A PROPOSAL TO

NORTH CAROLINA SMALL GRAIN GROWERS ASSOCIATION, INC.

FOR RESEARCH OR EDUCATION ENTITLED:

Varietal Screening for Hessian Fly Resistance

COVERING THE PERIOD FROM **10/01/2023** TO **09/30/2024**

REQUESTING SUPPORT IN THE AMOUNT OF **$10,000**

SUBMITTED BY:

Project Leader	Departmental Affiliation
Dominic Reisig	**Entomology and Plant Pathology**
Ryan Heiniger	**Crop and Soil Sciences**
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Note: This is a fundamental research or scholarly project and, as such, the University shall be free to publish or disseminate the results of this research or otherwise treat such results as in the public domain, and it will conduct the research in an open forum consistent with the University's mission of research, instruction and public service.

NCARS/NCCES Code: 24-05

OBJECTIVE(S): To determine the susceptibility of popular commercial wheat varieties grown in North Carolina to Hessian fly.

PROJECT DESCRIPTION AND RELEVANCE:

Hessian fly is one of the most severe insect pests of wheat in North Carolina. Generally, there are two generations in wheat- one occurs during the fall and one occurs during the spring. It is most easily managed through resistant varieties and crop rotation. Historically, the OVT program planted an insecticide-free wheat trial that allowed us to take ratings to determine varietal susceptibility. However, in order to come in line with best management practices for growers, the OVT moved toward wheat with full seed treatment similar to the way corn and soybean are managed in the program. An insecticidal seed treatment can reduce the number of larvae and improve yield by providing protection for up to three weeks under heavy Hessian fly pressure. This now makes evaluating resistant varieties within the OVT difficult for the important fall generation of Hessian fly.

Several additional screenings are managed by the OVT and we will work through the OVT to secure the seed needed to execute these trials. In summer 2023, during the call for wheat entries, sponsors will be asked to voluntarily participate in the Hessian fly screening by providing seed of their varieties without insecticidal seed treatment. Based on previous participation rates for other types of voluntary screening, we anticipate planting ~50 commercially available wheat varieties at Hugo, NC during October 2023. This location has historically provided exceptionally high pressure. Combined with early planting, we should be able to test the varieties for resistance.

Hessian fly larvae and pupae numbers tend to peak 4-6 weeks after planting, depending on temperature. We will take a single evaluation when these numbers have peaked. We will excavate ten random tillers per plot and record the number of larvae and pupae. We will also record tiller densities from 1 foot of row in each plot. Tiller death can sometimes occur even after these numbers have peaked. If this appears to be happening, we will take another tiller density rating. Yield will be collected from each plot.

Using these data, we will rate each variety as resistant, moderately resistant, moderately susceptible or susceptible. These ratings will be incorporated into the variety selection tool and will be available as a printable pdf on the small grains portal.

Our approach to quantify resistance will not quantify tolerance (the ability of a plant to produce high yield in the presence of heavy Hessian fly pressure) or antixenosis (avoidance of the plant by Hessian fly adults laying eggs.) However, it will be excellent to analyze antibiosis (where the plant interferes with development of the larvae.) Antibiosis is the most common type of resistance in wheat varieties. While companies often include Hessian fly resistance information on their technical bulletins, these screenings are generally completed in the greenhouse with a limited number of individual plants. It is important to also execute these resistance evaluations in the field due to differences in Hessian fly biotypes by region and differences in how varieties respond in the greenhouse versus in the field under natural pressures.

RELATIONSHIP TO SIMILAR PROJECTS, IN NC AND OTHER STATES:

No other similar projects are being researched.

FUNDS REQUESTED:

2023-24 ..... **$10,000**