

Storage and handling characteristics of new varieties of high oil content canola

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Canola varieties with high oil content have predominantly replaced low oil content canola grown in western Canada. Researchers in Manitoba conducted a three year study to develop more reliable safe storage guidelines for high oil content canola. The results of both small scale and large bin studies showed that high oil content canola can be safely stored for at least 10 weeks if temperature is at 25 C and moisture content is 11%. The safe storage periods of high and low oil content canola were similar, and buildings that are strong enough for low oil content canola could also support the high oil content canola.

Canola varieties with high oil content have predominantly replaced low oil content canola grown in western Canada. Safe storage guidelines were developed for low oil content, however guidelines for high oil content canola need to be developed to prevent quality loss and deterioration. Knowledge of storage and handling characteristics of the new varieties of high oil content canola seeds is essential in the design of oilseed storage, handling, drying, and processing systems.

Researchers in Manitoba conducted a three year study from 2011 to 2013 to develop safe storage guidelines for high oil content canola, and compare the developed guidelines with that of the low oil content canola. The project included both a small scale study and a large bin study of storing high oil content with 10% m.c. in non-ventilated bins. Physical property tests were also conducted to determine bulk density, angles of repose and coefficient of friction at six moisture contents (8, 9, 10, 11, 12 and 14%). The tested canola varieties were: high oil content (Nex4 105, 45H49, and Invigor 5440) and standard canola (5525 Clearfield).

For the small scale study, one kilogram of high oil canola (Nex4 105, 45H49, and Invigor 5440) and standard canola (5525 Clearfield) seeds with 8, 10, 12, and 14% moisture content (wet basis) were stored in 20-L plastic pails. These plastic pails were kept inside environmental chambers for up to 20 weeks. Samples were removed from the containers every two weeks and germination, visible and invisible mould, and FAV of the samples were determined.

In the large scale bin study, canola seeds (Nex4 105) at approximately 8.1% moisture content were loaded into three welded-steel flat bottom bins with fully perforated floors (approximately 2.9 m in diameter and 4.8 m height), located inside a large environmental

room. At the beginning of the study, the canola was aerated by using high humidity air (about 90% RH). The aeration fan was stopped after the average moisture content of canola seeds inside the bins reached 10%. The temperature and relative humidity of the environmental room were controlled by a computer system to simulate western Canadian storage conditions (from September to December in the year 2010). Every two weeks, samples were collected at a depth of 0.25, 1.25, 2.25 and 3.25 m. At each depth, canola at the wall and the centre of the bin was sampled. Germination, mould, and FAV of the sampled seeds were determined. The canola was stored inside the bins for four months.

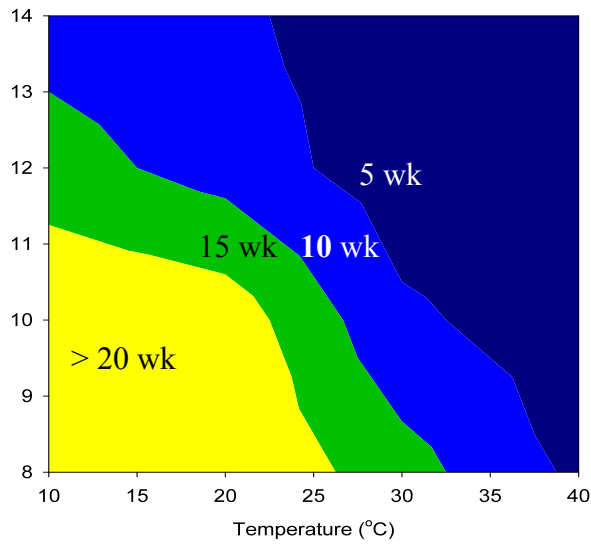
Overall, the study results showed that the safe storage periods of high and low oil content canola were similar. Based on a 20% drop of germination or the appearance of visible mould, high oil content canola at 8% m.c. could be safely stored at less than 20 C for one year. At 10% m.c., canola at less than 20 C could be stored without deterioration up to 40 weeks. However both high and low oil content canola at higher m.c. of 12 and 15% could not be stored safely for 20 weeks at almost all tested temperatures (20, 30 and 40 C). As well, the high oil content canola (Nex4 105) at 10% initial m.c. could spoil in 6 weeks without aeration because of moisture migration, even though it was stored at cold weather conditions.

In the large bin study, there were large differences of germination and visible mould at different locations in a bin or in different bins. Germination of the canola at the top layer of all three bins dropped more than 20 per cent in 16-week storage. At the top layer, germination of canola at the centre of the bins dropped faster than that at the walls. Germination of canola at other layers also dropped more than 10 per cent. Germination of canola at the bottom layers had a smaller decrease than that at other layers of seeds.

By 6 weeks, visible mould appeared at the top layers of the three bins when germination of the canola dropped approximately 10%. Visible mould was found on all samples of one of the three bins by 10 weeks. However, visible mould was only found on the canola sampled at the top layer and close to walls in another bin, and the canola sampled in the upper two layers in the third bin.

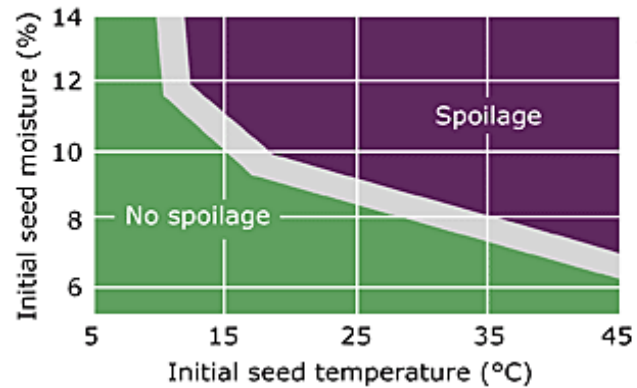
The results from the physical properties study showed that the bulk densities of both oil content varieties increased with increasing moisture contents from 8% to 10% and decreased with further increase of moisture content from 10% to 14%. However, the bulk density of high oil content canola was affected more by changing moisture content than low oil content canola. Moisture content in the tested range did not influence the repose angles very much. In general, emptying angles decreased, increased and decreased again when moisture content changed from 8% to 10%, 10% to 12% and 12% to 14%, respectively. The angles of repose of canola depend on varieties and kernel surface, and are independent of oil content. The coefficient of friction was not significantly affected by the moisture content but was by oil content, and buildings that are strong enough for low oil content canola could also support the high oil content canola.

Chart 1: Safe storage guidelines of high oil content canola



Source: Dr. Jayas, U of Manitoba.

Chart 2: Safe storage guidelines of low oil content canola



Source: CGC, 2010.

The research project continued in 2013 and 2014 and so far the results are confirming the original findings from the 2012 final results. Researchers expect to wrap up the project in the winter of 2014.