

Documenting and Expanding Biological Control of the Cereal Leaf Beetle in Small Grains with a Parasitic Wasp

Principal Investigators

Jaime Cummings, Ken Wise, and Amara Dunn, NYS Integrated Pest Management Program; and Elson Shields, Cornell University Department of Entomology

Project Start: 4/1/2019 **Project Term:** 8/1/2019 **Report Fiscal Year:** 2019

Executive Summary

The cereal leaf beetle (*Oulema melanopus*) is considered a primary pest of concern for small grains in NY, potentially causing significant yield loss and/or poor grain or forage quality. Losses to this pest can be sporadic, but are more prevalent in some regions than others. As we experience a perceived resurgence of this pest and subsequent damage in NY, growers have become more reliant on insecticides to mitigate losses. The necessity of some of these insecticide applications is questionable, and it's important to consider other potential management options. With the knowledge that a program in the 1970's focused on releasing a biological control parasitic wasp (*Tetrastichus julis*) in NY for managing this pest, we wanted to determine if the parasitoid is still present in NYS, at what levels, and whether we could increase populations of this biocontrol organism in a region that suffers annual losses to the cereal leaf beetle. A pilot study was conducted in 2019 to survey for the presence of the *T. julis* wasp in six counties in western and central NY. The parasitoid was detected at low levels at all locations where cereal leaf beetle larvae were collected and assayed, with a 'hot spot' near Ithaca in Tompkins County. Cereal leaf beetle larvae with known levels of parasitism by *T. julis* were released at the Musgrave research farm, near Aurora in Cayuga County, an area that frequently experiences losses to this pest. In future years, we will continue to survey fields with cereal leaf beetle infestations, determine parasitism levels and release parasitized populations at the Musgrave research farm. We will also continue to monitor parasitism levels at the research farm to determine any positive impacts such as increasing biocontrol and reducing cereal leaf beetle damage.

Issue

The cereal leaf beetle (CLB) (*Oulema melanopus*) is an invasive species introduced from Europe, which was first discovered in Michigan in 1962. Following failed chemical eradication efforts in the 1960's, this pest had spread to 11 states and parts of Canada, and was causing economic damage by 1971. It continues to be problematic in a number of states and provinces, and is considered a primary pest of concern for small grains production in NY, where it causes yield loss and inferior grain and/or forage quality. Though damage from CLB can be sporadic in NY, the pest and losses seem to be increasing in recent decades, and NY farmers have become more likely to spray insecticides to protect their crops from CLB. Even though clearly established economic thresholds exist for making management decisions, some crop consulting agencies are currently recommending prophylactic insecticides in tank mixes with the typical fungicide applications for Fusarium Head Blight. This is problematic because the insecticides are intended to target the CLB larvae, and the established threshold recommendations are for

applications prior to head emergence to be cost effective. Tank mix applications with head blight fungicides are applied too late, and therefore a waste of money to the grower and an unnecessary added exposure to insecticides which may harm beneficial insects or increase chances of resistance development in pest populations. Knowing that a rigorous biocontrol program utilizing a natural predatory parasitic wasp (*Tetrastichus julis*) to control CLB was successful in Washington State, and knowing that this same biocontrol wasp was released in NY in 1973, we set out to determine 1) whether the *T. julis* parasitoid is still present in NY, 2) at what levels, and 3) can we increase the population of *T. julis* in an area that experiences annual infestations of CLB in hopes of reducing losses over time while reducing the reliance on insecticides?

Progress Summary

A pilot study was launched in 2019 to survey for presence of the *T. julis* parasitoid within CLB populations in six counties (Cayuga, Cortland, Oneida, Seneca, Tompkins and Yates). The goal was to collect approximately 100 CLB larvae from individual infested fields in each county so that parasitism levels could be determined in 50% of the collected CLB larvae and the other 50% could be used for controlled releases. No CLB infested fields were identified in Oneida or Cortland Counties, but collections were made from fields in Seneca, Cayuga, Tompkins and Yates Counties (Table 1).

Table 1. Cereal leaf beetle collection efforts for determining parasitism levels in 2019.

Location	County	Collection date	Crop	# CLB larvae collected
Seneca Falls	Seneca	6-Jun	winter wheat, rye, barley	96
Musgrave	Cayuga	12-Jun	spring barley	92
Ithaca	Tompkins	12-Jun	winter wheat, rye, barley	45
Penn Yan	Yates	13-Jun	spring oats and peas	110
Oriskany	Oneida	11-Jun	winter wheat	0
Homer	Cortland	10-Jun	winter wheat	0

The CLB larvae were temporarily reared in the lab until ready to determine parasitism levels via dissection (Fig. 1). The *T. julis* parasitoid was detected in CLB populations from each location, though at very low levels (< 10%) at three of the four locations (Fig. 2). A ‘hot spot’ of parasitism was detected at the Ithaca, Tompkins location at 30%. After parasitism levels were quantified, the remaining CLB larvae with known levels of parasitism were released at the Musgrave research farm near Aurora in Cayuga County. This location was selected because it is within a region that experiences damage and losses from CLB in most years, it had the lowest detected level of parasitism, and because we can work with the farm manager to ensure that they don’t spray any insecticides where we make the releases.



Figure 1. Dissected cereal leaf beetle larvae to determine parasitism levels by *T. julis* biocontrol wasp eggs.

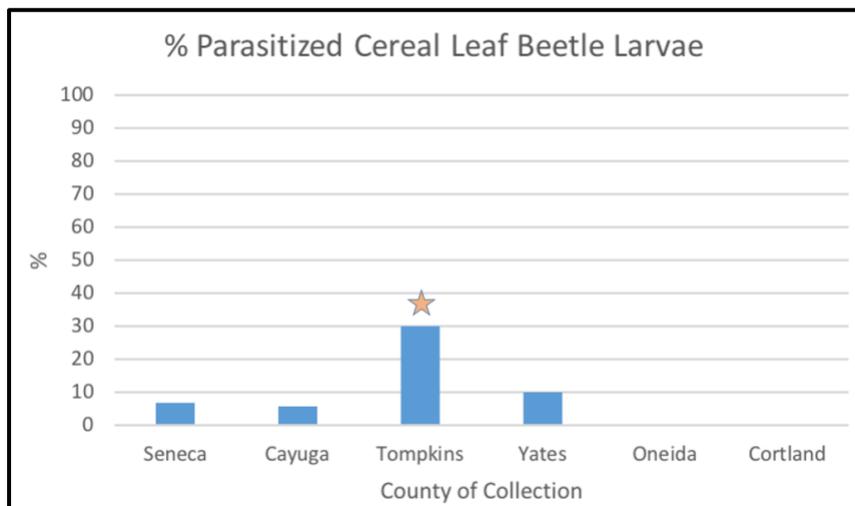


Figure 2. Parasitism levels of cereal leaf beetle populations by *T. julis* wasp at survey locations in New York in 2019.

We plan to continue this project in subsequent years. We will expand surveys of CLB populations to determine parasitism levels across small grains production areas in NY, and will continue to release parasitized CLB larvae at the Musgrave research farm in hopes of increasing biocontrol and decreasing CLB damage in the region.

Expected and Observed Impact

Given the resurgence of damage to small grain crops in NYS by CLB in recent decades, and an increased reliance on insecticides to manage losses, we hope to reduce the need for insecticides by expanding and increasing a naturalized parasitic wasp that provides biological control of this

pest. At the same time we will educate crop consultants and growers on the proper economic thresholds for making management decisions for CLB, and hopefully eliminate the current misconceived recommendation that growers should include an insecticide as part of tank mix when applying fungicides at flowering for Fusarium head blight management. The education efforts could significantly reduce the number of poorly-timed or unnecessary insecticide sprays for CLB in small grains statewide, which may allow some of our natural beneficial biocontrol insects to help manage CLB populations below economic thresholds. A similar program in Washington State was quite successful, and WA small grains growers have little need for insecticides for CLB now.

This project was a popular topic for extension meetings during the 2019-20 winter season. I was invited to present this project and results at the Northeast Certified Crop Advisors Advanced Training session, where nearly 50 crop consultants and agribusiness associates attended the sessions. This will also be presented at the NWNYSoybean and Small Grains Crop Congresses in February, where between 300-400 farmers, crop consultants, and agribusiness associates will learn about the potential benefits of this project and the proper thresholds and timings for making insecticide sprays for managing CLB. An [article](#) on this project was published in the Cornell Field Crops blog, and the NYS IPM Biocontrol Bytes blog in 2019, potentially reaching thousands of subscribers. These outreach and education efforts will continue in subsequent years as the project continues.

Project Conclusion

The pilot study concluded in 2019, and it was determined that we do have low levels of the *T. julis* parasitoid still in NYS, though at low levels. We hope to educate farmers and crop consultants on the proper scouting methods and economic thresholds for managing CLB with insecticides to reduce the number of pointless applications. We will continue to survey statewide CLB populations for *T. julis* parasitism levels and will release parasitized populations at the Musgrave research farm for a number of years in hopes of increasing the level of biocontrol and decreasing damages sustained by CLB in that region.