Canola Drying and Storage Management

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Factors affecting canola storage include seed maturity and condition, seed moisture, temperature, length of storage, molds, insects and mites, dockage, cultivar type, climate, and the storage and handling methods used.

Harvesting at the proper stage is very important in having a high-quality product. The seed needs to be yellow or brown before harvesting. If more than 2 percent of the seed is green when crushed, the canola is discounted severely at marketing. Some color change may occur during high-temperature drying, but very little color change is expected during storage.

Canola is a small, round seed that flows freely, so tight containers are required to store canola. The diameter of a canola seed ranges from 3/64 to 3/32 inch, depending on variety. Assure that aeration floors are designed for canola. Inspecting floors and unloading augers also is a good idea. The density of canola is specified at 50 pounds per bushel.

Recommended Storage Moisture

The recommended moisture content for storage at warm summer temperatures is 8 percent wet basis for canola at about 35 percent oil content. As the oil

content increases above 35 percent, the moisture content for safe storage must decrease. At 45 percent oil content, the recommended long-term storage moisture content at warm summer temperatures is about 7 percent. Storing 10 percent moisture and 45 percent oil canola at 80 F would be similar to storing wheat at 16 percent moisture content. The allowable storage time would be about 40 days.

The allowable storage time can be determined from a chart for cereal grains by subtracting 6 percent from the cereal grain moisture content. For example, the allowable storage time of 18 percent moisture content wheat at 60 F is about 50 days, so the estimated allowable storage time for 12 percent moisture content canola at 60 F is about 50 days. Canola can be stored at higher moisture contents as long as it is kept cool using aeration. The allowable storage time is approximately doubled for each 10-degree F reduction in canola temperature, so keeping the stored canola cool greatly extends its storage life.

Moisture meters are calibrated for mature seeds at a specific moisture and oil content. Anytime the seed or kernel changes, the accuracy of the moisture measurement will be affected.

When the kernel or seed is damaged, it is more prone to storage problems. A correlation has been found between low-test-weight grain and a shorter storage life. Sprouted canola should be dried to a moisture content at least a point lower than normal for storage, and the allowable storage time will be shorter.

Cooling grain with aeration is more important if kernel integrity is poor.

Storage management, including aeration, is critical. Heating during storage lowers protein quality and causes large increases in the amount of free fatty acid in the canola, which greatly reduces its value. Canola goes through a period of a high respiration rate producing heat and moisture during the first weeks of storage. The respiration will be greater at higher moisture contents and temperatures. Aeration and frequent monitoring of the canola during this period is very important.

The spoilage time of freshly harvested rapeseed stored aerobically in tubes, without aeration, demonstrates the importance of immediate aeration to control the rapid respiration after harvest. Seed clumping, which is caused by mold mycelia, preceded the appearance of visible mold colonies.

Maximum period (days) without visible "clumping" of canola by molds.

	Temperature F				
Moisture	**80**	**70**	**60**	**50**	**40**
(percent)	**Days without clumping**				
17.0	4	4	6	11	20
15.6	4	6	6	11	28
13.7	4	6	11	20	46
12.3	8	6	18	25	109
10.6	11	18	42	42	238
8.9	23	48	116	279	300
6.7	69	180	300	300	300

The canola should be aerated within days after being placed in storage until all the canola has been cooled uniformly to outdoor air temperature. Then is should be cooled whenever average outdoor temperatures are 10 to 15 F cooler than the canola. Cool canola to about 20 to 25 F for winter storage in cold winter climates. Temperatures should be checked frequently (every couple of days) after the initial binning. Observations may be less frequent (every two to three weeks) after the canola has been cooled.

At 70 F, mites develop from egg to adult in about 14 days; however, at a temperature of 40 F, development will take several months. Except for the immediate aeration because of the initial higher respiration of canola, storage management is similar to storing grain.

Grain bags do not prevent spoilage or insect infestation, so grain needs to be placed into the bags at a similar or lower moisture content than in storage in bins.

Airflow Resistance

The type of canola affects the aeration system design, operating static pressure, airflow and fan selected. The resistance to airflow (static pressure) of Argentine canola is about twice that of wheat, and for Tobin canola, it is about three times that of wheat. Fans must be selected to operate at the appropriate static pressure. For example, to obtain an airflow rate of 0.2 cfm/bu (cubic feet per minute per bushel) in a 36-foot-diameter bin filled 24 feet deep with

B. napus (Argentine, Westar) canola, you would need a 4.5-horsepower fan operating at 4.4 inches of static pressure. The Argentine is the most common type of canola grown. Obtaining that same airflow rate through *B. rapa* (Polish, Tobin) canola requires a 6.8-horsepower fan operating at 6.6 inches of static pressure. If a 5-horsepower low-speed centrifugal fan is placed on the 36-foot-diameter bin filled 24 feet deep with Argentine canola, an airflow rate of 0.23 cfm/bu is obtained. However, if the same fan is placed on the bin of Polish canola, an airflow rate of only 0.18 cfm/bu is obtained.

Natural Air Drying

Natural air/low-temperature drying with an airflow rate of 0.75 cfm/bu will dry canola at moisture contents up to 12 percent. An airflow rate of 1 cfm/bu permits drying canola with initial moisture contents up to 13 percent. Higher airflow rates are not economical due to the large resistance to airflow through canola.

Estimated depths of *B. napus* "Argentine" canola at selected airflow rates and static pressures.

	Airflow Rate (cfm/bu)	
Static Pressure	**0.75**	**1.0**
(inches of water)	**—— Canola Depth ——**	
6"	14 ft.	12 ft.
7"	15 ft.	13 ft.

Equilibrium Moisture Content

Based on average North Dakota climatic conditions, canola would be expected to dry to about 8 percent in August, 9 percent in September and 9.8 percent in October. The canola moisture content is expected to be lower due to the fan warming the air about 5 F. With this warmed air, the expected moisture contents are: August, 6.6 percent; September, 7.8 percent; and October, 8.2 percent.

Supplemental heat may be added if canola does not reach the recommended storage moisture content using natural air drying. Do not warm the air more than 5 F or the canola will be overdried. The estimated drying time in September using an airflow rate of 1 cfm/bu is about 25 days, and with an airflow rate of 0.75 cfm/bu, it is about 35 days.

Equilibrium moisture content of canola at certain air conditions.

	Temperature (F)						
Relative Humidity	20	30	40	50	60	70	80
(percent)							
20	4.9	4.5	4.1	3.8	3.6	3.4	3.2
30	6.5	5.9	5.5	5.1	4.8	4.5	4.3
40	8.1	7.4	6.8	6.3	6.0	5.6	5.3
50	9.6	8.8	8.1	7.6	7.1	6.8	6.4
60	11.3	10.3	9.6	9.0	8.4	8.0	7.6
70	13.1	12.1	11.2	10.5	10.0	9.3	8.9
80	15.4	14.2	13.2	12.3	11.6	11.0	10.5
90	18.6	17.2	16.0	15.0	14.2	13.5	12.8

High-temperature Drying

High-temperature dryers work for drying canola, but check the screen size on column dryers because most are equipped with a standard-size perforation of 3/32 inch through which canola seed may pass or lodge. Check with the dryer manufacturer before making any changes to be sure fan operation will not be affected adversely.

Drying temperatures need to be limited during high-temperature drying. At moisture contents up to 12 percent, a drying temperature of 180 F can be used with dryers that mix the seed as it is dried. At moisture contents exceeding 12 percent, the dryer temperature needs to be limited to 160 F, even with mixing occurring in the dryer. Without mixing, the dryer temperature needs to be limited to 140 F. Canola that is used for seed should be dried at temperatures less than 110 F. If the moisture content is above 17 percent, drying the kernels in two passes is advantageous. Too much moisture extracted at one pass can lead to shriveling and cracking of the seed, as well as limit the drying performance.

Overdrying causes cracking of the seed coats. Damaged seeds undergo a marked rise in the level of free fatty acids, causing a reduction in oil quality. Canola offers more resistance to airflow than cereal grains, so airflow and the drying rate will be reduced. Chaff may interfere with the flow of canola in a dryer, which may lead to an overdried area and the potential for fires.

Fire risk when drying canola may be reduced by cleaning the seed to remove light or fine material before drying, removing accumulations of debris from the walls and other areas of the dryer, using wind deflectors to prevent drawing airborne material through the burner, and avoiding overdrying the seed. Frequently check the dryer and periodically clean it to reduce the fire hazard.

Handling Canola

Operate augers at full capacity and moderate speeds to avoid excessive damage to the seed. Drag conveyors have been used successfully, but experience with canola suggests that the spacing between paddles should be reduced to maintain satisfactory capacity. Pneumatic conveyors can handle canola adequately but may have difficulty in feeding and discharging the seed. Kernel damage usually is not a problem for most equipment unless the moisture content is below 7 percent.