

# Flax on the Farm

## Preparing for Harvest

There are three key things to consider before harvesting flax: 1) plant maturity, 2) harvest methods, and 3) straw residue management.

### I. Plant Maturity

#### Pre-Harvest Intervals

- A pre-harvest interval (PHI) is the minimum number of days between the last application of a chemical to a crop and harvest (swathing or straight-cutting), which can be found in Table 1.
- This time interval ensures that residue levels on the harvested crop will not exceed the Maximum Residue Limits (MRL) of export markets, [MRL comments](#) can be found on the SaskFlax website.
- When a tank mix is used, the PHI is equivalent to the individual chemical with the longest PHI.

#### Maximum Residue Limits

- A MRL is the legally tolerated maximum amount of pesticide residue on a food product that will not cause a human health concern. MRLs are set at levels which are well below amounts that could affect human health.
- MRLs for the same chemical often differ between countries because processes used to establish MRLs vary.
- Talk to your flaxseed buyer to find out if any chemicals are an issue for their market.

PHIs and MRLs are determined through toxicological tests on agricultural products that are produced according to standard practices while following chemical labelling guidelines, and therefore it is very important to adhere to label requirements when applying mid to late season chemicals.

#### Determining Maturity

Variable plant staging within the same crop can make pre-harvest chemical application at the proper stage extremely challenging and reinforces the importance of rating the maturity flax crops accurately.

- The seed of brown-seeded varieties changes from pale green to yellow with brown tips and then to brown as it matures (Figure 1). Yellow-seeded varieties turn from pale green to pale yellow with darker yellow tips to a darker yellow colour.
- As the seed inside the boll matures, the colour of the boll changes. Bolls will change from green to yellow and finally to brown during the maturation process (Figures 1 and 2).
- Flax is considered physiologically mature when 75% of the bolls (in the field or on a plant) are brown and the boll segments have begun to separate (Figure 3). This is a visual rating that corresponds to a grain moisture content of around 30% and is known as the 75% boll turn or 75% brown boll stage.
- The shade of 'brown' can differ between flax varieties so it is important to also look for boll segment separation.
- Flax is ready to be swathed or desiccated when physiologically mature because seed quality and yield will not be compromised at this stage of the crop's lifecycle.
- When a crop consists of plants of multiple growth stages, a pre-harvest chemical should not be applied until the latest maturing plants reach physiological maturity, or alternatively the late maturing patches within the field can be avoided and then sprayed later when at the appropriate stage.
- Flax is ready to be combined when 90 to 100% of the bolls are brown. Seed will rattle loudly in the bolls and the moisture content will be 10% or less. Bolls will easily crush with fingers and seed should easily rub out of bolls.

**Table 1. Mid to late season chemicals supported for use on flax with a pre-harvest interval (PHIs)**







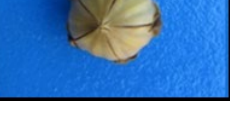

Pesticide Type	Active ingredient(s)	Products	PHI (d)
Herbicides	<i>bentazon</i>	Basagran, Basagran Forte, Boa, Berserk, Benta Super, Broadloom	!
	<i>bromoxynil</i>	Pardner, Brotex*, Koril 235, Bromotril II, Starbuck, Bromoxynil 240 EC, MPOWER Buck	60
	<i>bromoxynil/MCPA Ester</i>	Buctril M, Mextrol 450, Badge, Canuck, Bromoxynil-MCPA, Logic M	60
	<i>clethodim</i>	Select*, Arrow*, Advantage, Independence, /clethodim 240, Centuri-on, IPCO GraminX, CO-OP Patron II, Shadow RTM, Statue, Antler*	60
	<i>clopyralid</i>	Lontrel XC, Pyralid, Clobber, Advantage Clopyralid 360	!
	<i>clopyralid/MCPA</i>	Curtail M, Clobber M	60
	<i>MCPA</i>	Na 300, Amine 500, Amine 600, Ester 500, Ester 600	!
	<i>quizalofop</i>	Assure II, Yuma GL Liquid EC, Contender*, Quiz, Idol, Leopard, Elegant 10EC, Marshall	82
	<i>sethoxydim</i>	Poast Ultra	60
Insecticides	<i>chlorantraniliprole</i>	Coragen	1
	<i>chlorpyrifos</i>	Lorsban*, Pyrinex 480EC, Nufos 4E, Citadel 480EC, Pyrifos 15G, Warhawk 480EC, Sharphos	21
	<i>deltamethrin</i>	Decis*, Poleci 2.5EC, Advantage Deltamethrin 5 EC	40
	<i>dimethoate</i>	Cygon*, Lagon 480E	21
	<i>lambda-cyhalothrin</i>	Matador, Silencer 120 EC, Labamba	7
	<i>lambda-cyhalothrin/chlorantraniliprole</i>	Voliam Xpress	7
	<i>malathion</i>	Malathion*	7
	<i>permethrin</i>	Pounce 384 EC, Perm-UP, Ambush 500 EC, IPCO Syncro	7
Fungicides	<i>fluxapyroxad/pyraclostrobin</i>	Priaxor, Dyax	21
	<i>mefentrifluconazole/pyraclostrobin</i>	Veltyma	21
	<i>picoxystrobin</i>	Acapela	28
	<i>prothioconazole</i>	Proline 480 SC, Holdfast, Soratel	36
	<i>pyraclostrobin</i>	Headline EC	21
Pre-harvest treatments	<i>diquat</i>	Reglone*, Desica, Armory 240, Advantage Diquat 240, Clone, Desicash Desicant, Co-op Bolster II, IPCO Bolster II, Stage, Drifast, Craven	4-10
	<i>glyphosate</i>	Advantage Glyphosate*, Credit 45, Credit Xtreme, Crush'R*, Factor 540, Glyforce WDG, Matrix, Disruptor*, Roundup*, R/T 540, Sharda Glyphosate, StartUp, Stonewall, Vector*, VP480	7-14
	<i>saflufenacil</i>	Heat*	3

Compiled from the 2022 AB, SK and MB crop protection guides and product labels. Check product labels for application rates and restrictions (environmental conditions, PPE, water volume, tank mixes, crop staging, re-entry periods and buffer zones).

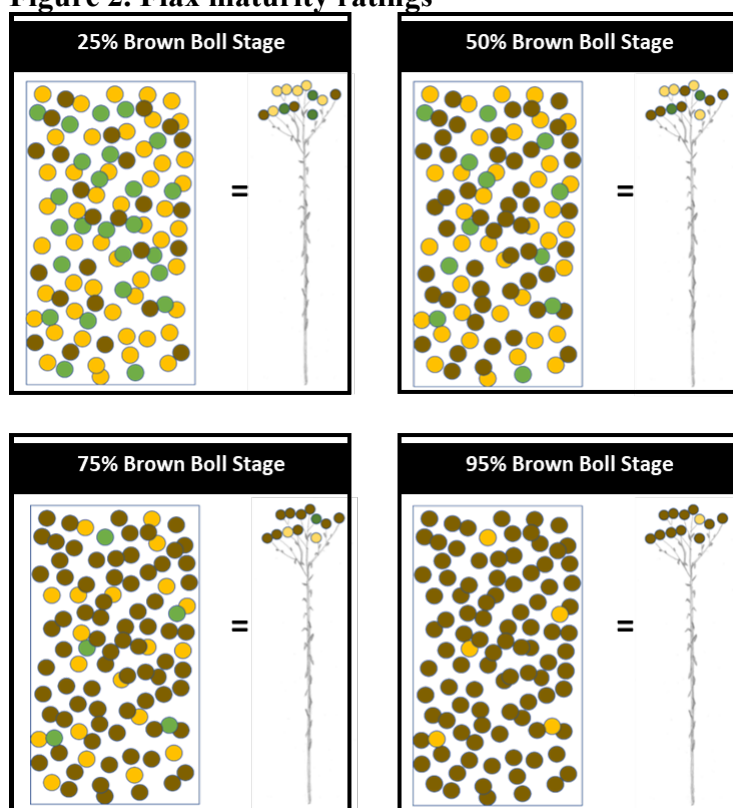
\*including products under that name

! = no PHI listed

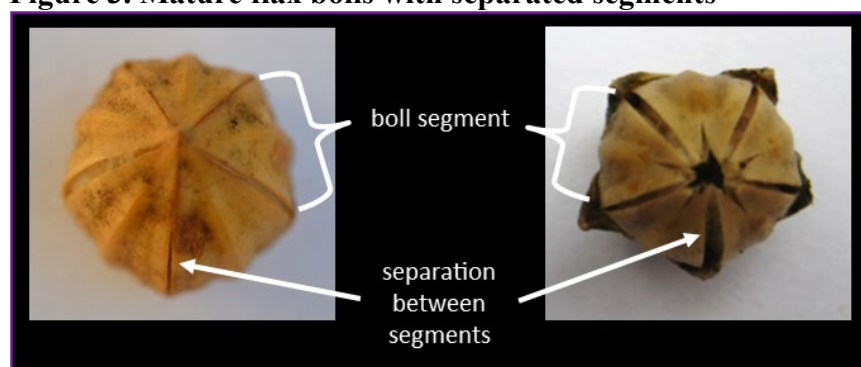
**Figure 1. Brown-seeded flax boll and seed colour change**

lime green/yellow boll stage			pale green
yellow to brown boll stage			yellow with brown tips
light brown boll stage			light brown (immature)
brown boll stage			brown (mature)

**Figure 2. Flax maturity ratings**



**Figure 3. Mature flax bolls with separated segments**



## Pre-Harvest Treatments

- Two types of chemicals are available to assist with flax harvest management: pre-harvest herbicides (sometimes called harvest-aids) and desiccants (Table 2).
  - Pre-harvest herbicides are non-selective systemic herbicides that provide late season perennial weed control and may improve the harvestability of the crop by reducing the amount of green material in the field.
  - Desiccants are non-selective contact herbicides that rapidly dry down the crop and weeds to allow for an earlier harvest.
  - Neither type of chemical will speed up the maturity of the crop.
- The main benefits of desiccants over pre-harvest herbicides is that the period between application and harvest is typically shorter and they can be used on crops when the harvested seed will be sown. Desiccants tend to be faster acting than pre-harvest herbicides because they do not require actively growing plant tissue (e.g. green leaves) for the chemical to be active.
- Three pre-harvest chemicals are currently available for use on flax (Table 3). Consult with your exporter/processor before you spray.
- When a pre-harvest treatment is used, the crop should be harvested as soon as possible after it reaches 10% or less grain moisture to minimize losses due to boll drop.
- The use of glyphosate as a harvest-aid outside of herbicide tolerant (HT) cropping systems, increases the risk of weeds developing resistance and of losing the effectiveness of the HT system.
- It is very important to follow label directions for late season chemicals because MRLs can be an issue and seed can be damaged if chemicals are applied too early. The use of pest control products that are not registered for use on flax can also cause the same issues.
- The effectiveness of diquat and glyphosate as a pre-harvest application was determined in a recent ADOPT demonstration funded by SaskFlax and Saskatchewan Ministry of Agriculture. A full description and results can be read in the [Summer Newsletter](#).
- A pre-harvest application can decrease stem and straw moisture but choosing the best option is highly dependent on environment and seasonal weather conditions.
- Some producers forego using pre-harvest chemicals and instead wait for the crop to dry down naturally or for a hard frost event to kill the crop. While effective, this could mean waiting a month before the crop is ready to harvest compared to 7 to 14 days after application of a pre-harvest herbicide or 4 to 10 days after using a desiccant.

**Table 2. Comparison between pre-harvest herbicide and desiccant characteristics**

Characteristic	Pre-harvest herbicide	Desiccant
type of herbicide	systemic	contact
desiccant?	no	yes
growth stage when applied	75-80% brown bolls or < 30% grain moisture	75% brown bolls
cost	cheap	expensive
water volume required	less	more
weeds controlled	annual (inconsistent), perennial	annual, perennial (suppression)
effect on maturity	none	none
effect on dockage	reduction	reduction
effect on seed moisture	decrease	decrease
effectiveness under cool temperatures	poor	good
number of days after application until harvest	7-14	4-10
effect on seedling vigour and emergence	decreased germination and vigour	none

**Table 3. Pre-harvest chemicals registered for use on flax**

Active ingredient		<i>diquat</i>	<i>glyphosate*</i>	<i>saflufenacil</i>
Type		contact	systemic	contact, systemic
Products		Reglone, Region Ion, Desica, Armory 240, Advantage Diquat 240, Clone, Dessicash Desiccant, Co-op Bolster II, IPCO Bolster II, Stage, Drifast, Craven	Advantage Glyphosate <sup>^</sup> , Credit, Crush'R <sup>^</sup> , Factor 540, Glyforce WDG, Matrix, Disruptor <sup>^</sup> , Roundup <sup>^</sup> , R/T 540, Smoke, Sharda Glyphosate, StartUp, Stonewall, Vector <sup>^</sup> , VP480	Heat WG, Heat LQ
Group		22	9	14
Desiccant or harvest-aid		desiccant	harvest aid	both
Weed control	annual grasses	y	y	
	annual broadleaves	y	y	y
	perennials	S	y	S
Pre-harvest interval (PHI)		4-10 days	7-14 days	3 days
Crop stage		75% brown bolls	<30% grain moisture or 80% brown bolls	75% brown bolls
Conditions that increase effectiveness		- cloudy conditions	- warm sunny conditions when weeds are growing	- conditions that promote active weed growth
Conditions that decrease effectiveness		- heavy winds, rain or hail after crop dry down	- frost which kills >40% of above ground tissue - foliage covered in dust - use of hard water will reduce activity	- conditions that harden off weeds (cold, drought, excessive heat)

Compiled from the 2022 AB, SK and MB crop protection guides and product labels. Check product labels for application rates and restrictions (environmental conditions, PPE, water volume, tank mixes, crop staging, re-entry periods, buffer zones and pre-harvest intervals).

\* do not apply to crops if harvested seed is to be sown

<sup>^</sup> including products under that name

S=suppression

## II. Harvest Methods

- Swathing used to be the most common method of harvesting flax but straight-cutting has significantly increased in popularity.
- Flax straw can be tough, so ensure cutter/sickle bar and knives are sharp and in good working condition prior to harvest. Sharp straw chopper knives are also key. Knives should sit flat and tight on fingers to reduce vertical play on the knives and to promote good shearing (i.e. scissoring) action. Removal of the secondary knife set may ease the flow of flax straw through the combine. Sunny days with relative humidity <65% are best for combining flax.
- Swathing/windrowing
  - The crop is ready for swathing at the 75% brown boll stage.
  - Combining can occur as early as a couple of days after swathing if the weather is hot and dry, but more typically occurs a week afterwards. The crop is ready to combine when grain moisture is  $\leq 10\%$  which corresponds to the 90-100% brown boll stage when seeds are rattling loudly within the bolls.
  - Swathing is a good alternative for a crop that is not uniform in maturity (e.g. lots of fall re-growth), is lodged, is weedy, has hail damage or may remain in the field for an extended period of time prior to harvest.
  - Seed in swaths may be more resistant to frost.



- Straight-cutting
  - Flax can be straight-cut when grain moisture is  $\leq 10\%$ . This corresponds to the 90-100% brown boll stage when seeds are rattling loudly within the bolls and often occurs one to two weeks after applying a pre-harvest herbicide or desiccant depending on the weather conditions and product used.
  - Flax can be susceptible to boll drop when left standing if pasmo is present, a fungicide was not applied and if strong winds or hail occur.
  - If you have access to a stripper header for straight-cutting flax there are advantages:
    - Taller stubble captures more snow and provides greater protection against erosion.
    - Can combine when stems are not fully dried down.
    - Less straw reduces wear on the combine.
    - Produces higher quality straw.

### III. Straw Residue Management

- Options for handling straw:
  - Use of a stripper header
    - The less straw processed by a combine means that combining is more efficient and there is less wear and tear on the equipment.
    - Harvest can typically occur earlier than if harvesting whole plants because the stems can still be somewhat green.
    - Ensures that the maximum length of straw is left standing.
    - Subsequent crop can be seeded into very little chaff between the standing rows improving seed to soil contact.
    - 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.
    - Potential for flax straw to cause problems during seeding if disc openers are not used.
  - Chop and spread
    - Method of reducing the bulk of straw deposited by the combine.
    - Requires a combine equipped with a straw chopper or installation of an after-market straw chopper.
    - May require desiccation to ensure uniformity and maximum dryness of the crop for ease of combining.
    - Planting an early maturing variety and/or seeding early may help to ensure the crop is as dry as possible at harvest.
    - Typically slows the process of combining.
    - Potential for flax straw to cause problems during seeding if hoe openers are not used.
    - Some producers have had success with combining their flax crop at a 45-degree angle (to the direction of seeding) in order to reduce straw bunching and plugging issues when seeding into flax stubble the following spring.
  - Not Chopped
    - Straw is typically baled or bunched.
    - Can provide additional crop income if a [flax straw buyer](#) can be found.
    - Buyers often have specific harvest recommendations depending on the intended use of the straw (e.g. straw must lay in the field for a couple of weeks before baling).
    - Flax straw contains valuable nutrients. If removed from the field, consider replacing the equivalent the following season ([flax seed and straw nutrient uptake and removal - IPNI](#)).
  - Burn
    - Straw is typically bunched into large piles but can also be burnt in windrows.
    - Burning may require a permit from the local municipality.
    - Burning may negatively affect populations of arbuscular mycorrhizal fungi and other beneficial soil microbes.



## RESEARCH NOTE: Revising the Crop Nutrient Uptake and Removal Guidelines for Western Canada



Dr. Fran Walley is leading a research project to revise the crop nutrient and removal guidelines for Western Canada and is looking for pre-harvest straw samples in 2022. If you are interested in having a flax field sampled e-mail Fran at [fran.walley@usask.ca](mailto:fran.walley@usask.ca)

### For more information about flax harvest preparation contact the following:

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Saskatchewan Ministry of Agriculture  
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### Useful links:

#### 1. Maximum Residue Limit Information:

- [Canadian MRL database](#)
- [U.S. MRL database](#)
- [Links to MRL databases around the world](#)

#### 2. Provincial Crop Protection Guides:

- [Alberta](#)
- [Saskatchewan](#)
- [Manitoba](#)

#### 3. PMRA Pesticide Product Label Search:

- [Online](#)
- [App](#)

#### 4. Straw Buyers:

- [Prairie Clean Energy - Regina, SK](#)

#### 5. Pre-harvest Herbicides

- [Preharvest Weed Control and Desiccation Options for Flax 2020 Report \(Agri-ARM\)](#)
- [Preharvest Weed Control and Desiccation Options for Flax 2021 Report \(Agri-ARM\)](#)

#### 6. 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 \(SK\)](#)

#### 7. Grain Drying and Storage Information:

- [Manage Stored Grain \(CGC\)](#)
- [Grain Storage \(AB\)](#)
- [Natural Air Grain Drying \(SK\)](#)
- [Grain Drying and Storage \(NDSU\)](#)
- [Drying and Storage of Damp Grain \(MB\)](#)
- [The Process of Grain Aeration \(Ron Palmer\)](#)
- [Moisture Content of Canadian Grains \(CGC\)](#)
- [Flax Moisture Meter Conversion Table \(CGC\)](#)

#### 8. Storage Pests

- [Seed Storage Insect Identification Keys \(CGC\)](#)
- [Insects and Mites in Farm-Stored Grain \(MB\)](#)
- [Insects in Stored Grain app \(UofM\)](#)