will likely be heaviest the next spring, and early season populations will be concentrated.

### When to do Grasshopper Counts

Locations should be sampled when the majority of grasshoppers are in the adult stage. Adult grasshoppers have fully developed wings and can fly. Only adult grasshoppers are counted, because the adults are the reproductive stage.

To meet this requirement, sites should be surveyed between **August 1<sup>st</sup> and September 1<sup>st</sup>**. The survey is designed so that counts can be done during routine field visits if desired, and thus will not be too time consuming.

### Where to do Grasshopper Counts

Only roadsides **or** sites in the field need to be sampled, wherever grasshopper populations appear to be highest. If both field and roadside are monitored, only whichever of the two has the highest counts will be used to produce the forecast. Most often, highest densities will be along the roadside, but pasture and alfalfa stands may be the reverse.

## How many locations should be sampled

Sample enough locations so that you have a good representation of the grasshopper populations in your area. If possible, sample at least five locations in your region.

## How to do Grasshopper Counts

1. At each location, walk approximately 50 metres and estimate the number of grasshoppers in five one-metre<sup>2</sup> areas along the 50-metre strip. Getting exact counts can be difficult, particularly if vegetation is tall or dense. When exact counts are not possible, estimates are all that are required to forecast risk in an area.
2. Adding the five counts and dividing by five will give you your average number per metre<sup>2</sup>.
3. Fill out the attached form completely. Remember to include a GPS location for each site.

## Tips to Make Estimating Grasshopper Densities Easier

**Estimating the Area to Sample.** Before starting the counts, measure one metre<sup>2</sup> on the ground to fix the size of the unit to be assessed for grasshoppers in your mind. A meter stick can be carried as a visual tool to give perspective for a one-metre width, if needed. With experience, one can often visualize the necessary width and a meter stick may not be required.

**Counting Grasshoppers.** To estimate grasshopper density, as you begin walking the 50-metre strip, focus on an area ahead of you that is about one metre<sup>2</sup>. As you walk toward the metre<sup>2</sup> area, estimate the number of grasshoppers that jump or fly from the area. If grasshopper numbers are high it will not be possible to get an exact count of the number of grasshoppers that jump or fly from the area of your count as you approach it. Estimating the approximate number, or a range (ex, 20 to 30) is sometimes all that can be done. Once at the metre<sup>2</sup>, count the remaining grasshoppers in the metre<sup>2</sup>. A quick and easy way to detect grasshoppers while at the metre<sup>2</sup> is to disturb the plants in the area with your feet to encourage any grasshoppers still present to jump. Repeat four more times along the 50-metre strip to get your five counts.

**Estimating High Numbers of Grasshoppers.** If grasshopper numbers are very high, and estimating the number of grasshoppers per metre<sup>2</sup> is difficult, try estimating numbers in a quarter of a metre<sup>2</sup>, or a foot<sup>2</sup> area. If estimating numbers in a quarter

metre<sup>2</sup>, multiply by four to get a metre<sup>2</sup> count; if using a foot<sup>2</sup> count, multiplying by ten will give an approximate metre<sup>2</sup> count.

- **Caution: Do Not Bias Your Counts.** The grasshopper counts are meant to be a representation of the average number of grasshoppers per metre<sup>2</sup> in the approximately 50-metre area you are surveying. This means that within the 50 metres, the five counts should be at random, not just where grasshoppers are clustered. The risk of having high counts that are not representative of the true number of grasshoppers per metre<sup>2</sup> on average is even greater when counting grasshoppers in areas smaller than one metre<sup>2</sup> and multiplying by four or ten (as described above). As an example, in an area with low grasshopper numbers, selectively looking for foot<sup>2</sup> areas with at least one or two grasshoppers in them to do a counts will, after doing the math, result in counts of at least ten to 20/metre<sup>2</sup> , which may be very unrepresentative of the average grasshopper density in the area. For this reason, estimating grasshopper numbers using count areas smaller than one metre<sup>2</sup> is only recommended when populations are very high and estimating numbers per metre<sup>2</sup> is very difficult.

### **Predominant Species of Grasshopper**

Not all species of our potential pest grasshoppers feed on the same crops. Knowing the dominant species in a region is helpful for knowing the potential risk for specific crops. If you are comfortable distinguishing the different species of grasshoppers, and notice while doing the counts that a particular species of grasshopper is predominant in an area, this is useful information. A sweep net can be used to capture a sample of grasshoppers and determine the dominant species. Content of the sweep net can be put into a clear plastic bag to observe and determine species.

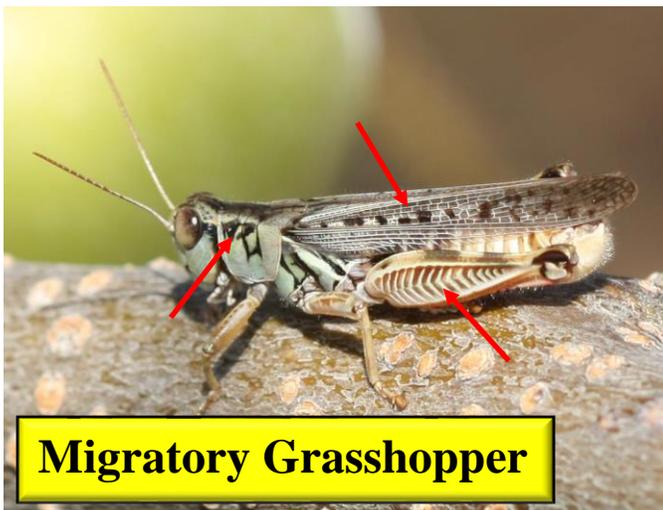
# Common Crop Feeding Grasshoppers of the Canadian Prairies



- Two **pale stripes** from eyes to tip of forewings.
- Solid **black stripe** on hind legs.



- Also has two **pale stripes**.
- Note the **brown blotches** on the forewings. Two-striped grasshopper does not have similar blotches on the forewings, and is bigger.



- Note **black bands** behind eyes.
- Forewings have rows of small dark **rectangular spots** like the windows on an aircraft.
- Hind legs have series of **black bands**.



- Two **light-coloured stripes** from just behind eyes to back of the thorax.
- **Blue hind tibia** (long, thin lower section of leg).

Additional information to help identify potential pest species of grasshoppers can be found on the Manitoba Agriculture website at:  
<https://www.gov.mb.ca/agriculture/crops/insects/grasshoppers.html>

### Fungal Pathogen of Grasshoppers

Dead grasshoppers clinging to the upper portion of the plant are an indication of a fungal pathogen, *Entomophagus grylli*. Note where, and the approximate density of these diseased grasshoppers if present.



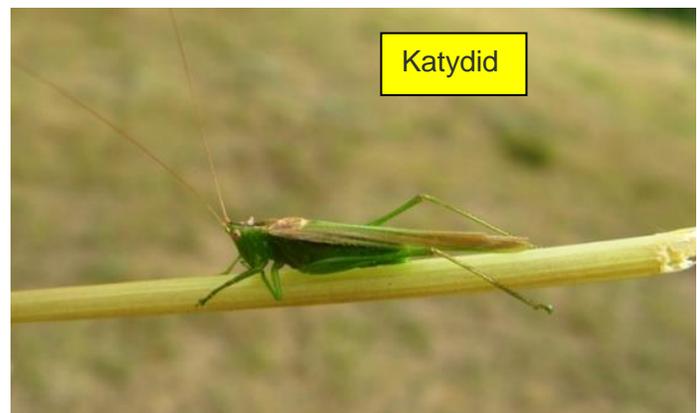
### Other Observations

Other observations (such as an abundance of grasshopper predators, etc.) which may influence grasshopper populations should also be noted.

### Precautions

Katydidids are not considered potential crop pests and should not be counted in the survey.

Note that katydidids (which belong to a family known as long horned grasshoppers) have antennae that are as long as the body or longer. The potential pest species of grasshoppers belong to a family of grasshoppers known as short-horned grasshoppers, with relatively short antennae.



### What will be done with the numbers and observations you collect

The final results will be used to produce a map and grasshopper forecast for the following year for the agricultural area of Manitoba. Grasshopper counts from August will be mapped using the following categories:

0-4 / metre <sup>2</sup> = very light	12-24 / metre <sup>2</sup> = severe
4-8 / metre <sup>2</sup> = light	> 24 / metre <sup>2</sup> = very severe
8-12 / metre <sup>2</sup> = moderate	

This, and other information such as weather data and recent trends in grasshopper populations, will be used to forecast the risk for potentially economical populations of grasshoppers in an area for the following year. Interpretation of the data and observations will also be prepared.

### Where to Send Data

Please enter data directly into the computer database (see data sheet), or send or email the following “grasshopper monitoring data sheet – 2022” by **September 30, 2022** to:

John Gavloski  
Manitoba Agriculture  
Box 1149, Carman, Manitoba R0G 0J0  
Fax: 204-745-5690

