

# INVESTIGATING NOVEL SOURCES OF RESISTANCE TO WHEAT STEM SAWFLY, A DEVASTATING PEST OF WHEAT LOCATION (LARIMER AND WELD COUNTIES)

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Extension mentor: Todd Ballard

## PROJECT INTRODUCTION

Wheat stem sawfly (*Cephus cinctus*) is a pest that has affected Northeastern Colorado wheat production for many years and has caused millions of dollars of damage annually (Beres et al., 2011). This pest survives by laying eggs in the hollow stem of the wheat, where the offspring will then overwinter and emerge the following year. The emergence of the sawfly every summer causes the wheat stems to topple over, which makes harvesting difficult. Pesticides are a noneffective treatment when trying to control the population because most of the sawfly's lifecycle is contained inside the wheat stem. We have begun to investigate novel varieties of wheat to try to find resistance to this pest and control the population from spreading any further.



Image 1. Photo by Erika Peirce

The wild wheat species are an important factor to test in this project since they could have novel resistance to the wheat stem sawfly. This means that there could be a certain component within the DNA of the wild wheat species that makes the wheat uninhabitable or unattractive to the pest. We decided to test many different varieties of the wild wheat species so we could also determine the reason why certain varieties can resist the wheat stem sawfly.

## INTERNSHIP GOALS



Image 2. Photo by Erika Peirce

My goals for this project consisted of:

- Learning how to perform scientific research
- Gaining lab and field experience
- Becoming comfortable with data processing, data entry, and data analysis
- Learning how CSU and other extension schools provide education and research for the community

## WHAT YOU DID

WSS Research:

- I helped conduct an experiment that tested the novel sources resistance to the wheat stem sawfly. This meant that we had multiple different varieties of wild wheat species that we would take to the field to become infested by the wheat stem sawfly.
- I helped cut the wheat stems open to note the number of egg and larvae present within the stem.
- I also noted information such as stem diameter, stem thickness, and wheat growth stage to identify the causes of sawfly presence within each wild wheat species.
- I worked on data entry where I input all the information into excel.
- The next steps in this project were mainly done by my mentor, Dr. Erika Peirce, since it consisted of coding for the data analysis. She still taught me and helped me to learn data analysis techniques, so I could be more educated for future projects.
- I also did many other tasks around the lab such as cleaning, organizing, and helping with other projects as needed.

CSU Extension:

- Went to online and in-person meeting to meet and network with other interns.
- Connected with extension agents on the western slope to learn how to help the community around us.
- Toured different CSU facilities that researched local issues.

## HOW DOES THIS APPLY TO YOUR EDUCATION

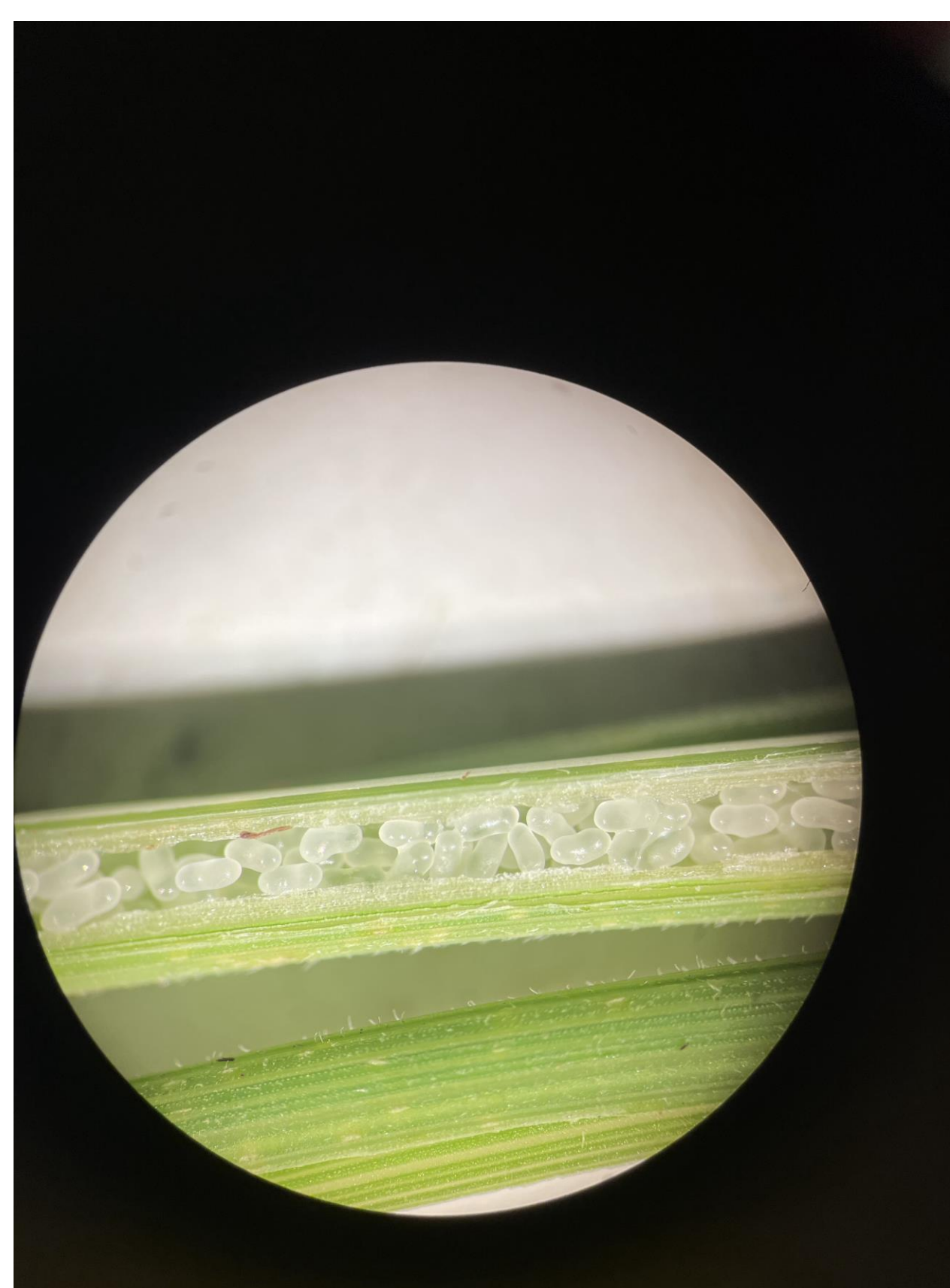


Image 2. photo by Erika Peirce

I am currently studying Ecosystem Science and Sustainability with a minor in Restoration Ecology and this project has helped me to better understand...

- The methods that go into making a research project successful.
- How to succeed even further in my classes than I would have before this summer.
- What I should expect from my future graduate school projects in restoration ecology and making our lands healthier to live on for generations to come.

## WHAT YOU LEARNED

WSS Research:

- This internship has taught me so much in the field of entomology, agricultural biology, and extension agencies.
- I learned how the sawflies reproduce and survive within the wheat, differences in the wild wheat species, and even the dispersal of the sawfly throughout Colorado.
- I also learned many valuable lessons on how a research lab functions daily and the process of starting and finishing a project.
- There was many other small task throughout the lab I had to learn throughout the summer including watering the greenhouse, fertilizing, and other small lab duties.

CSU Extension:

- Through extension, I was able to learn about providing outreach to the community.
- I also learned how the research we think is important to us does have meaning and can help many people throughout our communities.
- I was able to connect to extension agents and learn about the many different job opportunities that extension can offer.

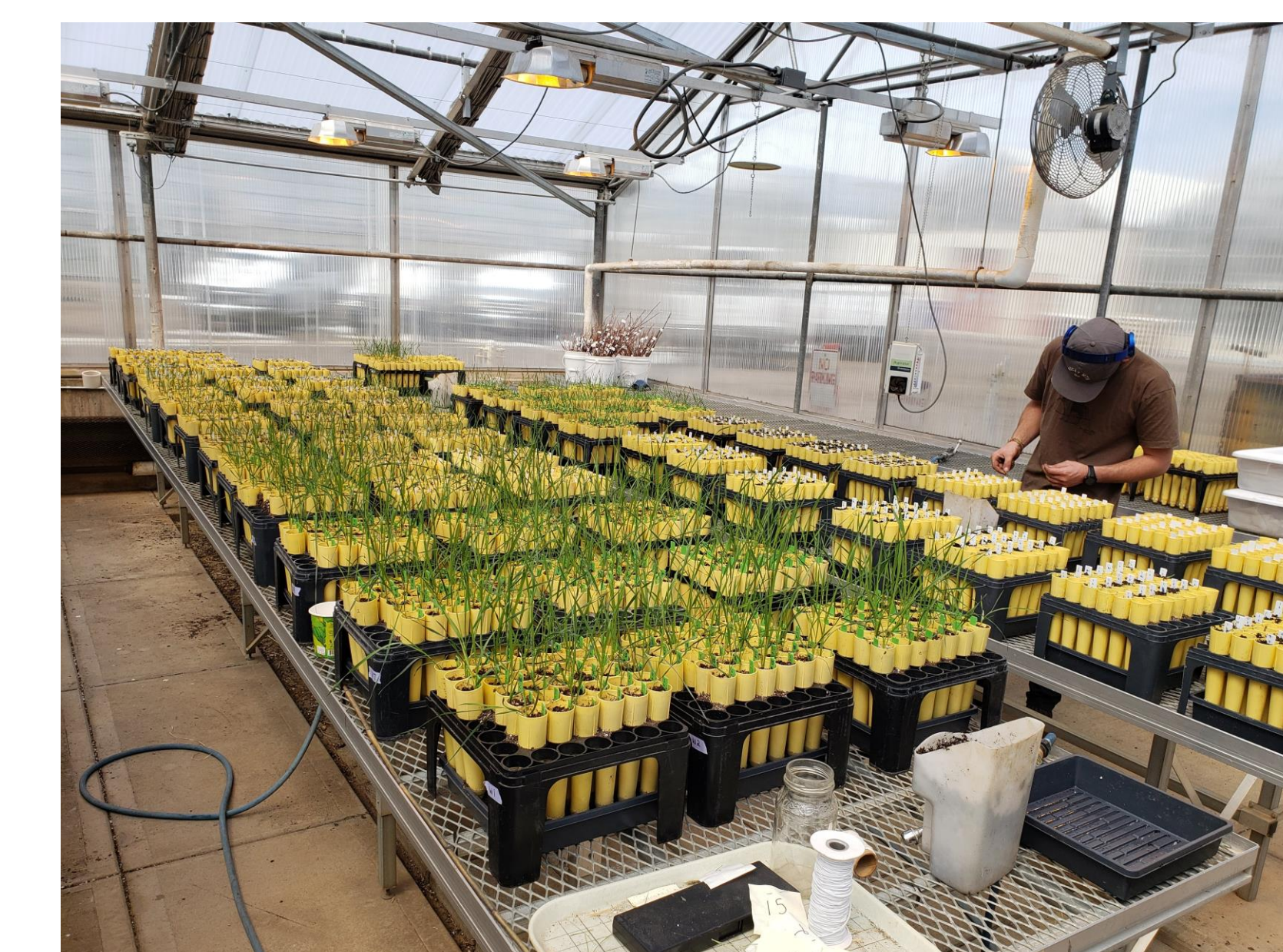


Image 3. Photo by Erika Peirce

## NEXT STEPS

- The WSS research has been ongoing at CSU for over 10 years and there will continue to be research done over the topic until there is a successful solution to the wheat stem sawfly problem in Colorado.
- I am going to continue working at the lab over the semester and help with wrapping up the research that we had started.
- I am hoping to evaluate the results of this project in the months to come to see if the novel sources of wheat can provide resistance to the Wheat Stem Sawfly.

References:

- Beres, B. L., Dosedall, L. M., Weaver, D. K., Cárcamo, H. A., & Spaner, D. M. (2011). Biology and integrated management of wheat stem sawfly and the need for continuing research. *The Canadian Entomologist*, 143(2), 105–125. <https://doi.org/10.4039/n10-056>
- Entomologist, 85(3), 103–107. <https://doi.org/10.4039/Ent85103-3>
- Portman, S. L., Jaronski, S. T., Weaver, D. K., & Reddy, G. V. P. (2018). Advancing Biological Control of the Wheat Stem Sawfly: New Strategies in a 100-yr Struggle to Manage a Costly Pest in the Northern Great Plains. *Annals of the Entomological Society of America*, 111(3), 85–91. <https://doi.org/10.1093/aesa/say002>