

Project #: 3043-3327

Progress Report Year: 1 of 2 (maximum of 3 year funding cycle)

Title: Hessian Fly Management: An Emerging Research Issue in Wheat

Researchers: **Laura Lavine, Mike Pumphrey**

Cooperators: *Arash Rashed, Arron Carter, Kim Garland-Campbell*

Executive summary: The Hessian fly *Mayetiola destructor* is an emerging economic threat to wheat grown in the inland Pacific Northwest. While screening for Hessian fly for wheat improvement has been funded by the Washington growers for several years (Pumphrey, Bosque-Pérez, & Rashed), it is critical to have new research on insect management practices for Hessian fly in Washington state based on its emergence as a new economic threat. The overall goal of this project is to increase the profitability and sustainability of Washington wheat-based cropping systems via evidence-based insect management decisions. Our specific goal is to provide new biological and ecological information on this important insect pest that will lead to improved Hessian fly management. We will accomplish this (1) providing a comprehensive review of known environmental factors contributing to Hessian fly outbreaks in the inland Northwest through surveys and collaboration with scientists, growers, and extension specialists and (2) focus specifically on genetic virulence of Hessian fly to new wheat germplasm development in several new and current genetic lines including Louise to precise recommendations for management.

Accomplishments since July 1, 2019 when this project was funded. We have recruited and begun training the Entomology M.S. student, Daniel Gallegos. He has begun working with members of Mike Pumphrey's lab and Arash Rashed's lab to go into the field to collect Hessian Fly samples. Daniel and Laura have also attended field days, Daniel attended the Wheat Academy, and both have had meetings with our wheat and grain extension faculty as we put together information on needs for the Hessian Fly biology literature review and extension bulletin. He is in the process of setting up the Hessian Fly wheat screening program at WSU modeled on the facility at the University of Idaho so that we can increase the capacity of genetic lines screened. And we have formed a Hessian Fly reading group that meets twice a month to review the most relevant scientific information on Hessian Fly biology and management.

Impact:

Hessian fly resistance in the inland Northwest is valued from \$45 to \$104 per acre based on a study led by Dick Smiley at Oregon State University. Applying these values, a very conservative Washington state-wide loss estimate without resistant varieties is over \$10,000,000 per year, not including lower-level losses to winter wheat crops. Hessian fly infestations are widespread through the state every year and sampling with pheromone traps produces hundreds to thousands of flies at all locations sampled.

Hessian fly is largely controlled through genetic resistance maintained by expert screening of germplasm and by farmer adoption of resistant varieties. Typical insect pest management regimens for Hessian fly rely on prevention measures. From 2016-2018, we've seen heavy infestations at more sites, with heavier pressure than has been seen in over ten years or more. While newly released WSU varieties Glee, Alum, Chet, Seahawk, Tekoa, and Ryan are Hessian fly resistant due to the Hessian fly screening program funded by Washington growers, this work not only needs to continue, but the insect can and

does adapt to resistant varieties. Therefore, additional research on Hessian fly population genetics and Hessian fly virulence is critical for successful management now and in the future.

No measureable impact has yet been shown in this project in the most recent funding cycle as we are setting up the foundational work for Hessian fly screening at WSU as we show in our output and outcomes table below.

Outputs and Outcomes:

Use the [Excel template provided](#) to report on the following. Ideally, you simply update your spreadsheet from previous reports. The objectives and deliverables identified in the spreadsheet should be consistent with the original objectives and deliverables described in the project proposal.

A. Progress:

Objective	Deliverable	Progress
1: Comprehensive review of PNW Hessian fly biology	Published literature review of updated Hessian Fly biology; new extension bulletin published.	Surveys are being formulated; literature has been reviewed; manuscript will be written in spring 2020
2: Field collections of HF; screen against varieties in greenhouse	New MS grad student; HF screening at UI and at WSU (new).	New cages are being built, a greenhouse at WSU has been identified, HF samples are stored from field collections this summer and fall to be used in screenings this Jan-June

C. Timeline:

Objective	Timeline
1: Comprehensive review of PNW Hessian fly biology	Spring 2020 with extension bulletin submitted to peer review by June 1, 2020
2: Field collections of HF; screen against varieties in greenhouse	Jan-June HF screening at WSU and UI; Wheat Life article after August 2020

D. Communication:

Objective	Communication
1: Comprehensive review of PNW Hessian fly biology	Presentations at Field Days; peer reviewed extension bulletin
2: Field collections of HF; screen against varieties in greenhouse	Presentations at Field Days; peer reviewed scientific publication to be prepared; article for Wheat Life