

Controlled traffic farming and on-farm research with controlled traffic and random farming systems – 2014F015R: April 1, 2014 – March 31, 2017

Controlled traffic farming (CTF) on-farm research was conducted from 2014-2016 to explore the agronomic and economic viability of CTF in Alberta, Canada.

Replicated, field-scale plots were established in the 2014 growing season on six cooperator farms and increased by two farms in 2015. Data collected over three growing seasons included water infiltration, plant and weed counts, soil biology, and yields. The soils at the sites ranged from sandy loams to heavy clays. A wide variety of soils, terrain and climate was achieved in the site selection.

The growing seasons under study were characterized by dry springs and relatively low soil moisture at seeding. Rainfall in 2014 and 2015 was below normal for most sites with 2015 being very dry. 2016 was very wet and harvest was disrupted by rain and snow.

Weed counts for 2014 through 2016 did not reveal any population shift. There were however, a few instances where significant differences were observed in the weed populations between the two treatments.

Most fields exhibited no significant differences for crop emergence between CTF and RT with the exception of the Lacombe site in 2014. Canola emergence was significantly better in the random traffic plots.

In 2016 soils were collected from each site and analyzed for soil biological activity. Soil microbial biomass carbon was significantly higher in the RT at the Neerlandia site. Carbon cycling was measured and no significant differences were found. It is likely too early in the system evaluation to detect noticeable changes.

Infiltration rate under CTF management was significantly greater than under RT management. Looking at all site years, the average infiltration rate under CTF was 40.9 ml sec⁻¹ as compared to the average infiltration rate of 22.0 ml sec⁻¹ under RT. There was a great deal of variability within plots when measuring infiltration. Infiltration rates tended to be faster in the controlled traffic plots starting in the first year.

Cooperators were able to maintain yields as they implemented CTF. Overall, looking at all site-years, the yield under CTF management was significantly greater than yield under RT management, albeit the difference was small. Relative yield (expressed as a percentage of average yield of both the CTF and RT plots) was 101.1 % for CTF as compared to 98.9 % for RT.

The springs were quite dry each year at seeding at most sites when random traffic was imposed on the plots so less compaction has occurred than if soils were at field capacity. Given Alberta's climate and soil types we are uncertain as to how long soils may take to repair the effect of years of random traffic and high axle loads, especially in the subsoil horizons.

The research project has led to observations of system benefits that indicate that CTF can contribute to a number of critical factors that will improve the cropping system and make an individual farm business more sustainable.