Biological Control of Cereal Leaf Beetle: Preventing an Invasive Organism from Becoming an Economical Concern.

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Cereal leaf beetle is an invasive insect that feeds on many grassy plants, including cereal crops, forage grasses, and grassy weeds such as wild oats and quackgrass. Adults are small beetles, about 5 mm (Figure 1). Larvae, which may be slightly longer than the adults when fully grown, feed on the tissue between the veins on the upper leaf surface, leaving the lower epidermal cuticle intact, while adults chew through the leaf. Larvae have a yellow body, brownish-black head and legs, and may look somewhat slug-like (Figure 2). They are usually covered in a mass of slimy, dark fecal material. This fecal deposit is thought to protect the larvae from predation and desiccation, but it also appears to attract some of it's host-specific parasites.


Fig. 1. Cereal leaf beetle adult.


Fig. 2. Cereal leaf beetle larva.

Cereal leaf beetle was first detected in North America in Michigan in 1962. Biological control has been a successful strategy for managing cereal leaf beetle from early in its establishment in North America. In the U.S. Midwest and southern Ontario, a parasitic wasp called *Tetrastichus julis* had become widely established by the mid-1970's (Harcourt et al. 1977).

Tetrastichus julis, an introduced parasitoid, is very good at locating and parasitizing larvae of cereal leaf beetle. Where populations of this parasitoid are established, the risk of cereal leaf beetle being an economical pest of cereal crops in the region is greatly reduced.

In recent years, populations of cereal leaf beetle have been establishing in western Canada. It was first found in the Creston Valley of British Columbia in 1998, Alberta in 2005, Saskatchewan in 2008, and Manitoba in 2009 (Kher et. al. 2011).

In Manitoba, the cereal leaf beetle was first found in the Swan River Valley in 2009. Larvae were collected and sent to the University of Alberta, where it was determined that none of the larvae sent were parasitized. In both 2009 and 2010, larvae of the cereal leaf beetle that contained the parasitoid *T. julis* were sent from Alberta to Manitoba, where they were released in the Swan River valley. In 2011, larvae of the cereal leaf beetle

were collected from the Swan River Valley and it was determined that *T*. *julis* had established in the population in the areas of the release.

Since the first confirmed finding of cereal leaf beetle in Manitoba in 2009, the distribution and spread of cereal leaf beetle has been tracked, and where new populations are found larvae are collected and examined to determine if the parasitoid *T*. *julis* is also established in the area. If no parasitoids are found, a release of several hundred of these parasitoids, which will only attack cereal leaf beetle, will be done in the area. Parasitoids for release are sent from Agriculture and Agri-Food Canada in Lethbridge, Alberta.

In 2013, cereal leaf beetle was found near Roblin, Brandon, and Treherne, Manitoba. Samples were sent to Lethbridge, Alberta to determine if parasitoids already existed in the populations. The cereal leaf beetle population from the Brandon area already contained *T*. *julis*, whereas parasitoids were not able to be detected in samples collected near Treherne. A release of about 200 adult wasps of *T*. *julis* was done in the Treherne area in July, 2013 and approximately 200 cocoons containing *T*. *julis* were released in the same area in September, 2013. Larvae of cereal leaf beetle form the Treherne area were examined for parasitism in 2014, and found to contain *T*. *julis*.

In 2014, cereal leaf beetle was found in fields near Roseisle. Pilot Mound and LaRiviere, Manitoba. In most fields the populations were very small, and difficult to get significant samples for assessing parasitism. However, 73 larvae of cereal leaf beetle were collected from a field west of Roseisle, sent to Lethbridge, and no *T*. *julis* were found in these larvae. In July about 260 adult wasps of *T*. *julis* were released at the field these 73 larvae were collected from. A further release was done in September, when about 200 parasitized cocoons of cereal leaf beetle, each containing about 5 *T*. *julis*, were buried along the edge of a field directly across the road from the field the 73 larvae were collected from. The location for burying the cocoons was chosen so they would be next to a field that would be in a cereal crop the next year, and a location that will not be disturbed by tillage in the fall or seeding operations. Tillage can result in high levels of mortality to both *T*. *julis* and the cereal leaf beetle (Leibee and Horn 1979).

To date, *T.julis* has successfully established at locations where releases have been made in Manitoba. And cereal leaf beetle, although present in many areas of Manitoba, have not become a significant pest of cereal crops.

How agronomists and farmers can help?

It is important for us to know the distribution of the cereal leaf beetle in Manitoba. And where populations are present and have not been tested for parasitism, we need to have samples of larvae collected and tested for parasitism. This is where agronomists and farmers can be of help. If you find cereal leaf beetle in fields in your area, collect a sample, ideally a minimum of 30 larvae, and place them in a container with some food. Larvae can be collected either by hand picking or knocking the larvae off the plants into a container with food, or using a sweep net. Samples can then be sent to Agriculture and Agri-Food Canada in Lethbridge to determine whether *T.julis* is present in the population. If it is not, then a release of the parasitoid can be arranged in the area. If you need assistance getting a sample of cereal leaf beetles collected, contact John Gavloski (contact information at top of paper), and we will try to arrange to have a sample collected. More information on the biological control of cereal leaf beetle, as well as details on where to send samples of cereal leaf beetle, can be found at: http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/all/prm13779/$FILE/tjulius.pdf

References

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