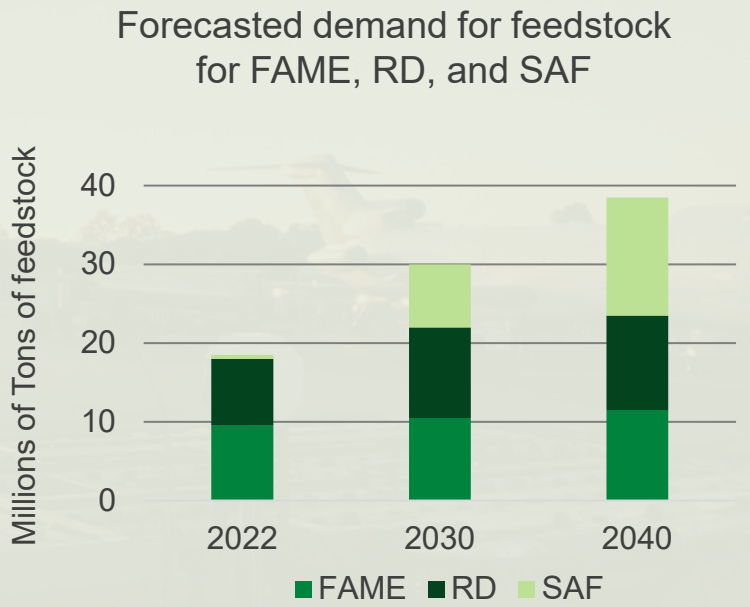
Winter Camelina

A new series of crops on the market

By 2040, global demand for renewable fuels will double.



Source: Waste Oils and Fats Report 2024

Let’s put it into perspective

There are only so many acres to produce biofuels, we need to increase oil/acre

- 150 acres fills about 1 tanker truck (assuming 1000lb yield)
  - Most O&G companies need at least at least 500,000 acres to meet small scale requirements
  - These companies have expressed the need for novel oil seeds as the “gap” for vegetable oil growth
- We need to scale quickly without displacing food!
- Cargill is feedstock agnostic but requires commercial acceptance
  - Many crops in the space: Camelina, Pennycress, Caranata…Canola?
  - Are the byproducts (oil and meal) safe and accepted to use in the supply chain?
  - Does policy provide a pathway to market oil?

Cargill

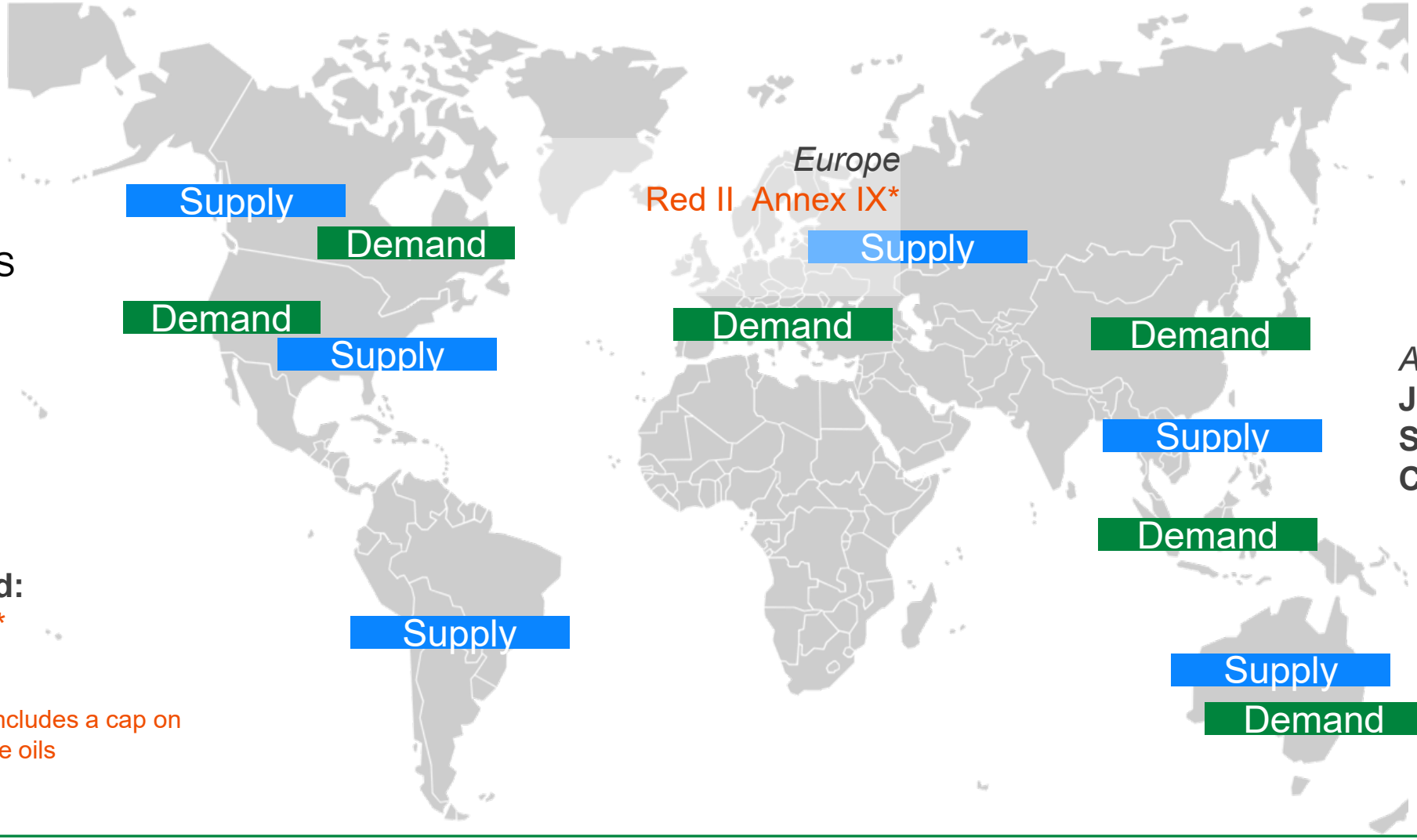
What about policy?

Canada
Federal
- CFR

Province:
- BC-LCFS

USA
Federal
- RFS
- 45z

State based:
- C-LCFS*



Asia
Japan
Singapore
China

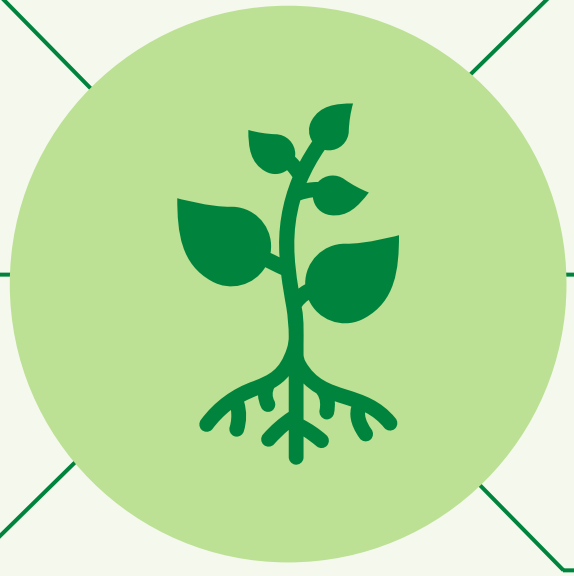
*Policy includes a cap on vegetable oils

What makes a good biofuel feedstock?

Complements, doesn't compete with, food/feed production.

Works for farmers – economically and operationally

Reduces carbon emissions



Fits into existing crop systems

Reliable income stream and long-term demand

Minimal need for new equipment or inputs

Winter camelina — an emerging biofuel crop

A hardy oilseed that performs like a cover crop, but pays like a cash crop

- Winter-hardy and fast-growing (survives harsh MN winters)
- Has high oil content (~40%) with valuable meal byproduct (60%).
- Meal is high-protein and marketable
- Enables double cropping (e.g., soy after camelina)
- Increases total oil production per acre

Cargill

Where have we seen Winter Camelina before?

8

Camelina as a cover crop

Many acres of camelina cover crop went in this fall- most in cereal rye mixes

One of few over wintering broadleaves in uppermost mid west

Camelina vs. rye

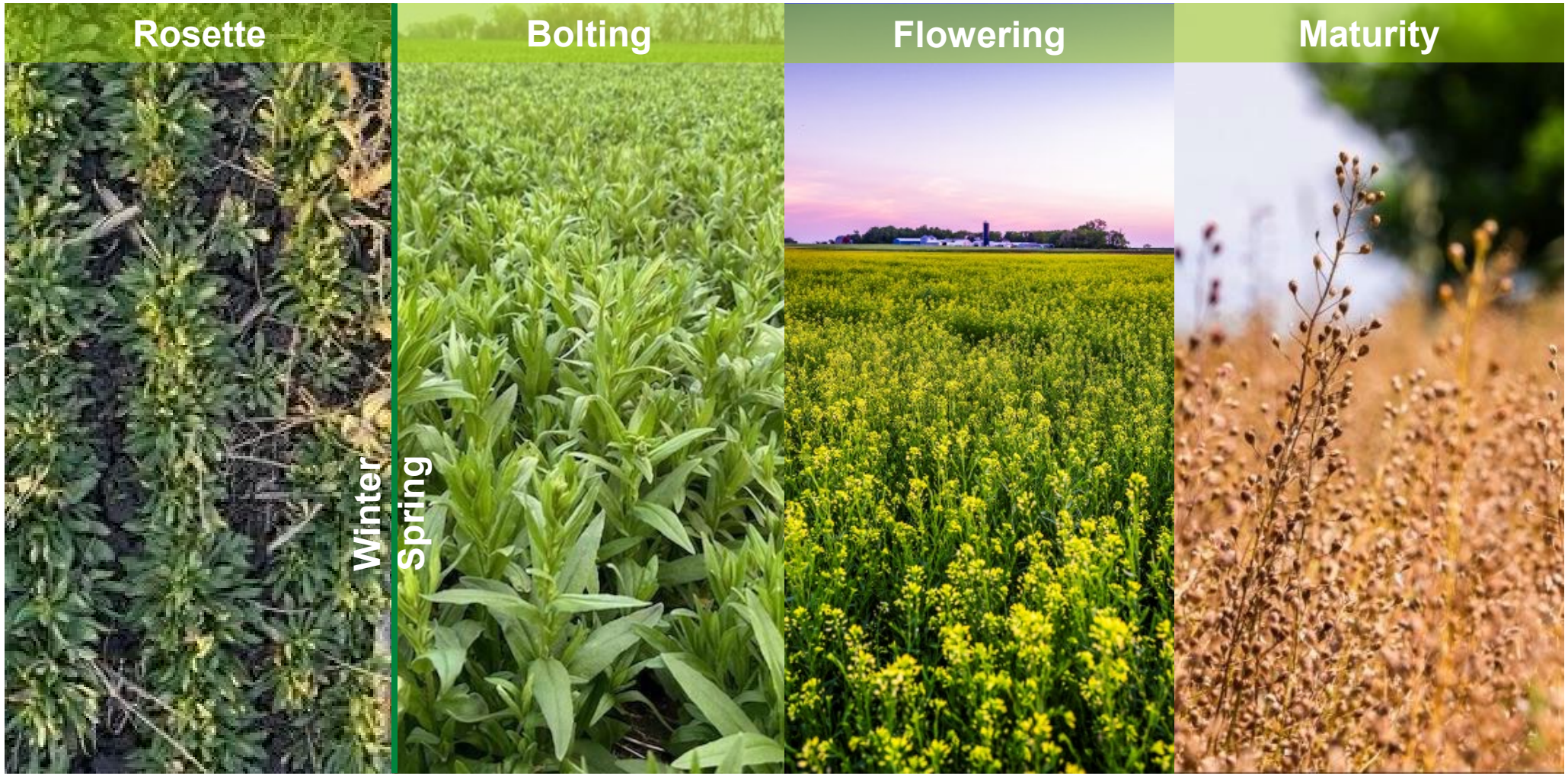
- Similar weed suppression properties
- Similar winter hardiness
- Similar nutrient uptake in the spring (even when fertilized)
- Lower C:N ratio (~20:1)
- Camelina reduces SCN
- Provides early season pollen
- Pest resistant to most troublesome insects

Now how does it fit as a grain crop?

Recent UW-extension research shows no yield drag when terminated compared to rye.

Agronomy and Crop Rotation Considerations

The phases of growth



Crop Characteristics

Brassica family (canola, radishes or turnips, etc.)

- High % of oil (35-39%) just below canola
- TINY seed (clover is similar)

Fall seeded (like winter wheat)- MN,ND,SD,WI,IA

- Between Sept 15th and Oct 15th (further north plant earlier)
- Seed 4-10lbs/acre depending on equipment. 8lbs is avg.
- Seeding depth of ½ - ¾ in: seed to soil contact!!
- Must manage heavy residue

Early harvest (June 10th-July 4th)-MN,ND,SD,WI,IA

Can yield between 700-1500lbs/acre

- First time growers ~850lbs, experienced growers ~1000
- Minimal input costs (50lbs N, planting, harvest)

Crop Rotations

*Be careful of residual broadleaf herbicides

Grain Farmers:

- Corn* → Winter Camelina → Soybeans
- Small grains → Winter Camelina → Soybeans

Livestock/Dairy

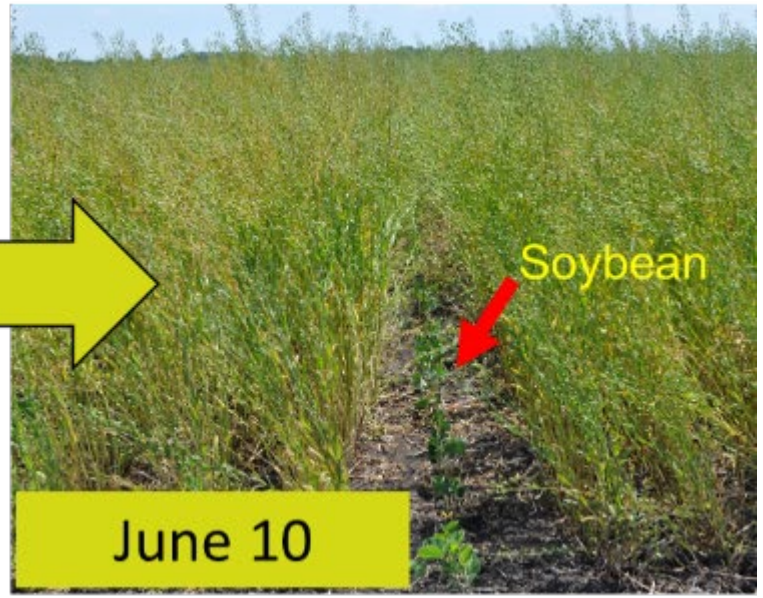
- Corn silage → Winter Camelina → Annual Forage
- Corn silage → Winter Camelina → Soybeans

Specialty Crops

- Soybeans → Winter Camelina → Dry beans/canning crops
- Small grains → Winter Camelina → Dry beans/canning crops

Crop harvested by seeding window → winter camelina → short season maturity or relay crop

Relay Cropping Soybean With Winter Camelina



- Two crops harvested in one year and three crops in two years
- Nearly year-round living cover
- New economic & environmental benefits

USDA

Where has winter camelina been grown successfully?

This is with <u>one variety</u>

More breeding is under way in industry with traits like:

Bigger seed size

Early maturity

Herbicide tolerance

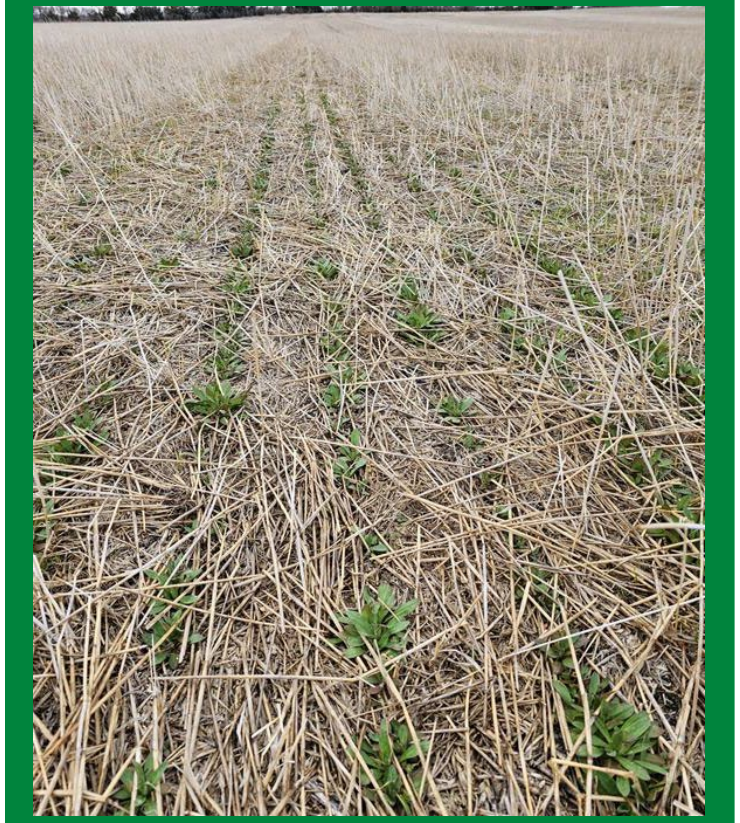
Yield improvements

Commercial traits
- Oil ↑
- Protein ~
- Fiber ↓

Camelina establishment in different tillage systems

Planting technique can vary more than we thought.

No-Till w/ residue



No-till min residue

Conventional Tillage

Herbicide Use

Herbicide plant back restrictions are critical for establishment in Corn/Soy systems

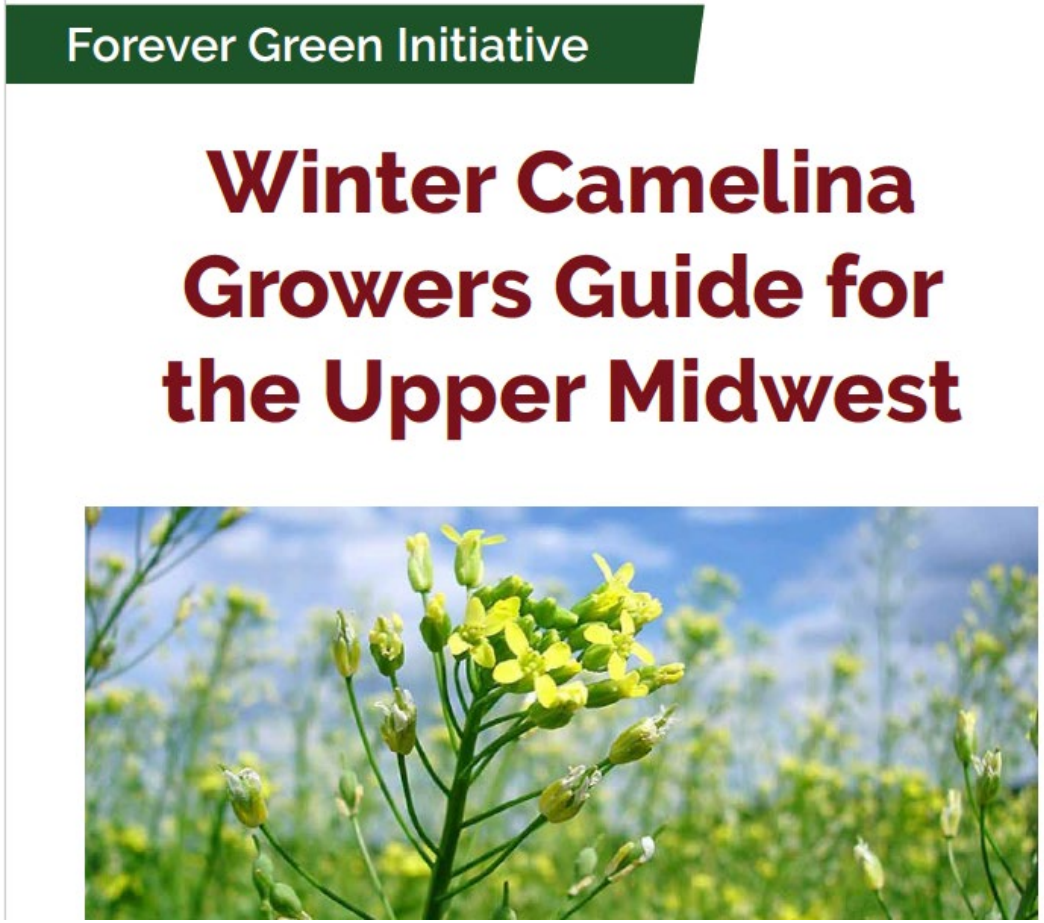
Main Watchout Groups: 2, 3, 4, 5, 14, 15, 27

There is still much research to do with winter camelina and herbicide restrictions. Requires significant pre-planning on farm.

Growers have felt that with the right field selection minimal herbicide use is needed

- In IA observed reduction in waterhemp
- In ND it suppressed kochia

Desiccation was critical for harvest 2025 and provided a weed management window



Herbicide Use

The list is limited but Camelina is very competitive against weeds

Use pattern	Active ingredient	Registered Product	Manufacturer
Preplant Burndown			
	Carfentrazone	Aim	FMC
		Antik EC	Atticus
		Longbow EC	Nufarm
	Caprylic/Capric Acid [a]	FireWorxx [b]	OHP
		HomePlate [b]	Certis
	Glufosinate [a]	Interline	UPL
	Glyphosate [a]	Cornerstone K	Winfield United
		Credit 41 Extra	Nufarm
		Credit 5.4 Extra	Nufarm
		Credit Xtreme	Nufarm
		GlyStar K-Plus	Albaugh
		Honcho K6	Bayer
		Roundup Powermax 3	Bayer
	Pyraflufen	Vida	Gowan
	Quizalafop	Targa	Gowan
Preplant Incorporated (PPI)			
	Trifluralin	Agri Star Trifluralin 4EC	Albaugh
		Treflan TR-10	Gowan
	Ethalfluralin	Sonalan HFP	Gowan
Preemergence (PRE)			
	Clomazone	Caravel	Sipcam Agro
Postemergence (POST)			
	Clethodim [c]	Arrow 2EC	ADAMA
		Avatar	Innvictis Crop Care
		Avatar S2	Innvictis Crop Care
		Ceridian	Atticus
		Clethodim 2E	Albaugh
		Tide USA Clethodim 2EC	Tide International USA
		Willowood Clethodim 2EC	Willowood
	Quizalafop [d]	Assure II	AMVAC
		Targa	Gowan
	Sethoxydim [d]	Poast	BASF
Harvest Aid or Defoliant			
	Saflufenacil [e]	Sharpen	BASF
Harvest Aid or Defoliant			
	Caprylic/Capric acid	All products listed under preplant burndown	All products listed under preplant burndown
	Carfentrazone	All products listed under preplant burndown	All products listed under preplant burndown
	Glyphosate	All products listed under preplant burndown	All products listed under preplant burndown

a Some products also allow for Preemergence burndown use (after camelina is planted but before it emerges).
b OMRI listed product (eligible for use on certified organic farms).
c 70 day preharvest interval
d 60 day preharvest interval
e Do not apply to camelina grown for seed production.

Herbicide Use

The list is limited but Camelina is very competitive against weeds

Central MN
Organic

Southern MN
Conventional

Herbicide Use

The list is limited but Camelina is very competitive against weeds

Central MN
Organic

In the row

Planting
Skip

Southern MN
Conventional

In the row

Planting
Skip

Combine settings

What's worked, what hasn't? We're still learning

- Swathing is acceptable
- Use preset settings for canola, flax, alfalfa, turfgrass and go from there
- Fan speed should be as slow as possible
- Draper, flex head, auger style all work
- Concaves don't need to be super tight unless damp

No Modification –Manufacturer dependent!!

- Drive very slow- let it tumble (1.5mph)
- Small grains kit or other modification may be necessary

Modification

- Round hole screen (5/32nd), or clover/alfalfa sieve
- Cover the first 2/3

Alternative

- Use a seed cleaner/KwikKleen if you happen to have access
- Talk to someone who grew seed beans.

Handling and Storage

Small seed brings unique challenges

- Due to Camelina's very small seed size:
  - Difficult to handle/contain in transport
  - Will have to seal/duct tape any cracks to contain leakage in bottom hoppers and end gates
- Recommend sound storage bins. (Hopper bins)
- In humid conditions drying fans with low heat may be required
- Caution on aeration floors on flat storage
  - Perforations may be too large to contain Camelina seed
- Camelina may be difficult to handle on a windy day

Why Winter Camelina?

Cover crops protect your soil and your water

Access to an emerging market

Adds economic value to a “cover crop”

Commitments to lowering CI

© 2024 Cargill, Incorporated. All rights reserved.