

# Flax on the Farm

## Herbicide Residue Considerations for Flax

### Residual Herbicides

- Residual herbicides have become an integral part of crop production in Western Canada
- The breakdown of herbicides is dependent on either soil microorganisms or chemical reactions (e.g. hydrolysis, photolysis) for breakdown and consequently their persistence is further influenced by soil moisture, pH, type, temperature and organic matter content.
- Often, conditions of drought, extremes in soil pH and excessive cold will delay the breakdown of herbicide residues in the soil. Such conditions during the season of application, or even the season following, may result in higher levels of residue in the soil than expected causing injury to subsequent crops.
- Tillage and the number of subsequent applications of certain sub-groups of herbicides (i.e., imidazolinones, pyridines and sulfonylureas) can also influence the degree of herbicide carryover.

### Re-cropping After Residual Herbicides

- Many residual herbicides have rotational crop restrictions associated with them and therefore herbicide labels should be consulted for details.
- Some residual herbicides have tank mix options, and in these cases the most restrictive replanting interval for the chemicals in the mix should be followed.
- A field bioassay can be conducted before planting the next crop in a treated field.
- Weakened seedlings are more susceptible to damage and therefore recommendations to decrease the chance of herbicide carryover injury to the subsequent crop may include: planting seed into moist, warm and shallow seedbeds, and following best agronomic practices for the crop (e.g., high quality seed, optimal fertilizer rates, rotation, seed treatment, etc.) to get the crop off to the best start as possible.
- The prairies are under an extreme risk of residual herbicide injury this year

### Flax and Residual Herbicides

Flax is susceptible to damage from several herbicide residues in the season following application, and in some cases, a few seasons after application. Before making the final decision on which field your flax will be seeded into this season, a review of what residual herbicides were applied last year is recommended. Table 1 summarizes the residual herbicides that may affect flax.

### Bioassays

Field or plant bioassays are conducted before seeding flax into a field previously treated with certain residual herbicides. These tests provide an indication of whether the levels of herbicide residue remaining in the soil are sufficient to injure the intended crop. A plant bioassay (also known as a soil bioassay) involves collecting soil samples from the field in question, as well as from an untreated field, and growing the intended crop indoors to observe differences between plants grown in the treated and untreated soils. In contrast, a field bioassay involves planting strips of the intended crop in the field in question, as well as in an adjacent untreated field and observing any differences in plant growth throughout the season. Nonetheless, both types of assays do not account for abiotic interactions and the results may not be available in a timely manner for the current cropping season.

**Table 1. Residual herbicides with re-cropping restrictions for flax.**

Active ingredient	Product(s)	Group	Crop interval	Details for flax production
aminopyralid, 2,4-D	Restore II, Milestone	4	3*	Application should be avoided under drought conditions
amitrole	Amitrol 240 <sup>α</sup>	11	1	
atrazine	Aatrex Liquid	5	1*	Flax is typically not affected by rates up to 0.9 L/ac in the previous season; injury to succeeding crop may occur during extended periods of dry weather during the season of application; damage to rotational crops may be decreased by ploughing or deep tilling the land flat in the fall prior to seeding
atrazine, metolachlor	Primextra II Magnum	5, 15	2*	Extended periods of dry weather during the year of application followed by stressful conditions the following season (e.g. abnormally hot, dry weather) can injure the rotational crop; sensitive crops may be affected for more than two years after
bromoxynil, pyrasulfotole	Infinity	6, 27	1	
carfentrazone-ethyl, pyroxasulfone	Focus	14, 15	1*	Drought conditions following application will extend the rotational crop interval by one year and a field bioassay is required before seeding flax
clomazone	Command 360 ME	13	2*	Residue carryover risk to rotational crops greater in soils with pH ≤ 5.9, during extremely dry conditions and exceeding the recommended rate will result in temporary whitening or yellowing of leaves
dicamba	Banvel VM, Disha 480, Engenia, FeXapan <sup>α</sup> , Oracle, Xtendimax, Ammo	4	2*	Dry weather and late applications (after September 1) may extend the rotational crop interval and a field bioassay is required before seeding flax
ethalfluralin	Edge MicroActiv	3	1*	Extreme conditions may weaken seedling and increase risk of injury resulting in reduced crop development and reduced yields; do not direct seed (zero till) into standing stubble on land that was treated for the previous crop; uneven spread and distribution of straw may cause poor crop emergence; weakened or stressed seedlings in drought conditions are more susceptible to damage from residue so seed flax into a shallow, warm and moist seedbed, possibly at a 10% higher seeding rate than normal to prevent thinning; field bioassay is recommended
ethametsulfuron	Muster Toss-N-Go	2	1	
florasulam	Blitz, FirstPass, Flora, Battlefront, PrePass Flex, Priority + glyphosate	2	1*	Flax may be grown the following year if it is a Corteva AgriScience product only; field bioassay is recommended
florasulam, dicamba	Korrex II	2, 4	1*	Flax may be grown if product applied before Aug. 1
florasulam, fluroxypyr, MCPA, Ester	Outshine, Stellar <sup>α</sup> , Stellar XL, Steel	2, 4	1*	Flax may be grown the following year if it is Corteva Agriscience or Sharda Crop Chem product, field bioassay is recommended

**Table 1. Continued**

Active ingredient	Product(s)	Group	Crop interval	Details for flax production
florasulam, glyphosate	Blitz, FirstPass, Flora, Battlefront, PrePass Flex, Priority + glyphosate	2, 9	1*	See florasulam description
florasulam, halauxifen	Paradigm PRE	2, 4	1	
florasulam, MCPA Ester	Topline, Frontline XL	2, 4	1*	Flax may be grown the following year if it is a Corteva AgriScience product only; field bioassay is recommended
flucarbazone	Everest 3.0 AG, Himalaya, Sierra 3.0 AG	2	1*	Dark brown and black soils: drought conditions and cold temperatures after application and in the following season, soils with low organic matter (<2%) or high pH (>7.5) may delay product breakdown
flucarbazone	Everest 3.0 AG, Himalaya, Sierra 3.0 AG	2	2 <sup>?</sup> *	Brown and grey wooded soils: drought conditions and cold temperatures after application and in the following season, soils with low organic matter (<2%) or high pH (>7.5) may delay product breakdown; field bioassay is recommended
flucarbazone, florasulam	Himalaya Pass	2	1*	Dark brown and black soils: precipitation equal or about 10 year average; organic matter content <4%; soil pH >7.5 may delay product breakdown
flucarbazone, florasulam	Himalaya Pass	2	2 <sup>?</sup> *	Brown and grey wooded soils: precipitation equal or about 10 year average; organic matter content <4%; soil pH >7.5 may delay product breakdown; field bioassay is recommended
flucarbazone, florasulam, carfentrazone-ethyl	Inferno Trio	2, 14	1*	Dark brown and black soils: precipitation equal or about 10 year average; organic matter content <4%; soil pH >7.5 may delay product breakdown
flucarbazone, florasulam, carfentrazone-ethyl	Inferno Trio	2, 14	2 <sup>?</sup> *	Brown and grey wooded soils: precipitation equal or about 10 year average; organic matter content <4%; soil pH >7.5 may delay product breakdown; field bioassay is recommended
flucarbazone, tribenuron	Inferno Duo, Himalaya Extra	2	1*	Dark brown and black soils: precipitation equal or about 10 year average; organic matter content <4%; soil pH >7.5 may delay product breakdown
flucarbazone, tribenuron	Inferno Duo, Himalaya Extra	2	2 <sup>?</sup> *	Brown and grey wooded soils: precipitation equal or about 10 year average; organic matter content <4%; soil pH >7.5 may delay product breakdown; field bioassay is recommended
flumioxazin	Chateau WDG, Valtera WDG, Payload	14	1*	A successful soil bioassay required before planting flax
flumioxazin, pyroxasulfone	Fierce WDG, Torpedo WDG, Fierce EZ, Torpedo EZ	14, 15	1*	A successful soil bioassay required before planting flax
fomesafen	Reflex <sup>^</sup>	14	2 <sup>?</sup>	
fomesafen, glyphosate	Flexstar GT <sup>^</sup>	9, 14	2 <sup>?</sup>	

**Table 1 Continued**

Active ingredient	Product(s)	Group	Crop interval	Details for flax production
foramsulfuron	Option 2.25 OD <sup>^</sup>	2	2 <sup>?</sup>	
halosulfuron	Permit WG	2	2 <sup>?</sup>	A field bioassay is required after 2 years to determine persistence in soil
imazamethabenz	Assert 300 SC <sup>α</sup>	2	1*	Black and grey wooded soils
imazamethabenz	Assert 300 SC <sup>α</sup>	2	3 <sup>?</sup> *	Brown and dark brown soils; a successful soil bioassay required before planting flax
imazamox, fluroxypur	Altitude FX3	2, 4	1*	If drought, prolonged cold, soils with pH <6.5, organic matter <3% or sandy soil conditions exist delay by one year
imazamox, imazapyr	Ares SN	2	2*	If drought conditions are present during the year of application flax may be affected for more than two years after application
imazamox, imazapyr, clopyralid	Salute	2, 4	2 <sup>?</sup>	
imazamox, imazethapyr	Duet, Ninja, Odyssey NXT, Judo	2	2*	Residue carryover risk to rotational crops greater in soils with pH ≤ 6.5, during extremely dry and excessive cold conditions
imazamox, imazethapyr	Quasar	2	2 <sup>?</sup> *	Residue carryover risk to rotational crops greater in soils with pH ≤ 6.5, during extremely dry and excessive cold conditions; a successful field bioassay is required before seeding flax
imazeothapyr	Pursuit 240, Kamikaze, Phantom	2	2 <sup>?</sup> *	Residue carryover risk to rotational crops greater in soils with pH ≤ 6.5, during extremely dry and excessive cold conditions; a field bioassay is required after 2 years to determine persistence in soil
metsulfuron	Ally Toss-N-Go, Escort	2	1*	pH <7 in black and wooded grey soils; add one year to the re-cropping period if less than 10" (250 mm) of rainfall received during the season of application or any subsequent season
metsulfuron	Ally Toss-N-Go. Escort	2	2*	pH <7 in brown and dark brown soils; add one year to the re-cropping period if less than 5" (130 mm) of rainfall received during the season of application or any subsequent season
metsulfuron	Ally Toss-N-Go, Escort	2	3*	pH between 7 and 7.9 in all soil types; add one year to the re-cropping period if less than 5" (130 mm) of rainfall received during the season of application in brown and dark brown soils; add one year to the re-cropping period if less than 10" (250 mm) of rainfall received during the season of application in black and grey wooded soil
metsulfuron, aminocyclopyrachlor	Navis Flex, TruRange	2, 4	1*	A successful field bioassay is required when converting rangeland that has been treated to crop land; instructions can be found on the label
metsulfuron, aminopyralid, 2,4-D	Reclaim II, ClearView	2, 4	3*	A successful soil bioassay required before planting flax

**Table 1 Continued**

Active ingredient	Product(s)	Group	Crop interval	Details for flax production
metsulfuron, saflufenacil	Smoulder	2, 14	1*	Flax can be seeded after one year in all regions except the brown soil zone, an extra year for crop interval is needed
metsulfuron, thifensulfuron, fluroxypyr	Travallas	2, 4	1	
picloram, 2,4-D	Grazon XC, Aspect	4	5	
propyzamide	Kerb SC	3	1	
pyroxsulam	Simplicity 30 OD, Simplicity GoDRI	2	1	
pyroxsulam, halauxifen, 2,4-D	Rexade	2, 4	1	
quinclorac	Facet L, Clever, Ingenious	4, 26	2*	Add one year under drought conditions or soils with low organic matter
rimsulfuron, nicosulfuron	Steadfast IS	2	1	
sethoxydim, imazamox, imazethapyr	Odyssey Ultra NXT	1, 2	2	
simazine	Princep Nine-T, Simazine 480	5	1 <sup>2</sup> *	Do not seed flax if an excess of 2 kg/ha of Princep Nine-T or 3.65 L/ha of Simazine 480 was applied the previous season; drought conditions and high pH can reduce the rate of herbicide breakdown
sulfentrazone, pyroxsulfone	Authority Supreme	14, 15	3*	If drought conditions are present during or after application extend interval by one year; a successful field bioassay is recommended
thifensulfuron, tribenuron, fluroxypyr	Barricade II, Foxy R	2, 4	1	
topramezone	Impact, Armezon	27	1*	Flax may be grown the following year after one application of Impact only
tribenuron, dicamba	Express FX	2, 4	1*	Field treated with a chemfallow application can be seeded to flax; do not seed flax the season following a post-harvest application
trifluralin	Treflan Liquid EC, Treflan MicroActiv, Rival, Bonanza	3	1*	Injury to succeeding crop may occur if periods of dry weather occurred during the season of application; damage to rotational crops may be decreased by seeding flax into a shallow, warm and moist seedbed, possibly at a 10% higher seeding rate than normal; do not direct seed (zero till) into standing stubble on land that was treated for the previous crop

Compiled from the 2021 Alberta, Saskatchewan and Manitoba crop protection guides and individual product labels. Check product labels for more detailed information about rotation/re-cropping intervals and bioassays. Rotation/re-cropping intervals may differ depending on rate, region, province, soil characteristics, environment, time of application, crop variety and whether the field is cropped or fallowed. If tank mixes were applied, the most restrictive guidelines should be followed.

\*product only registered for use in Manitoba or in the Red River Valley of Manitoba

<sup>2</sup>an estimate only; flax is either not listed as a rotational crop or for a particular soil type on the product label



### How to Conduct a Plant (or Soil) Bioassay

- Sampling should occur to a depth of approximately 5 cm (2 in) for no-till soil and to the depth of tillage for cultivated sites (typically around 15 cm or 6 in) and can be collected using a trowel, spade or soil sampler.
- Clear combine residue from the soil surface before collecting samples.
- Although it is possible to conduct this test at home, it is recommended that soil samples be sent to a lab because optimal conditions for field crop growth at home are difficult to achieve.
- Collect samples randomly from various representative locations in the field. It is also advised to collect samples from locations in the field that may contain higher levels of residue (e.g., low spots, knolls or ridges, edges, headlands, slough margins, areas with noticeably different soil texture, etc.).
- The test should ideally be conducted one month prior to seeding but keep in mind that the lab turnaround times may be up to six weeks.

### How to Conduct a Field Bioassay

- Plant test strips of the crop in question perpendicular to the direction the residual herbicide was applied.
- Strips should be placed to represent different field conditions (e.g., texture, pH, drainage, turn-around areas, edges, etc.) and should be long enough to cross the width of several spray passes.
- Be sure to use the same planting time, conditions, techniques and cultural practices you normally use to plant and grow the crop.
- A check strip on an untreated piece of similar land is required for comparison.
- As the crop emerges and develops, observe the following: crop stand, root development, rate of growth, abnormality of growth (e.g., leaf cupping, meristem damage, excessive branching), plant colour (i.e., chlorosis, purpling), vigour and seed yield. If no visible signs of injury, stand reduction or yield reduction occur, then the field can be seeded with the desired crop the next growing season. If the bioassay indicates that residues are still present, continue cropping only to those crops listed on the label, and do not plant the crop in question until a field bioassay indicates that it is okay to do so.

#### 2022 Flax Disease Survey

A Saskatchewan flax disease survey is planned for 2022 and permission to survey fields must be granted by landowners. If you are interested in supporting provincial pest survey efforts please sign up here:

<https://ca.surveygizmo.com/s3/50060966/Pest-Monitoring-Sign-up>



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**Other Useful Links:**

1. Pesticides

- PMRA Pesticide Product Label Search:
  - [Online](#)
  - [App](#)
- Provincial Crop Protection Guides:
  - [Alberta](#)
  - [Saskatchewan](#)
  - [Manitoba](#)
- 2022 [Saskatchewan Herbicide Carryover Risk Map \(June – August 2021\)](#)
- 2022 [Saskatchewan Herbicide Carryover Risk Map \(June – September 2021\)](#)

2. Lab offering plant bioassays:

- [A&L Canada Laboratories Inc.](#)

3. Weather

- [AAFC Agroclimate Maps for the current season](#)

4. Seed

- Provincial Seed Guides:
  - [Alberta](#)
  - [Saskatchewan](#)
  - [Manitoba](#)
- [SaskFlax Registered Variety List](#)

5. Pests and Beneficials

- [Prairie Pest Monitoring Network](#)
- [Field Heroes](#)