

Farmers in the north western Prairies are beginning to investigate the uses of vertical tillage. The perceived benefits of vertical tillage is that it may improve yield by blackening soil, causing higher temperatures, improving seedbed quality and emergence without disrupting the soil profile. The economic benefits of vertical tillage in traditional northern cropping systems may be minimal for several reasons: **1)** residue in cereal-oilseed rotations is not as excessive as those which include corn, **2)** the cost of the implement and fuel required to operate may outweigh the improvements in yield, **3)** cool-season crops typically grown may not benefit from warmer soil temperatures compared to warm season crops. However, with short season corn and soybeans gaining popularity among farmers in northwest Saskatchewan, a warmer soil temperature early in the growing season may improve yields of these warm-season crops.

This demonstration was conducted at the AAFC Scott Research Farm in 2014 and 2015. A randomized complete block design arranged as a split-plot with four replicates. The main factors consisted of tillage treatments (fall, spring, no-till) and sub-plots consisted of crop type (canola, wheat, corn, soybeans).



Figure 1. From left to right: Spring vertical tillage, fall vertical tillage, no tillage

Tillage did not have a significant effect on corn, wheat, canola and soybeans grain yield. There are several possible explanations why tillage treatments did not affect grain yield in this demonstration. The vertical tillage implement used is a relatively light-duty model, with coulters running on a 90° angle, thus minimizing residue incorporation. The barley and wheat stubble which the demonstration was located on was not excessive;

therefore, the residue management was negligible. In a situation where there would be more crop residue, such as after a corn crop, vertical tillage may have demonstrated more benefits in terms of plant emergence and grain yield. Results of the non-significant effects of tillage on crop yield agrees with that of Adey (2015) of Kansas State University who found no significant effect of tillage systems on corn and soybean yield in 2012, 2013 and 2014.

Limited soil moisture in the fall of 2013 and 2014 may have also affected the effectiveness of the fall tillage treatment. The fall vertical tillage pass did not penetrate the ground, as the land had experienced a dry late summer/fall with little precipitation. Without proper penetration of the implement into the soil, the implement is not able to achieve the proper residue incorporation/chopping and soil fracturing capabilities it is designed for. Although the spring tillage treatments were better able to penetrate the soil compared to the fall tillage treatment, there was no observed advantage in plant density or grain yield compared to either the no-tillage or fall vertical tillage treatment.

Fall and spring tillage using a light-duty vertical tillage implement with moderate levels of barley and wheat residue did not improve plant emergence or yield of crops when compared to a no-till system. There was a slight increase in soybean and corn emergence at the sampling dates 19 DAS, but the increase is likely attributed to warmer soil temperatures. The increase in plant density did not affect grain yield. Under no-till, low residue cereal-oilseed-pulse systems typical of northwest Saskatchewan, vertical tillage does not appear to improve plant density or seed yield for warm or cool season crops.

Read the full report at: <http://www.westernappliedresearch.com/research/warc-annual-reports/2015/>

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