PROJECT DETAILS

- **Title**: Determining best practices for summer storage of canola in Western Canada
- **Funders:** Alberta Canola, Manitoba Canola Growers, SaskCanola
- **Research program:** Canola Agronomic Research Program (CARP)
- **Principal investigator:** Joy Agnew, Prairie Agricultural Machinery Institute (PAMI)
- **Collaborators/additional investigators:** Les Hill and Bryan Lung
- **Year completed:** 2014

Final report

The project successfully gathered in-bin data on the effect of bin management (aeration, turning, leaving it alone) on the temperature and relative humidity profile in-bin throughout the summer months (June and July). In addition, the bench-scale trials provided data on the warming rate of canola with different airflow rates.

The project results generated information on:

- Temperature profile in a bin of cooled canola throughout the summer months
- Effect of turning and aeration on temperature profile
- Warming rate of canola due to aeration
- Effect of airflow rate on the warming rate of canola

The key results from the project are:

- There was very little moisture migration in all three bins throughout June and July, therefore, no spoilage or condensation was observed for any treatment. However, lack of moisture migration may have been partially due to the lack of moisture in the canola (the canola moisture content was 6%).
- There were large temperature differences in each bin throughout the summer. The baseline bin temperature was 25°C at the edge and -3°C in the core for most of July.
- There was no noticeable difference in the grain temperature on the sunny side of the bin versus the shady side of the bin.
- The temperature in the bin headspace fluctuated widely from day to night (reaching as high as 55°C), but the relative humidity of the air in the headspace was very low (<40%). The temperature of the grain at the top of the bin (within 2 ft of headspace) did not fluctuate during the day.
- Turning the seed (700 bushels in a 4,000 bushel bin) initially resulted in a relatively warm core and warm edges but cool seed between the core and edges. This temperature differential eventually evened out (the core actually cooled throughout June).

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.

- Aerating the seed resulted in a uniform temperature distribution (approximately 20°C), but the transition between the warming front and the cool seed resulted in some unstable conditions (potential for condensation).
- Aerating the seed (using warm, summer air) added a large quantity of water to the air voids in the bin (as measured by absolute humidity). However, this moisture was not transferred to the seed since the moisture content of the canola did not change (6.6% at the start of monitoring and 6.5% three weeks after aeration was completed).
- The turned bin and aerated bin had some unstable conditions in July that could possibly have resulted in spoilage. Unstable conditions resulted in warm seed being directly adjacent to cool seed. In the aerated bin, these conditions occurred as the warming front moved through the cool seed. In the turned bin, these conditions occurred because the warm seed at the top funneled down into the center of the bin during turning, leaving a warm core adjacent to cool seed. However, these unstable conditions did not result in noticeable condensation or spoilage.
- The baseline bin had a large temperature differential (28°C), but the temperature difference was gradual, resulting in generally stable conditions
- The warming rate of canola is approximately equal to the cooling rate when using aeration flowrates (0.1 to 0.5 cfm/bu). In the 4,000 bu bin, it took approximately 48 hours to uniformly warm the seed using 0.75 cfm/bu (the lowest flowrate possible with the fan on the bin). In the small test bins, it took 90 hours to uniformly warm canola from -10°C to 20°C using 0.25 cfm/bu and 75 hours to uniformly warm canola from -10°C to 20°C using 0.5 cfm/bu.
- Based on the results from this study, "leaving it alone" seems to be the best practice to minimize storage risk throughout the summer. However, these results were limited to overdry canola that had been frozen over the winter and stored in an 18 ft diameter bin. Canola starting at a higher moisture content or a higher temperature or stored in a different sized bin might behave differently during the summer. Therefore, the key recommendation from this project is to leave it alone but monitor the temperature profile and have a plan in place to move it if problems arise.

The results from this project were useful and interesting, but the resulting recommendation is limited to overdry canola that was frozen over the winter. If the stored canola has a higher moisture content or different starting temperature, the degree of moisture migration may be different over the summer months, which could raise the risk of spoilage or heating. In addition, the temperature profile and potential for moisture migration may be different in bins with a larger diameter. Therefore, PAMI is proposing to continue this research project and monitor bins of larger diameter with different starting conditions.

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