



Michael Stamm and Kraig Roozeboom, Department of Agronomy, Kansas State University

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.
- Elevated crown height may be a good indicator that a cultivar will or will not survive in minimum disturbance no tillage.
- 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 $\alpha = 0.05$.

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

Season	Planting dates			
2009-2010	13-Aug	1-Sep	18-Sep	2-Oct
2010-2011	23-Aug	30-Aug	13-Sep	20-Sep
2011-2012	31-Aug	9-Sep	22-Sep	3-Oct

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).

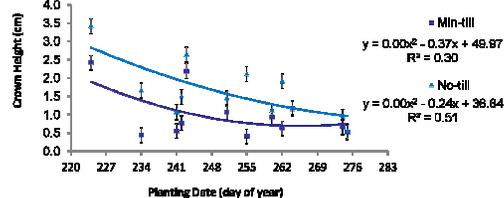


Figure 2. Canola fall crown height response to planting date and tillage over three seasons, 2009-10 to 2011-12.

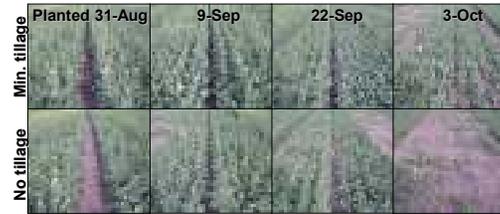


Figure 1. Photos taken 26-Mar-2012.

Results – Crown Height

- 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.

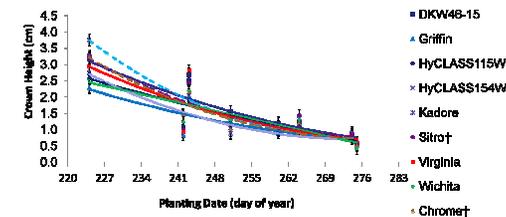


Figure 3. Canola fall crown height response to planting date and cultivar, 2009-10 and 2011-12. ([†]Hybrid, dashed lines)

Results – Winter Survival

- 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).

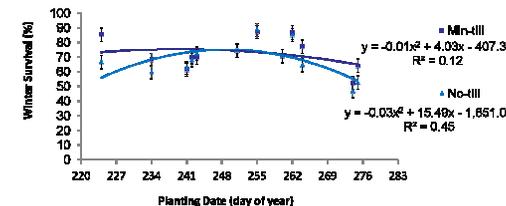


Figure 4. Canola winter survival response to planting date and tillage over three seasons, 2009-10 to 2011-12.

- In 2010-11, neither tillage nor cultivar affected winter survival (data not shown).
- In 2009-10 and 2011-12, HyCLASS 115W, HyCLASS 154W, Wichita, and Chrome had significantly better winter survival with minimum tillage (Fig. 5).
- In 2009-10 and 2011-12, DKW46-15, Griffin, Kadore, Sitro, and Virginia had similar winter survival with or without tillage (Fig. 5).

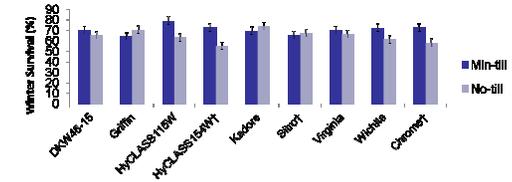


Figure 5. Canola winter survival response to cultivar and tillage, 2009-10 and 2011-12.

Results – Yield

- 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).

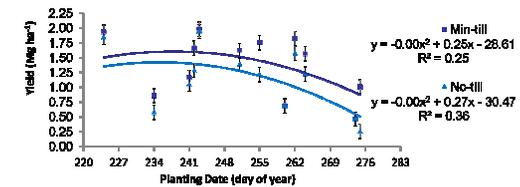


Figure 6. Canola yield response to planting date and tillage over three seasons, 2009-10 to 2011-12.

- 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).

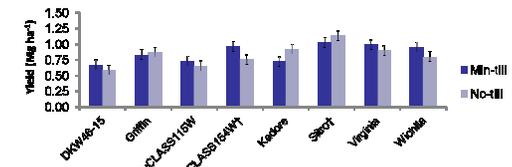


Figure 7. Canola yield response to cultivar and tillage, 2009-10.

Conclusions

- Although crown height varied with planting date, tillage, and cultivar, it did not correlate well with winter survival ($r = 0.07$, $n = 726$) or yield ($r = 0.15$, $n = 750$).
- Winter survival was the cultivar characteristic most strongly correlated with yield ($r = 0.38$, $n = 722$, $P < 0.0001$).
- The recommended planting window for winter canola in central Kansas is accurate. Planting between 1-Sep and 22-Sep resulted in the best winter survival and yield. Planting date is especially important without tillage.
- Canola winter survival and yield are improved with minimum tillage or with some other method of managing residue, especially when planting at the extremes of the recommended planting window.
- Some cultivars (Griffin, Kadore, Sitro) may provide better winter survival and yield in no tillage.

Acknowledgments

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