

Flax on the Farm

Harvest and Storage of Flax

Harvest losses in flax can be the result of:

- frost damage
- weathering
- improper pre-harvest chemical use
- swathing or combining too early or too late
- unsuitable combine settings
- poor seed storage conditions

Weather-related losses are a challenge to avoid but those related to chemical application, harvest timing, combine settings and seed storage conditions are relatively easier.

1) Preparing for Harvest

- Pre-harvest chemicals should be applied at the 75-80% brown boll stage and within the appropriate pre-harvest interval (PHI). Certain chemicals should not be used on flax due to potential maximum residue limit (MRL) issues. Check with your grain buyer to find out if any chemicals are an issue for their market. Refer to the [MRL information](#) on the SaskFlax website for more details.
- Flax is ready to be combined when 90 to 100% of the bolls are brown. At this stage, seed will rattle loudly in the bolls and the moisture content should be 10% or less and suitable for storage. Bolls will easily crush with fingers and seed should easily rub out of bolls.
- Refer to the [July edition of Flax on the Farm](#) for more advice on preparing for flax harvest.

2) Harvest

- Combine settings should ideally be adjusted when switching crops and even on different days of combining the same crop. Further adjustments may need to be made throughout the day due to changes in relative humidity and temperature.
 - For your flax crop start with the following settings*:
 - concave - smaller opening
 - cylinder/rotor - higher speed setting
 - pre-cleaner/sieve - smaller opening
 - chaffer sieve - largest opening
 - tailings sieve – moderate opening
 - cleaning sieve – moderate opening**
 - fan - lower speed setting
- *settings may need to be adjusted depending on the brand or model of combine used.
 **will vary with type of combine and harvest conditions. Adjust to a lower setting to limit the amount of unthreshed material in the tank.
- Once settings have been adjusted, begin combining at a very low fan speed and increase slowly until only a few seeds are blowing out the back. After this, increase the speed of the combine and check overall performance. Measure the loss out of the back of the combine using a catch pan but remember to disengage choppers and spreaders first. Target no more than 2% mechanical losses. Examine the quality of what is in the grain tank; too dirty or too clean means further adjustments are required.

- Flax straw can be tough so ensure cutter/sickle bar and knives are sharp and in good working condition prior to harvest. Knives should sit flat and tight on fingers to reduce vertical play on the knives and to promote good shearing/scissoring action. Sharp straw chopper knives are also key. Removal of the secondary stationary knife set may ease the flow of flax straw through the combine.
- Installation of filler plates/strips at the front of the concave may be necessary on certain combines to adequately thresh flax.
- Straw is more difficult to chop under conditions of higher humidity. Sunny days with relative humidity <65% are best for combining flax.
- The fibre content of flax stems is lowest at the base of the plant and highest towards the top of the main stem, so flax plants may be more difficult to cut higher up on the stem than at the base.
- Avoid over-threshing because this will overload the cleaning system.
- Slow down for flax to avoid plugs and wrapping. Travel at speeds appropriate for acceptable losses.
- Slow down in dry conditions as breaking straw can overload the shoe and cause loss.
- Flax has a thin seed coat and can be easily damaged, especially if harvested at a low moisture content. Too high of a cylinder speed or too tight of a concave clearance will cause cracks in the seed coat. Larger seed can be more prone to cracking than smaller seed.
- The fire risk when combining flax can be high, especially when combining under very hot and dry conditions. Be prepared.

Submit your Flax Samples to the Canadian Grain Commission's Harvest Sample Program

You will receive an unofficial grade in addition to the oil and protein content and the iodine value (IV) for the flax seed lot. Results will be available within 20 business days of the CGC receiving the sample.

This process serves to provide quality data that is used to promote the high quality of Canadian grain and to aid in the marketing of Canadian grain.

Samples will be accepted until November 30, 2022.

Click [here](#) to find out more information or sign up for your free kit.

3) Storage

Flax is often one of the last crops harvested and as such storage considerations are important. Deteriorating harvest conditions such as cooler temperatures, early snowfall or late season rains can contribute to grain that is at less than optimal conditions upon binning.

Bin Basics

- Storability is influenced by crop type and the moisture content and temperature of the grain at the time of binning. The higher the temperature and moisture at the time of binning, the shorter the safe storage period.
- Tough or damp grain needs to be dried immediately following harvest.
- To reduce the moisture content of grain, run fans when the air has the greatest capacity to dry or use a grain dryer. Refer to [equilibrium moisture content \(EMC\) charts](#) to determine the best conditions for natural air drying grain.
- Maximum drying temperature for seed that will be sown is 45°C, otherwise germination and vigour will be reduced.
- Seed that is binned at a high temperature stays hot for a long period of time, so it is important to cool (aerate) grain after drying. Even if grain is dry when stored, it often must be cooled to preserve quality and prevent spoilage.

- The bottom of the bin always dries first and can even over-dry.
- Warm moist air migrates towards the top of the bin and causes moisture to condense on the underside of the roof. This moisture then drips on the grain and causes crusting.
- Pockets of higher moisture can form in a bin because of moisture migration.
- Immature, freshly harvested and high moisture seeds have high rates of respiration and produce heat. Seeds can respire up to six weeks in storage before going dormant.
- High moisture combined with fungal or microbial growth can cause seed to heat.
- Leave enough headspace at the top of the bin for adequate airflow and aeration.
- Check stored crops bi-weekly during the fall and spring and at least monthly during winter.
- Monitor stored grain regularly for signs of spoilage which include:
 - increased temperature
 - increased moisture
 - visible mould
 - insect/mite activity
 - increased CO₂ levels
 - clumped grain, crusting
 - off-odour
- Storage insect pests tend to be more prolific at higher temperatures so cooling your seed as quickly as possible after binning is a good preventative measure. Temperatures less than 15 to 18°C typically prevent storage insect feeding and reproduction. You can also apply an insecticide prior to storing seed. Damaged or weathered seed is more susceptible to microbial infection/attack.

Revising the Crop Nutrient Uptake and Removal Guidelines for Western Canada

Dr. Fran Walley is looking for pre-harvest straw samples in 2022. If you are interested in providing samples for this project that can be taken or will be picked up on farm, please email Fran or Issah at:

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Monitoring of insect species occurring in farm grain bins on the Canadian Prairies

Dr. Vincent Hervet is looking for volunteers to place grain probe traps in their bins and send in the samples. If you are interested in providing samples and learning more about this [project](#), please contact Vincent for more information by email at:

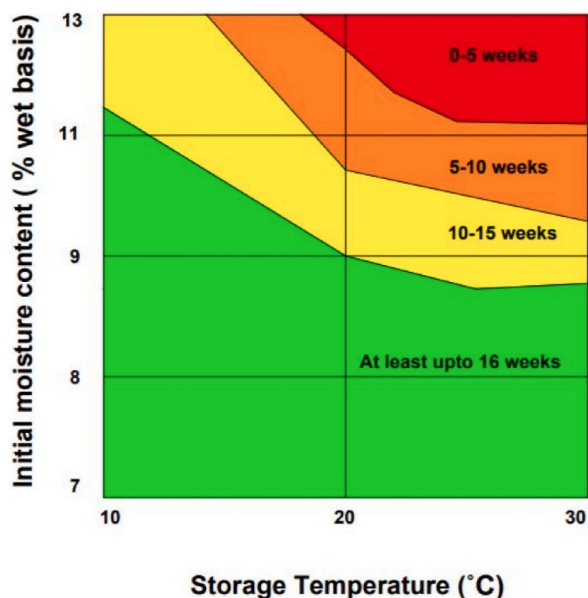
vincent.hervet@agr.gc.ca

Considerations when Storing Flax Seed

- Severe insect infestations are very uncommon in flax. Potential storage insect pests of flax are: the saw-toothed grain beetle, confused flour beetle, merchant grain beetle, red flour beetle, lesser grain borer and the rusty grain beetle. Storage insect pests are more common in warmer grain.
- The only insecticides registered for use on flax in storage are Protect-It and Insecto. Do not store flax in a bin treated with malathion or cyfluthrin within the past year due to potential residue issues. Tempo 20 WP may be used to control insects in flax storage facilities, truck beds and other areas where flax is stored **before** filling with grain.
- Use the charts below (Figures 1 and 2) to determine if your seed falls within the no spoilage zone, it will store safely for at least 5 months. If your seed falls into the spoilage zone, cool and/or dry it until it falls within the no spoilage zone. A maximum moisture content of 8.5% is recommended for long-term storage of flax seed. If the seed lot to be stored contains chaff and/or damaged seed, a moisture content less than 8.5% may be required for long-term storage.
- Commercial flax seed typically has a moisture content of 10% or less.
- Dockage can be high in harvested flax which can be a storage issue. Dockage contains moisture and can increase the moisture content of a stored seed lot. Storage insect pests are typically more plentiful in grain that has higher dockage.
- Flax is prone to moisture migration even if seed was stored dry at a uniform moisture content.

- Moisture leakage into a storage bin is bad news for flax. The seed is coated in mucilage and when this combines with water it becomes sticky and can lead to caking/adherence of seed which is challenging to remove from a bin.
- Flax seeds respire significantly immediately after harvest so can cause quick heating if stored too wet.
- Ventilation of stored flax seed is essential as damp, damaged and sprouted flax seed produces hydrogen cyanide gas.
- Dry flax is prone to heating due to its high oil content.
- Flax seed can be damaged in storage due to heating and therefore aeration of the seed immediately after binning is recommended to begin the cooling process. Frequent checking of the bin is required until the seed has been sufficiently cooled.
- Due to its size and flat shape, flax seed has strong airflow resistance (static pressure), meaning that a higher air pressure is required to achieve the same airflow rates as other crops. Therefore, to ensure good airflow through flax seed bulks, it is important to not overfill bins and larger fans may be required.
- Low level heat and a longer drying time is often recommended for drying flax seed using supplemental heat due to its higher oil content and lower ignition temperature.

Figure 1. Recommended safe storage guidelines chart for flax



Sourced from Mundhada, S., Chaudhry, M. M. A., Erkinbaev C., Paliwal, J., **2022**. *Development of safe storage guidelines for prairie-grown flaxseed*. Journal of Stored Products Research 97, 101965.
<https://doi.org/10.1016/j.jspr.2022.101965>

Figure 2. Approximate allowable safe storage time for flax

Moisture Content (%)	---Grain Temperature (°F)---					
	30° (-1°C)	40° (4°C)	50° (10°C)	60° (16°C)	70° (21°C)	80° (27°C)
8	*	*	*	*	200	140
9	*	*	*	240	125	70
10	*	*	230	120	70	40
11	*	280	130	75	45	20
12	*	200	90	50	30	15
13	*	140	70	35	20	10
14	*	90	50	25	14	7
16	190	60	30	15	8	3
18	130	40	15	10	6	2
20	90	35	12	8	5	2
22	70	30	10	7	4	2
24	60	25	5	5	3	1

Sourced from [NDSU's Allowable Storage Time for Cereal Grains chart](#) and adapted for flax.
 *allowable storage time exceeds 300 days

For more information about flax harvest preparation contact the following:

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Useful links:

1. Combine Adjustment and Harvest Tips:
 - [Don't Set it and Forget it! \(PAMI\)](#)
 - [Maximizing Harvest Productivity \(PAMI\)](#)
 - [Harvesting Oilseed Crops in Late Fall \(MB\)](#)
 - [Harvesting Fields with Multiple Crop Stages \(SK\)](#)
2. Grain Drying and Storage Information:
 - [Manage Stored Grain \(CGC\)](#)
 - [Grain Storage Considerations \(AB\)](#)
 - [A Grain Storage Primer-Inputs Podcast \(Top Crop Manager\)](#)
 - [Grain Drying and Storage \(NDSU\)](#)
 - [Drying and Storage of Damp Grain \(MB\)](#)
 - [The Process of Grain Aeration \(Ron Palmer\)](#)
 - [Grain Drying Calculator \(Ron Palmer\)](#)
 - [Grain Drying \(NDSU\)](#)
 - [Selecting Fans and Determining Airflow for Grain Bins \(University of Minnesota\)](#)
 - [Moisture Content of Canadian Grains \(CGC\)](#)
 - [Flax Moisture Meter Conversion Table \(CGC\)](#)
3. Storage Pests:
 - [Seed Storage Insect Identification Keys \(CGC\)](#)
 - [Insects and Mites in Farm-Stored Grain \(MB\)](#)
 - [Insects in Stored Grain app \(University of Manitoba\)](#)
 - [Stored Grain Insects, Mites and Moulds \(AB\)](#)
 - [Insects and Mould in Stored Grain \(SK\)](#)
4. Straw Buyers:
 - [Prairie Clean Energy](#)
5. Maximum Residue Limit Information:
 - [Canadian MRL database](#)
 - [U.S. MRL database](#)
 - [Links to MRL databases around the world](#)
6. PMRA Pesticide Product Label Search:
 - [Online](#)
 - [App](#)