

# Managing wheat residue for potential allelopathy in a winter wheat-winter canola rotation.

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## INTRODUCTION:

- Many producers have begun rotating winter wheat with winter canola to alleviate stagnant yields and poor quality wheat.
- Anecdotal reports indicate a decline in canola emergence, early growth, and winter survival.
- It has been theorized that some wheat varieties inhibit winter canola germination and survival by exuding allelopathic compounds.
- The interaction is most prominent in no-till rotations of winter wheat to winter canola, where crop residue is left in place.
- Approximately 30% of varieties tested, significantly decreased winter canola germination and biomass accumulation 7DAT.
- These results demonstrate that this is a facet of production that will need to be managed in order to maintain a productive and sustainable production system.

## OBJECTIVES:

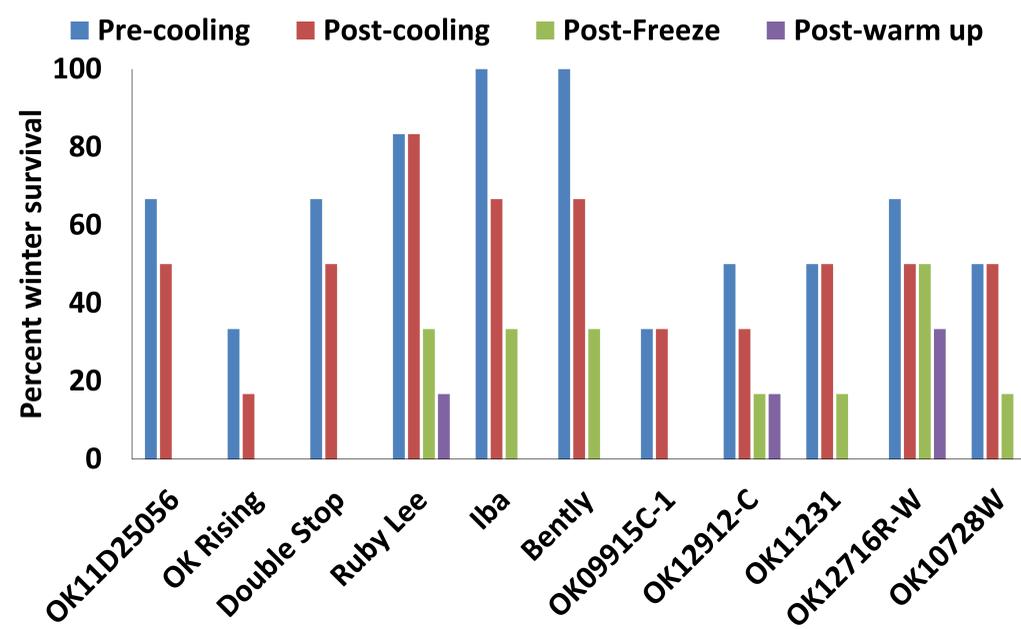
- Determining if wheat residue management can minimize the potential allelopathic impact of wheat residue to winter canola.

## EXPERIMENTAL DESIGN:

- Crop residue was either placed on the soil surface (no-till), incorporated into soil and evenly distributed (tilled), or burned and placed on the soil surface (burned).
- Four acre inches of water was applied in 0.5 inch applications over several weeks.
- After the canola plants had developed six true leaves stands were measured.
- Pots were then removed from the greenhouse and cooled in a moderately cold environment (Post-cooling) and stands measured.
- After a 2 day cooling period pots were exposed to a major freeze event (Post-freeze) and stands measured.
- Plants were then returned to the growing environment (post-warm) to simulate warming, and population and vigor measured.

## RESULTS:

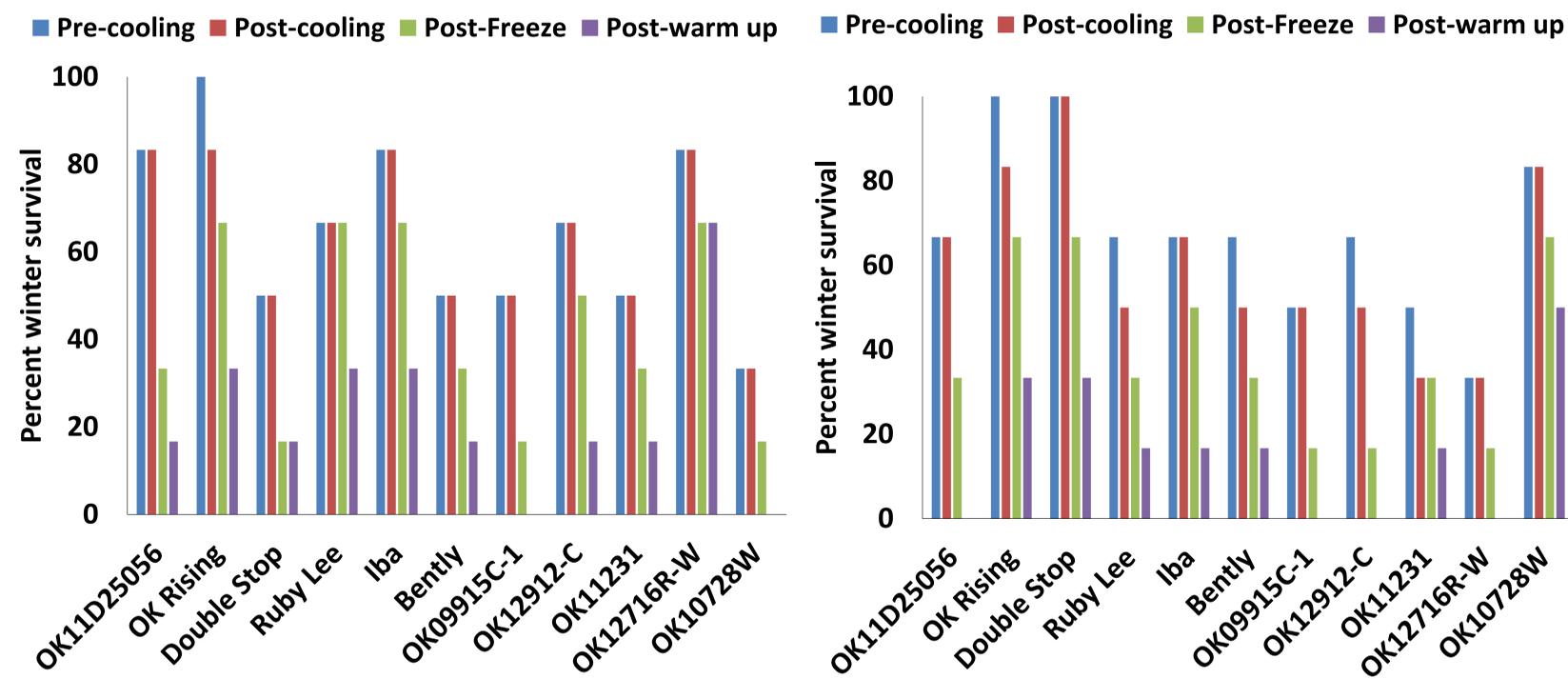
Figure 1. Winter survival as affected by wheat residue when planted in a simulated no-till system.



Cotyledons showing malformation in potentially allelopathic wheat varieties.



Table 2. Winter survival as affected by wheat residue when planted when residue was simulated to be tilled (A) or burned (B).



## Results:

- In a no-till system three varieties had plants survive into the post-warm, or stimulated spring, with decreased plant survival rates going into pre-cooling and out of post-freeze.
- With the conventional tillage system, seven varieties survived post-warm. All levels except for two decreased at post-cooling, with all decreasing significantly from post-freeze to post-warm.
- When the residue was burned, canola planted behind all wheat residues had some canola present. Three plant populations were affected at a greater level by the post-freeze, or simulated freeze event. Canola plants planted behind seven out of eleven survived following warm-up.
- **Conclusions:**
- A burn system or tillage event showed greater levels of canola winter survival compared to no-till.