PROJECT DETAILS

- **Title**: Effect of tillage method, plant population and soil moisture conditions on canola yield (Compaction impacts on canola establishment)
- **Funders:** Manitoba Canola Growers
- **Research program:** Canola Agronomic Research Program
- **Principal investigator:** Curtis Cavers, Agriculture and Agri-Food Canada
- **Collaborators/additional investigators:** Lorne Grieger, John Fitzmaurice
- **Year completed:** 2019

Final report

Many parts of the Canadian Prairies are experiencing extreme weather events that hamper the productivity of conventional cropping systems. In areas that receive excess precipitation and a lack of drying weather conditions, timeliness of operations for crop establishment, addition of inputs and harvest are often made during times of sub-optimal soil conditions for equipment traffic-ability. As a result, soil compaction is an outcome that negatively impacts soil health and reduces the long-term productivity on affected soils. In addition, there is a trend towards lowering seeding rates for canola but the presence of excess soil moisture or soil compaction may further reduce yields, as fewer individual plants may not be able to branch and thus compensate to the same degree.

Since nearly every commercial field in western Canada will have some portion impacted by increased equipment traffic, there should be merit in quantifying the impacts of soil compaction and soil moisture and linking this data with canola performance. By examining novel tillage practices, whose tillage depths range from approximately 2 inches (5 cm) with shallow vertical tillage to 16 inches (40 cm) under deep tillage (subsoiling), as well as the inclusion of raised beds/controlled traffic concepts, we can provide an assessment that may have implications for precision farming systems and alternatives to surface/tile drainage.

In 2018, this project compared the performance of L252 canola and soil penetrometer measurements to 18 inches (45 cm) at two separate sites at AAFC-Portage, both on imperfectly-drained clay loam soil. One site (Field 2) was newly established, while the second site (Field 7) was established in 2017 using flax as the indicator crop. Four plant populations were established in four tillage treatments and two moisture regimes (rain-fed and aggressively irrigated) to determine how to manage canola stands under compacted/excess moisture conditions for best performance. A summary of the findings based on the treatments includes:

Find more information on this project and many other relevant canola studies on the Canola Research Hub.
The Canola Research Hub is funded through the substantial support of the Canadian Agricultural Partnership and the canola industry, including Alberta Canola, SaskCanola, Manitoba Canola Growers and the Canola Council of Canada.

i. Tillage: Vertical and conventional tillage produced significantly higher canola yields than raised beds in 2018. Soil compaction values were generally higher under these two treatments than the others, but were still below critical values that should inhibit rooting depths. Seedbeds under these two treatments were more desirable for canola production under the prevalent conditions of limited moisture than those where subsoiling and raised beds were used.

ii. Moisture: Vertical and conventional tillage under dryland conditions had higher soil moisture at 12 and 20 cm depth than the other tillage treatments; lack of moisture in 2018 (and 2019) favored higher canola yields under these two treatments. Irrigation gradually increased soil moisture over a prolonged period, resulting in higher canola yields than under dryland conditions. However, irrigation was not successful in creating waterlogged/excessive moisture conditions when coupled with overall dry growing season conditions.

iii. Plant stand: A stand of 4 plants/ft^2 resulted in significantly lower canola yields than plants stands of 7, 10 and 13 plants/ft^2.

Future studies will look to better quantify and interpret the impacts of extremes in soil moisture during the growing season on various crops (including canola), as well as quantifying the impact of increased soil organic matter in moderating extremes in soil moisture and crop productivity.

Find more information on this project and many other relevant canola studies on the Canola Research Hub.
The Canola Research Hub is funded through the substantial support of the Canadian Agricultural Partnership and the canola industry, including Alberta Canola, SaskCanola, Manitoba Canola Growers and the Canola Council of Canada.

Find more information on this project and many other relevant canola studies on the Canola Research Hub.
The Canola Research Hub is funded through the substantial support of the Canadian Agricultural Partnership and the canola industry, including Alberta Canola, SaskCanola, Manitoba Canola Growers and the Canola Council of Canada.