

Flax on the Farm

Preparing for Harvest

There are three issues 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).
- This time interval ensures that residue levels on the harvested crop will not exceed MRL limits of export markets.

Maximum Residue Limits

- A Maximum Residue Limit (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.
- Every country has a different way of establishing MRLs and therefore MRLs for the same chemical may differ between countries.
- Talk to your flaxseed buyer to find out if any pre-harvest chemicals are an issue for their market.
- See Table 3 for MRL comments regarding pre-harvest chemicals.

Pre-harvest intervals and maximum residue limits 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 late-season chemicals (Table 1).

Table 1. Pre-harvest intervals (PHIs) of late season chemicals for use on flax.

Category	Active ingredient	PHI (d)	Comments
Herbicides	bentazon	none listed	
	bromoxynil/MCPA ester	60	
	clethodim	60	
	MCPA	none listed	
	quizalofop	82	
	sethoxydim	60	
Insecticides	chlorantraniliprole	1	
	chlorpyrifos	21	
	deltamethrin	40	
	dimethoate	21	
	lambda-cyhalothrin	7	
	lambda-cyhalothrin, chlorantraniliprole	7	
	malathion	7	
	methomyl	8	
Foliar fungicides	Bacillus subtilis	0	
	fluxapyroxad, pyraclostrobin	21	
	picoxystrobin	28	
	prothioconazole	36	
	pyraclostrobin	21	
Pre-harvest treatments	diquat	none listed	harvest when seed dry (≤ 10% grain moisture)
	glyphosate	none listed	harvest 7-14 days after application
	glyphosate, glufosinate ammonium	none listed	harvest 7-14 days after application
	saflufenacil	3	

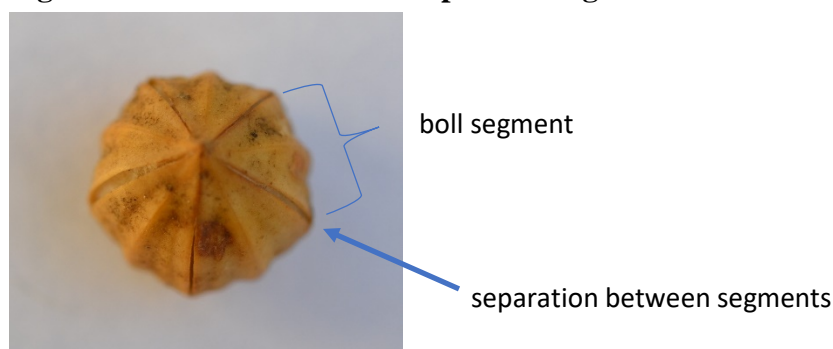
Determining Maturity

- 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 (Figure 1).
- 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 2). 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 greatly differ between flax varieties so it is important to also look for the 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.
- 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.

Figure 1. Flax maturity ratings.



Figure 2. A mature boll 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 herbicides that rapidly dry down the crop and weeds to allow for an earlier harvest.
- 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.
- Four pre-harvest chemicals are registered for use on flax (Table 3). Each of these chemicals lacks an MRL in one or more of the major flax export markets, so consult with your exporter/processor before you spray.
- The use of glyphosate as a harvest-aid outside of herbicide tolerant (HT) 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.
- 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. 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 \leq 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 vigour and emergence	negative	none

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

Active ingredient	Type	Products	Group	Desiccant?	Harvest-aid?	Annual grassy weed control?	Annual broadleaf weed control?	Perennial weed control?	Crop stage	Comments	Tank mix partner
diquat	contact	many	22	✓		✓	✓	S	75% brown bolls	no MRLs for US or China	
glyphosate	systemic	many	9		✓	✓	✓	✓	≤30% grain moisture (75-80% brown bolls)	do not apply to crops if harvested seed will be sown, no MRL for China	
glyphosate, glufosinate ammonium	contact and systemic	Roundup Fastforward Preharvest	9, 10	✓	✓	✓	✓	✓	≤30% grain moisture (75-80% brown bolls)	do not apply to crops if harvested seed will be sown, no MRL for Canada, US, Japan or China	
saflufenacil	contact and systemic	Heat WG, Heat LQ	14	✓	✓		✓	S	75% brown bolls	no MRL for China, if tank mixed with glyphosate do not sow harvested seed	glyphosate

Compiled from the 2018 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).

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. Removal of the secondary knife set may ease the flow of flax straw through the combine.
- 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 ≤ 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 or has hail damage.
- Straight-cutting
 - Flax can be straight cut when grain moisture is ≤ 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 desiccating depending on the weather conditions.
 - Stripper header
 - If you have access to a stripper header for harvesting flax there are advantages:
 - Produces higher quality straw.
 - 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.

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.
 - Potential for flax straw to cause problems during seeding if disc openers 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.
 - Not Chopped
 - Straw is typically baled or bunched.
 - Can provide additional crop income if a flax straw buyer can be found (see links below or the straw buyer list on the SaskFlax website).
 - 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).
 - Burn
 - Straw is typically bunched into large piles but can also be burnt in windrows.
 - Burning may require a permit from the local municipality.

For more information about flax harvest preparation contact the following:

Michelle Beath
Agronomist
Saskatchewan Flax Development Commission
(306) 664-1901
michelle@saskflax.com

Dane Froese
Industry Development Specialist – Oilseeds
Manitoba Agriculture
(204) 750-2840
dane.froese@gov.mb.ca

Matthew Bernard
Provincial Specialist, Oilseed Crops
Saskatchewan Ministry of Agriculture
(306) 787-4668
matthew.bernard@gov.sk.ca

Murray Hartman
Oilseed Specialist
Alberta Agriculture and Forestry
(403) 782-8024
murray.hartman@gov.ab.ca

Useful links:

A. Maximum Residue Limit Information:

Canadian MRL database: <http://pr-rp.hc-sc.gc.ca/mrl-lrm/index-eng.php>

U.S. MRL database: <https://www.globalmrl.com/db#login>

Links to MRL databases around the world: <https://www.mpi.govt.nz/growing-and-harvesting/plant-products/pesticide-maximum-residue-levels-mrls-for-plant-based-foods/pesticide-maximum-residue-level-legislation-around-the-world/>

B. Provincial Crop Protection Guides:

- Alberta: [https://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/agdex32](https://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex32)
- Saskatchewan: <http://www.publications.gov.sk.ca/details.cfm?p=77706>
- Manitoba: <https://www.gov.mb.ca/agriculture/crops/guides-and-publications/#gfcf>

C. PMRA Pesticide Label Mobile App: <https://www.canada.ca/en/health-canada/services/consumer-product-safety/pesticides-pest-management/registrants-applicants/tools/pesticide-label-search.html>

D. Straw Buyers:

- SWM: <https://www.swmintl.com/products/fibers-and-yarn/flax-fibers-and-pulp/>
- Sunstrand Sustainable Materials: <https://www.sunstrands.com/>

