Colorado Wheat Stem Sawfly Survey

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Background

The wheat stem sawfly (WSS, *Cephus cinctus*) has become an increasingly significant pest in Eastern Colorado wheat production since its initial detection 2010 near New Raymer. Adult sawflies emerge from wheat stubble in the spring, coinciding with the jointing stage of wheat development. Females lay eggs inside wheat stems over a 4–6-week flight. Once the eggs hatch, the larvae feed on the internal pith, compromising plant integrity. As the plant matures, larvae move toward the crown, construct a pupation chamber, and sever the stem, causing lodging before harvest.

Survey Overview

To assess the geographic spread and severity of WSS infestations, a statewide survey has been conducted annually since 2013. Survey sites are selected based on wheat acreage per county, proximity to the previous year's wheat stubble, and minimum distance of 10 miles from other survey sites. At each site, 100 wheat tillers are dissected to determine the presence of WSS larvae. Infestation levels are classified as follows:

- **Low**: <10% of tillers infested
- **Medium**: 11%–50% of tillers infested
- **High**: >50% of tillers infested

Infestation Trends

From 2013 through 2024, survey data indicated a steady increase in the proportion of infested sites, including a notable rise in locations with medium and high infestation levels. In 2023, there was a significant reduction in sawfly infestation due to the above-average precipitation levels, which may have negatively affected WSS survival or emergence. In 2024, sawfly infestations jumped back with an increased severity and spread southward of I-70.

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
0%	56	50	32	81	42	46	41	33	44	34	17	16
<10%	20	30	48	11	36	26	29	41	33	15	25	17
11-50%	13	15	16	4	13	12	22	20	20	24	19	19
>50%	5	5	3	3	5	12	14	11	3	21	4	17
Total Sites	94	100	99	99	96	96	106	105	100	94	65	69

Table 1: Number of wheat fields in each WSS infestation category from 2013 to 2024.
Additional results from previous years can be found at www.csuwheatentomology.com.

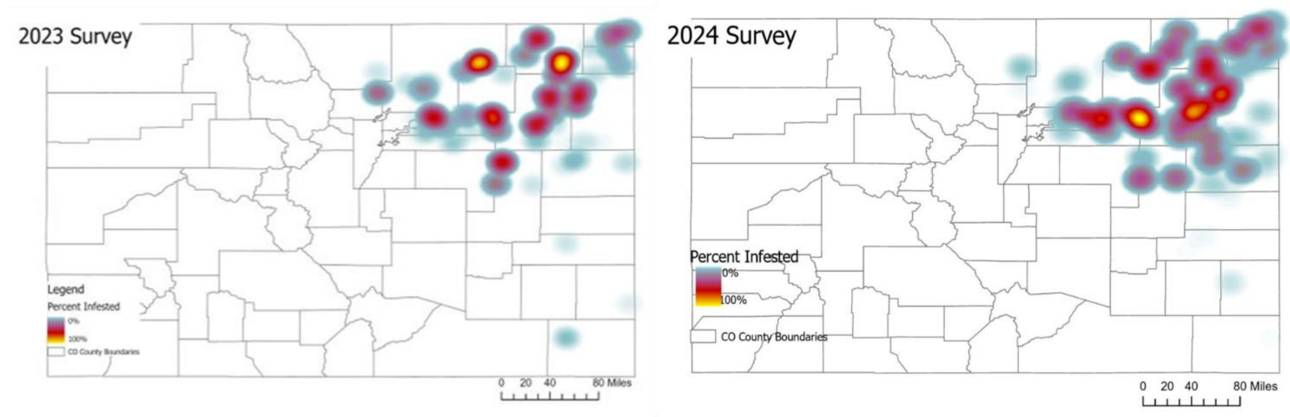


Figure 1: State-wide WSS infestation in 2023 and 2024.

<u>**Select CSU wheat stem sawfly research highlights**</u>

Screening for resistance to WSS in wild wheat species

Colorado State University collaborated with the Wheat Genetic Resource Center (WGRC) at Kansas State University to investigate novel hollow-stem resistance traits to the WSS in wild wheat species. We have identified *Triticum turgidum* and *Aegilops tauschii* as promising candidates for further evaluation and integration into wheat breeding programs. Over the last two years, we identified *Triticum turgidum* lines with hairy stems or leaf sheaths that deter egg-laying by sawflies. These lines are being introgressed with commercial wheat varieties to make a sawfly-resistant variety.

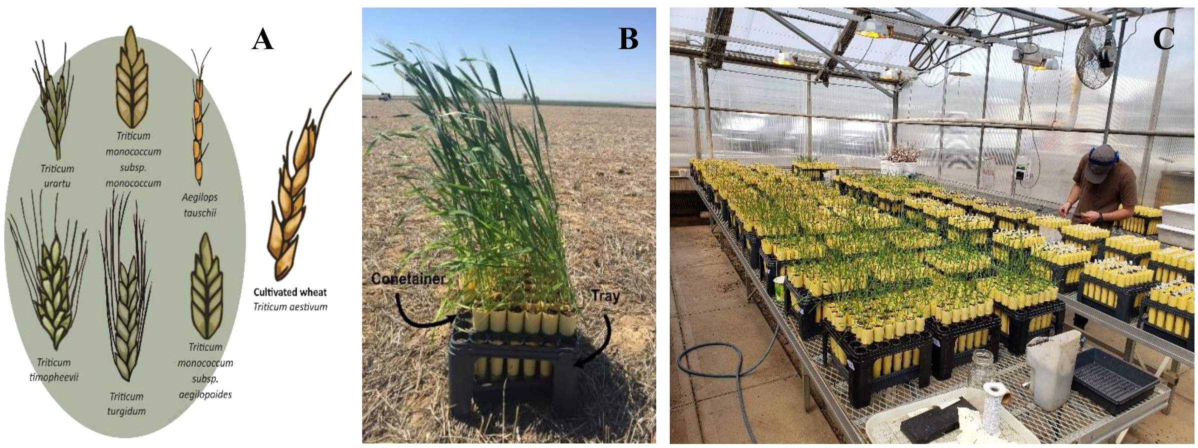
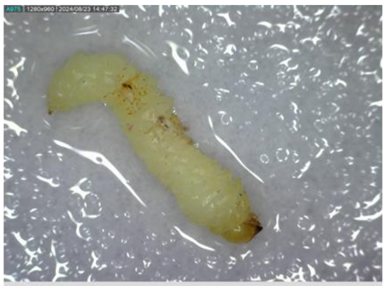


Figure 2. Screening for sources of WSS resistance in wild wheat species. A) wild wheat species, B) cone-tainer approach, and C) wheat lines being grown in the greenhouse. Picture credit: Erika Peirce.

Figure 3. *Triticum turgidum* lines with hairy stem or leaf sheath (the right) and a non-hairy wheat (left). The hairy leaf sheath trait prevents sawflies from laying eggs.

Biological control using novel entomopathogenic fungi:

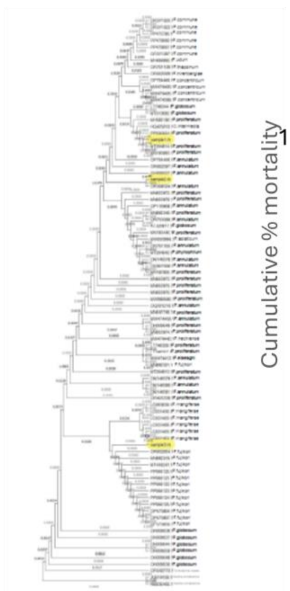
We have been testing isolates of entomopathogenic (insect-infecting) fungi on WSS larvae. We have characterized them to be *Fusarium proliferatum*, *F. annulatum* and *F. fujikori*. The isolates tested so far can cause mortality rates of greater than 50% within 5 days of treatment in lab assays. We are also testing the efficacy of commercial entomopathogenic fungi, *Beauveria bassiana* GHA and *Isaria fumosorosea* FE 9901 on sawfly larvae.



1.Cuticle discoloration

2.Initial stage of mummification

3.Progression of the infection



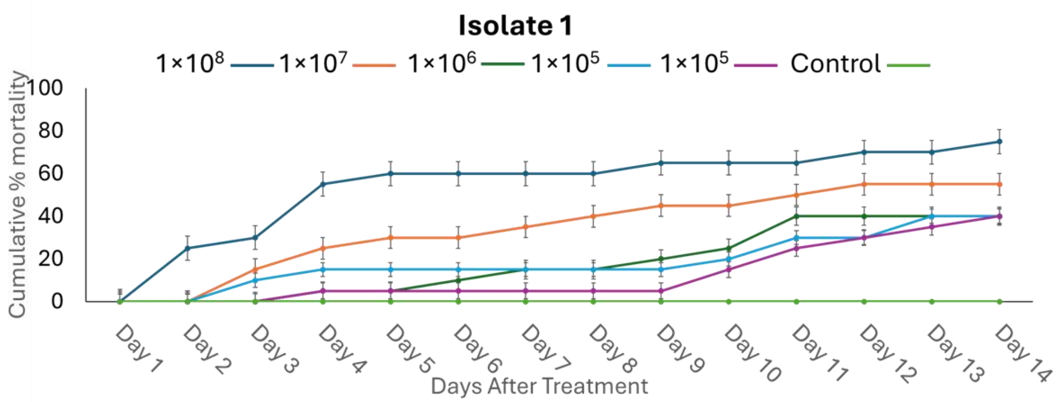


Figure 3. Wheat stem sawfly larvae mortality assay using *Fusarium* isolates in the laboratory.

Acknowledgements

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