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.

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.