Planting Date, Tillage, and Cultivar Effects on Winter Survival and Yield of Winter Canola

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Introduction

- Winter canola growers using minimum disturbance no tillage struggle with maintaining a stand over the winter months.
- Planting in no tillage without managing residue often delays emergence and increases the risk of winter stand loss, especially as planting date is delayed (Fig. 1).
- Cultivars may differ in their ability to survive the winter under no tillage based on characteristics such as a prostrate growth habit.
- Crown heights were greater in no tillage, especially with early planting (Fig. 2).
- Hybrid cultivars may perform well in no tillage because of their vigorous fall growth; however, they often have elevated crowns.

Objectives

- Understand the interaction of cultivar characteristics with planting date and tillage for winter survival and yield.
- Identify commercial winter canola cultivars that maximize winter survival and yield under no tillage.

Methods

- The experimental design was a randomized complete block with four replications. Treatments were arranged as a split-split plot with planting date as the main plot, tillage as the first split, and cultivar as the second split.
- The study was conducted over three growing seasons: 2009-10, 2010-11, and 2011-12.
- Four planting dates ranging from late August to early October were selected to test the extremes of the planting window for winter canola (Table 1).
- Commercial cultivars included DKW46-15, Griffin, HyCLASS 115W, HyCLASS 154W†, Kadore, Sitro, Virginia, and Wichita. Chrome† replaced Kadore in 2011-12.†
- *Hybrids – all others are open pollinated cultivars.
- *Kansas State University release with prostrate growth habit.
- The tillage treatment was performed as a light disking about two weeks before planting.
- Analysis of variance was carried out using SAS PROC Mixed with α = 0.05.

Table 1. Planting dates in each of three study years.

<table>
<thead>
<tr>
<th>Season</th>
<th>13-Aug</th>
<th>1-Sep</th>
<th>18-Sep</th>
<th>2-Oct</th>
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<tbody>
<tr>
<td>2009-2010</td>
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<td>2010-2011</td>
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<td>2011-2012</td>
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</tbody>
</table>

Results – Crown Height

- There was no interaction of cultivar with tillage for crown height in any year (data not shown).
- Crown heights were greater in no tillage, especially with early planting (Fig. 2).

Results – Winter Survival

- Winter survival was greater in minimum tillage compared to no tillage with early or late planting.
- Differences in winter survival between the tillage systems were minimal when canola was planted from late Aug to 22-Sep (DOY 240 to 265).
- Winter survival was maximized when canola was planted from 7-Sep to 22-Sep (DOY 250 to 265).
- Winter survival depended on planting date and tillage (Fig. 4).
- Winter survival was greater in minimum tillage compared to no tillage with early or late planting.
- Differences in winter survival between the tillage systems were minimal when canola was planted from late Aug to 22-Sep (DOY 240 to 265).
- Winter survival was maximized when canola was planted from 7-Sep to 22-Sep (DOY 250 to 265).

Results – Yield

- Cultivar crown height differed with early planting in fall 2009 and fall 2011, but not in fall 2010 (Fig. 3).
- Kadore, Wichita, HyCLASS 115W, and especially Griffin, tended to have lower crown heights.
- All hybrids plus the open-pollinated cultivars Virginia and DKW46-15 tended to have greater crown heights.

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Conclusions

- Yields tended to be greater with minimum tillage compared to no tillage regardless of planting date, but the advantage was greater with later planting (Fig. 6).
- Yields were maximized with planting dates between 2-Sep and 18-Sep (DOY 245 to 260).
- 2009-10 was the only season when yield response to tillage varied with cultivar (Fig. 7).
- DKW46-15, Griffin, HyCLASS 115W, Sitro, Virginia, and Wichita had similar yields regardless of tillage system.
- HyCLASS 154W had greater yield with tillage than no tillage.
- Kadore had greater yield in no tillage than with tillage.
- Cultivar response to planting date depended on year (not shown).

Acknowledgments

- Funding for this project was made available through the USDA-NIFA Supplemental and Alternative Crops Competitive Grants Program.