

# Manitoba Grasshopper Forecast for 2012

By: John Gavloski; Entomologist; Manitoba Agriculture, Food and Rural Initiatives  
Box 1149, 65-3<sup>rd</sup> Ave. NE, Carman, Manitoba, Canada, R0G 0J0



Grasshopper surveys have been conducted in Manitoba in various degrees of detail since 1931. The current grasshopper forecast is based on counts of grasshopper populations in August (which estimates the egg-laying population), weather data (which helps estimate whether those female grasshoppers present are capable of laying their optimum level of eggs), and recent trends in grasshopper populations. In some years, natural enemy populations may significantly affect the number of grasshopper eggs that survive and hatch, and such data may be pertinent to the forecast as well. Counts are generally done in or alongside crop fields in Manitoba. The goal is to estimate levels of the 4 species of grasshoppers that have potential to be pests of crops in Manitoba.

## Purpose of a grasshopper forecast

Although all stages of grasshoppers, except the egg stage, feed on plants, it is the older grasshoppers of particular species that later in the season can do the most damage to crops. In annual cropping systems, the young stages of these species are often highly concentrated around field edges early in the season, particularly around fields that had early season crops the previous year. If grasshopper populations get quite high, these younger, concentrated populations of grasshoppers are much easier to control than older and more dispersed populations later in the season.

Knowing the risk of grasshoppers being a problem the following season alerts farmers and agronomists to the importance of monitoring field edges and vegetation surrounding the fields in late-May and June for these younger grasshoppers. This information can also help farmers choose crops and plan seeding practices for the following year.

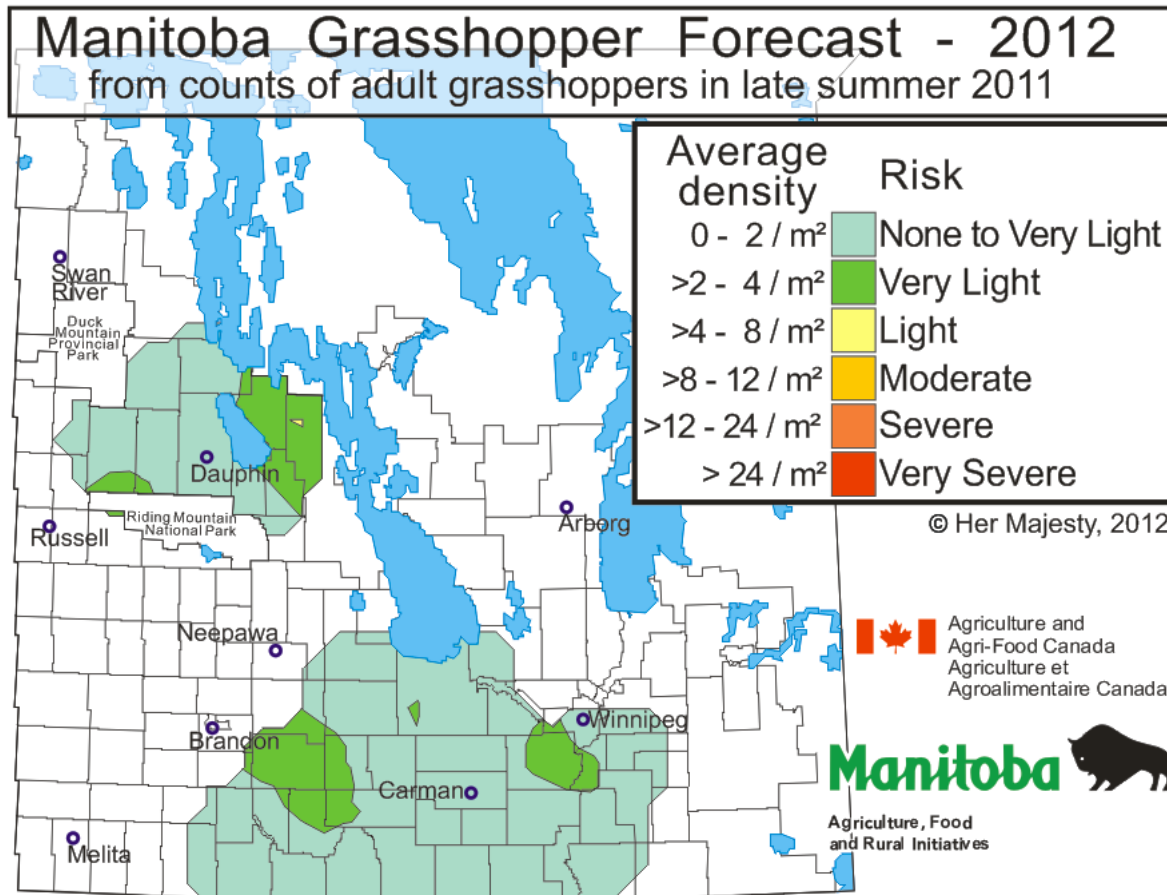
## How the forecast is done

Knowing how many grasshopper eggs have been laid in the soil in late-summer can help predict what the population will be like the following year. Although grasshopper eggs can be counted by digging soil and shaking it through sieves, this is a very labour-intensive and time consuming process. Doing counts of the adults that are laying the eggs in late-summer can be done relatively quickly. This, combined with weather data during the egg-laying period, gives an estimate of the eggs that were laid and the risk level of grasshoppers the following year.

## Interpreting the grasshopper population map

The grasshopper population map for Manitoba is based on counts of adult grasshoppers per m<sup>2</sup> done by farm production advisors, agronomists, and entomologists in August 2011. Grasshopper counts from 116 locations in Manitoba were used to produce the map. The legend on the map shows the average grasshopper counts in an area, and relates these to risk for many of our crops. Factors affecting grasshopper development, survival and behaviour will determine whether these August populations are

likely to increase, decrease, or remain fairly stable for the next year and are also important factors in the overall forecast for 2012. White areas on the map are areas where data was not collected.



**Figure 1. Average density of grasshoppers in Manitoba during August 2011.**

### The Grasshopper Forecast for Manitoba for 2012

#### What the grasshopper population map shows

Most of the surveyed area (99.97%) rated as very light risk. Of the 116 counts done in August 2011, 112 were between 0 and 4/m<sup>2</sup> (the very light category). The highest counts were 7/m<sup>2</sup> near Domain, and counts of 6/m<sup>2</sup> and 5.8/m<sup>2</sup> east of Glenboro.

#### Recent trends in grasshopper populations

Grasshopper outbreaks usually develop after a few years of conditions that are favourable for a steady increase in numbers of those species of grasshopper that can become pests of crops. Comparing the current August grasshopper counts with those of previous years can determine if the populations tend to be rising or falling.

The following table shows the percentage of surveyed area in Manitoba in each of the grasshopper population density categories for data collected from 2002 to 2011.

**Table 1. A 10 year comparison of grasshopper counts in Manitoba.**

Year	Very Light (0-4/m <sup>2</sup> )	Light (>4-8/m <sup>2</sup> )	Moderate (>8-12/m <sup>2</sup> )	Severe (>12-24/m <sup>2</sup> )	Very Severe (>24/m <sup>2</sup> )
2002	31.73	29.52	13.01	21.52	4.22
2003	15.69	25.39	21.97	28.29	8.67
2004	32.64	35.68	12.18	16.01	3.48
2005	96.15	3.85	0	0	0
2006	94.60	5.40	0	0	0
2007	56.30	38.26	5.21	0.23	0
2008	33.17	40.73	16.48	7.26	2.36
2009	47.19	24.84	16.86	10.67	0.44
2010	98.01	1.99	0	0	0
2011	99.97	0.03	0	0	0

During the grasshopper surveys in August, grasshopper populations were high in 2003, a year which saw many grasshopper problems, decreased in 2004, and decreased to even lower levels in 2005 and 2006. Populations increased in 2007, and in 2008 there was a further increase in grasshopper numbers. The counts from 2009 were similar to 2008. The counts from the 2010 survey were lower than in the previous few years, with none of the surveyed regions of the province in the moderate, severe or very severe categories, and the high majority of the surveyed areas in the very light category. There was an even further decrease in grasshopper counts in the 2011 survey, with 99.97% of the counts between 0-4 / m<sup>2</sup>.

### **How weather affects grasshopper development and survival**

**Late-Summer weather:** The potential for grasshopper populations to increase is to a very large extent determined by the number of eggs deposited, which in turn is greatly influenced by temperature during the egg-laying season. Warm and dry weather in late-summer will mean that there has been more opportunity for the potential pest species of grasshoppers to lay their maximum amount of eggs. Frequent rains during August and early September make it difficult for grasshoppers to mate and produce egg pods. As well, there is some embryonic development that will occur in these eggs before the colder weather sets in. Warmer conditions will mean that the embryonic development is further along before development ceases for the winter. The further along the development is going into winter, the earlier the eggs will hatch the next year. Earlier hatch means grasshoppers that are feeding on younger, less tolerant crops.

**Winter temperatures:** Very cold winter temperatures, with little snow cover, can result in higher mortality of grasshopper eggs as many will freeze. However, the species of grasshoppers that can potentially be pests of crops often lay their eggs in areas where snowfall tends to accumulate. So cold temperatures will likely only be a factor in years with exceptionally low snow cover. Temperatures of -15°C or less at about 5 cm below the soil surface are needed to cause substantial mortality of grasshopper eggs.

**Spring and Summer Weather:** Warm and dry spring and summer days favor early and rapid grasshopper development. As well as affecting their ability to cause more harm to crops, this also means they will become adults and start laying eggs for the next year sooner. So it is easy to see how several years of hot, dry conditions can build a grasshopper population up to outbreak levels.

### **Potential affects of weather from August and September 2011 on the grasshopper forecast**

The weather data used to forecast grasshopper abundance for 2012 is shown in Table 2. This data is from 15 sites located across the agricultural region of Manitoba.

The daily maximum temperatures were higher than normal in August and September of 2011. There were generally fewer days with rain and less total rainfall than normal, although there were some regional exceptions, as shown in Table 2. Some areas in the western part of Manitoba, such as Hamiota, Brandon and Carberry, had exceptionally little rainfall in late-summer, particularly in August. Warmer and drier weather in August and September is favorable for grasshoppers to lay eggs.

**Table 2 – Temperature and Rainfall Data from August and September 2011.**

Location	Avg. Daily Maximum Temp.				Total Rainfall (mm)				Days with Rain			
	August		September		August		September		August		September	
	2011	Norm*	2011	Norm	2011	Norm	2011	Norm	2011	Norm	2011	Norm
<b>Northwest</b>												
Roblin	23.9	23.9	<b>20.0</b>	17.4	<b>107.6</b>	70.6	38.6	53.7	<b>13</b>	10.6	9	9.2
Grandview	<b>25.9</b>	23.8	<b>21.6</b>	17.5	<b>76.0</b>	71.6	29.4	60.1	11	12.4	8	10.8
Hamiota	<b>26.9</b>	24.5	<b>21.1</b>	17.6	7.4	52.9	14.0	48.5	<b>11</b>	8.0	5	7.1
<b>Southwest</b>												
Brandon	<b>26.9</b>	24.8	<b>21.2</b>	18.3	5.4	69.2	29.2	49.9	7	9.9	6	8.9
Carberry	<b>26.5</b>	24.8	<b>21.0</b>	18.3	8.4	69.2	23.4	49.9	5	9.9	5	8.9
Melita	<b>27.5</b>	26.2	<b>21.5</b>	19.5	37.2	51.8	22.4	46.7	8	8.6	5	7.7
Boissevain	<b>26.7</b>	24.7	<b>21.4</b>	18.0	34.4	66.8	43.2	47.2	9	9.2	7	8.6
<b>Central</b>												
Portage	<b>27.0</b>	24.5	<b>21.3</b>	18.2	25.4	71.1	38.2	57.2	6	11.0	9	11.2
Pilot Mound	<b>25.5</b>	25.3	<b>20.6</b>	18.8	34.4	70.0	48.6	49.2	<b>12</b>	10.7	4	10.1
Carman	<b>27.0</b>	25.1	<b>21.5</b>	18.5	12.2	70.0	<b>64.7</b>	56.7	8	10.5	8	10.5
Winkler	<b>26.9</b>	25.2	<b>22.1</b>	19.0	20.0	66.9	<b>92.4</b>	51.0	8	10.6	8	9.4
<b>East / Interlake</b>												
Eriksdale	<b>26.2</b>	23.0	<b>20.7</b>	16.5	14.6	69.1	16.0	56.5	6	10.0	5	10.5
Teulon	<b>27.0</b>	25.0	<b>21.5</b>	18.3	17.6	63.3	25.6	54.0	11	11.6	7	10.9
Winnipeg	<b>27.8</b>	25.0	<b>21.1</b>	18.5	37.5	75.1	<b>67.5</b>	51.9	<b>11</b>	10.4	8	10.9
St. Pierre	<b>27.9</b>	24.7	<b>21.8</b>	18.4	38.0	68.5	<b>72.2</b>	59.6	10	10.1	7	9.5

\*Normals are based on 1971-2000.

Values in **Bold** type indicate the 2011 reading was higher than the 30 year normal.

### Summary

The grasshopper population was generally very light across Manitoba during the August survey. Weather in August and September was quite favorable for the grasshopper populations that were present to lay eggs. Because of the low counts of grasshoppers, the risk of economical populations of grasshoppers developing in 2012 remains low.

When they have the opportunity, farmers and agronomists are still encouraged to monitor grasshopper populations along roadsides, field edges, and other areas where populations tend to be concentrated or at high levels early in the season. This monitoring should begin in late-May or June. Given that there were good conditions for egg laying last year, warm and dry conditions next year could result in grasshopper populations starting to build.

For more information on the grasshopper forecast or monitoring for grasshoppers, please contact John Gavloski at (204) 745-5668. The protocol for doing the grasshopper counts for this survey can be found at: <http://www.gov.mb.ca/agriculture/crops/insects/fad95s00.html>