COLORADO STATE UNIVERSITY EXTENSION

INVESTIGATING NOVEL SOURCES OF RESISTANCE TO WHEAT STEM SAWFLY, A DEVASTATING PEST OF WHEAT

(LARIMER, YUMA & WELD COUNTIES)

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PROJECT INTRODUCTION

The wheat stem sawfly (*Cephus cinctus* Norton, WSS) emerged as a significant pest of Colorado winter wheat in 2010. Annual estimates indicate that the WSS is responsible for $30-40 million in statewide profit loss.

Pesticides are a popular method of insect control, but they have not proven effective against this pest. Given this, the CSU Wheat Entomology Program is researching alternative methods of resistance to WSS.

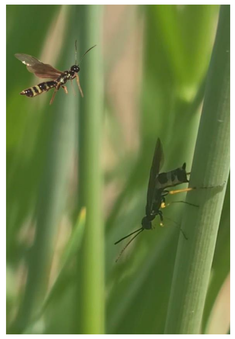


Figure 1 & 2. (Left) Female WSS ovipositing in stem, photo by Venkatesh Padimi. (Right) WSS larvae.

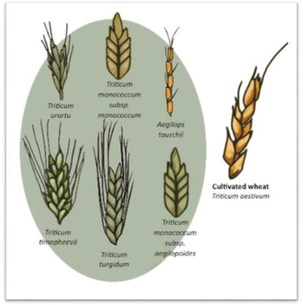


Figure 3. Ancestral wheat heads.

Wheat bred to have solid stems is currently the best defense, as these varieties are not conducive hosts for WSS larvae. This project screens for additional modes of resistance by exposing novel wheat cultivars to sawfly infestation. Ancestral wheat varieties were used to bring in genetic traits for this breeding initiative.

INTERNSHIP GOALS

My goals as an intern included:

- Developing a robust understanding of the WSS as a pest and its impacts on Colorado wheat growers.
- Engaging in meaningful learning opportunities and conversation through extension work.
- Contributing to ongoing sawfly research.
- Developing critical research and data analysis skills.

WHAT I DID

Throughout the summer, I had the opportunity to engage in extension work, research activities, and data processing:

Extension:

- Attended the Wheat Field days in Akron and Yuma.
- Listened in on the Tear Down the Walls annual conference.

Research Activities:

- Transported experimental lines to the field for sawfly infestation.
- Conducted sampling to monitor adult sawfly emergence.
- Evaluated oviposition rates and larval survival for screened lines.

Data Processing:

- Input data in Excel.
- Created and interpreted tables and graphs.
- Analyzed data to determine the best-performing lines.

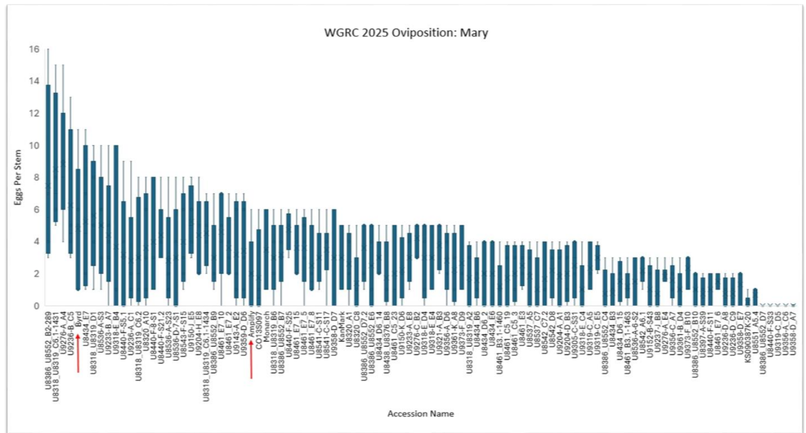
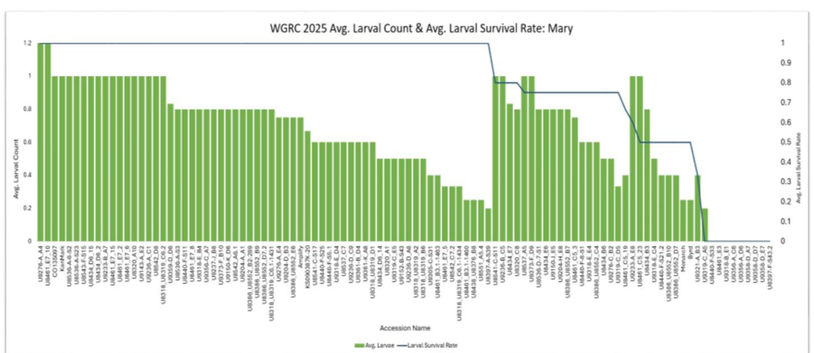


Figure 4 & 5. (Top) Comparison of oviposition rates between lines. (Bottom) Avg. larval count & avg. larval survival rate.



PRELIMINARY RESULTS

Name	Pedigree	Avg. Eggs	Avg. Larval Survival
U8440-F-S33	KS090387K-20*2/TA 1000	0	0
U9356-A_C6	C013D01383/TA 120//C013D01383	0	0
WGR023071	CS-T7S#3S.7BL [TA5688] / JOE	0	0
KS180941-5	Danby/TA 2395//Danby	0.75	0
U8461_E3	KanMark*2/TA 1195	2.5	0

Table 1. Compilation of several *Ae. tauschii* accessions.

The best-performing lines contained genetic information from the ancestral wheat species *Aegilops tauschii.* This year's data is consistent with the findings of previous years. *Ae. tauschii* accessions are thus a potential source of resistance for future commercial lines.

WHAT I LEARNED

I acquired a wealth of new skills through this internship and gained a profound understanding of the WSS. Some of what I learned includes:

- Insect sampling techniques (e.g., sweep net and transect).
- Field infestation methodology.
- Sample processing and data collection best practices.
- Data analysis skills (Excel).
- How to present research in an extension environment.
- Plant care in a greenhouse setting.

Figure 6. Lab employees transporting wheat cultivars for infestation, photo by Adam Osterholzer.

NEXT STEPS

The next steps for the project would be to utilize field plots rather than greenhouse trials. This would provide a larger sample size and allow for the cultivars to be tested in field conditions.