



Agriculture and
Agri-Food Canada

Agriculture et
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Unclassified / Non classifié
Canada

Weed management in potato production

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Weed competition costs Canadian potato producers upwards of \$672 million in lost yield potential annually



Weeds reduce potato yield by 44%



Minimal herbicide options



Reduced cultivation

Delaying weed control costs producers yield

High quackgrass pressure
250 acres of potatoes
Potato price = \$15/cwt
400 cwt/acre
\$1.5 million

Days after emergence	Yield Loss (cwt/acre)	Value lost (\$/acre)	Farm value 250 acres (\$)
10	68	1020	255,000
20	155	2328	582,000
30	206	3090	772,500
120	351	5268	1,317,000

Grasses vs Broadleaves

Weeds can be divided into two large groups



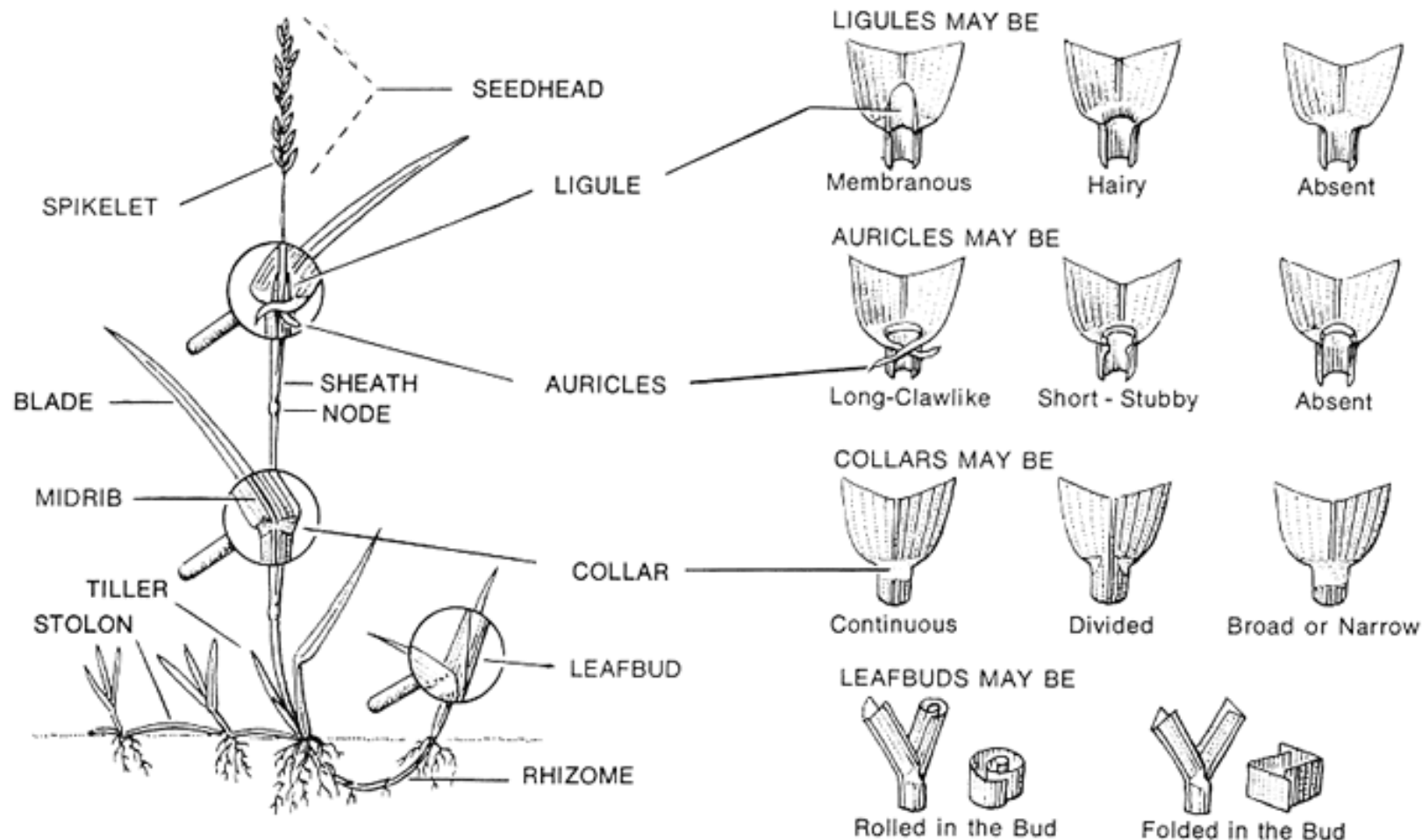
Monocots
Grasses



Dicots
Broadleaves

Identifying Grasses

Parts of a grass plant





© 2004 NC State University

Hairy

Ligules



Absent



Membranous

Auricles



Vegetative Growth



Rhizomes
Under-ground stems



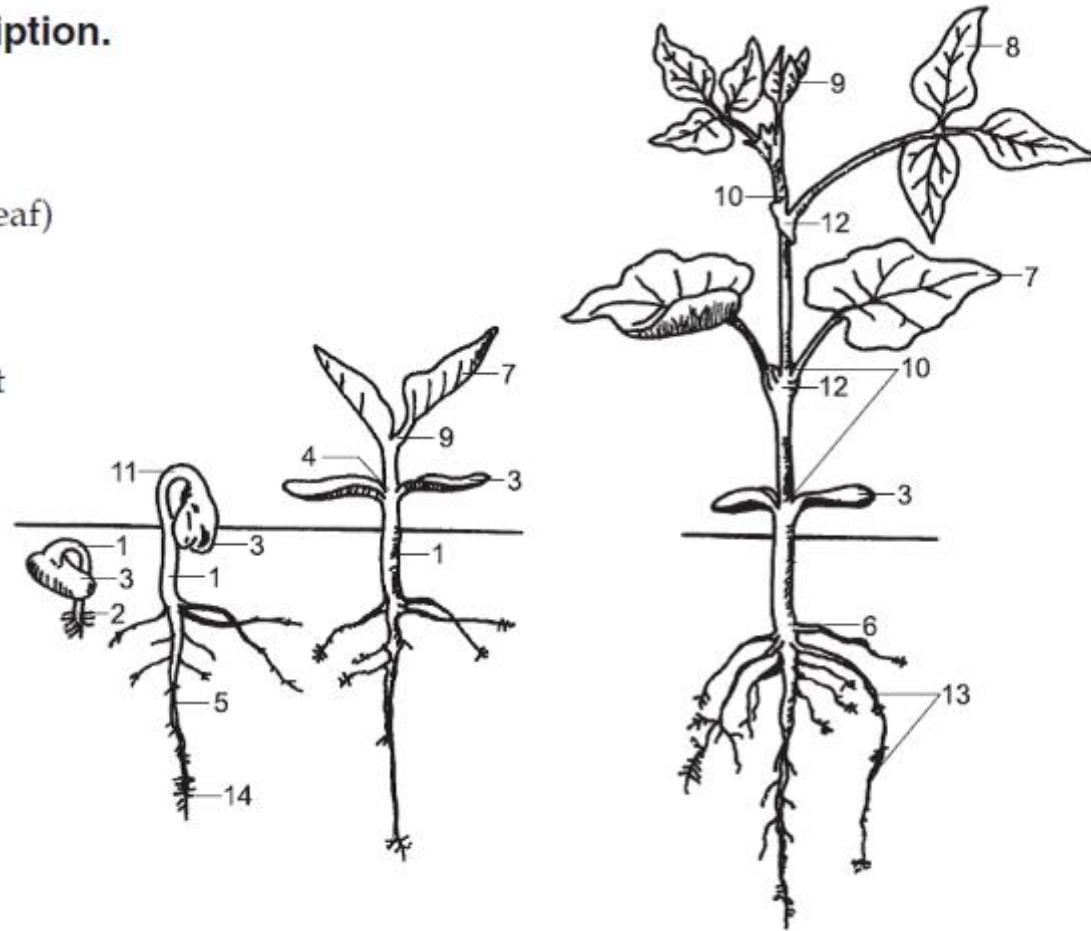
Tillers
Branches

Identifying Broadleaves

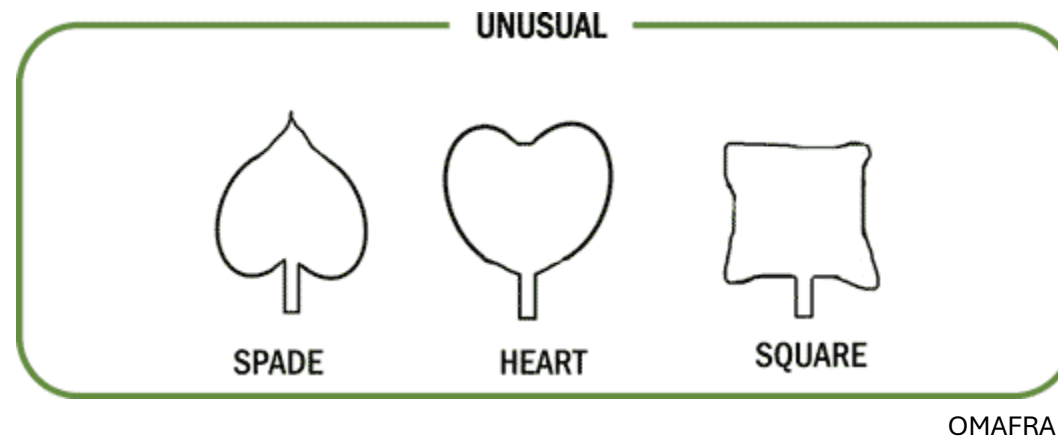
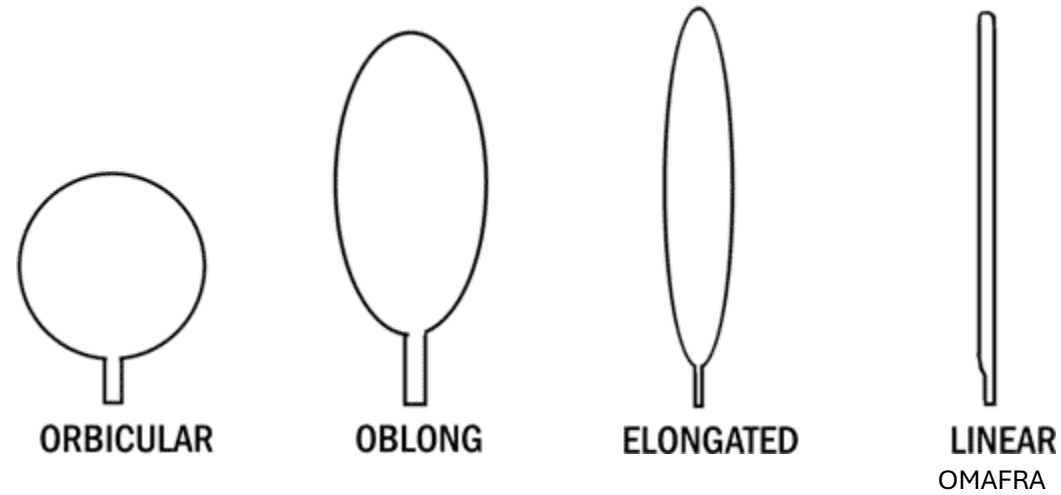
Broadleaf Morphology

Figure 1. Plant description.

1. Hypocotyl
2. Radicle
3. Cotyledon (simple leaf)
4. Cotyledonary node
5. Tap root
6. Lateral (branch) root
7. First true leaf (unifoliolate)
8. Trifoliolate leaflet
9. Terminal bud
10. Axillary buds
11. Hypocotyl arch
12. Nodes (point of leaf attachment)
13. Nodules
14. Root hairs



Cotyledon morphology



Leaf morphology



Compound

Leaf architecture



Opposite



Alternate



Rosette



Whorled

Vegetative reproduction



Stolons
Above-ground stems



Tubers- storage organs



Rhizomes
Below-ground stems



Adventitious root system

Other distinguishing features



Clasping leaves



Ocrea



Spines or thorns



Presence or absence of hair

Problem weeds of PEI



Annual Grasses



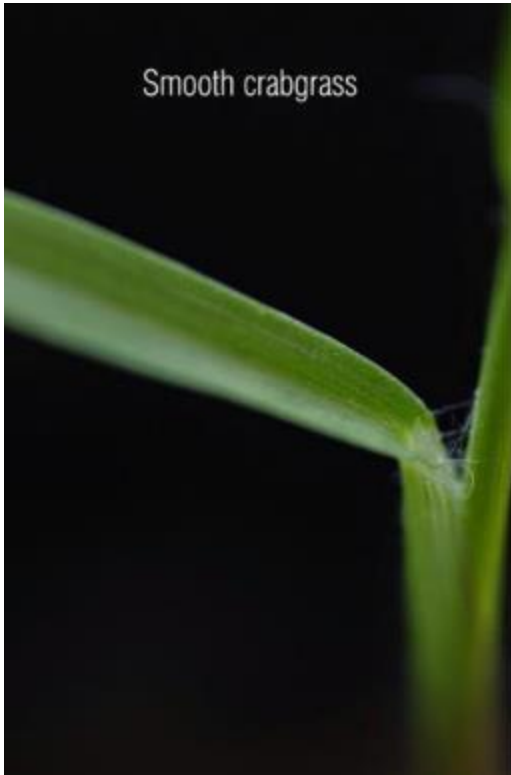
Barnyardgrass
Echinochloa crus-galli
No auricles
No ligule



Foxtails
Setaria spp.
Hairy ligule
Distinctive seed head



Annual Grasses



Smooth crabgrass



Large crabgrass

© Aaron J. Patton



Crabgrasses (*Digitaria spp.*)

Membranous ligule

Smooth crabgrass may have hairs

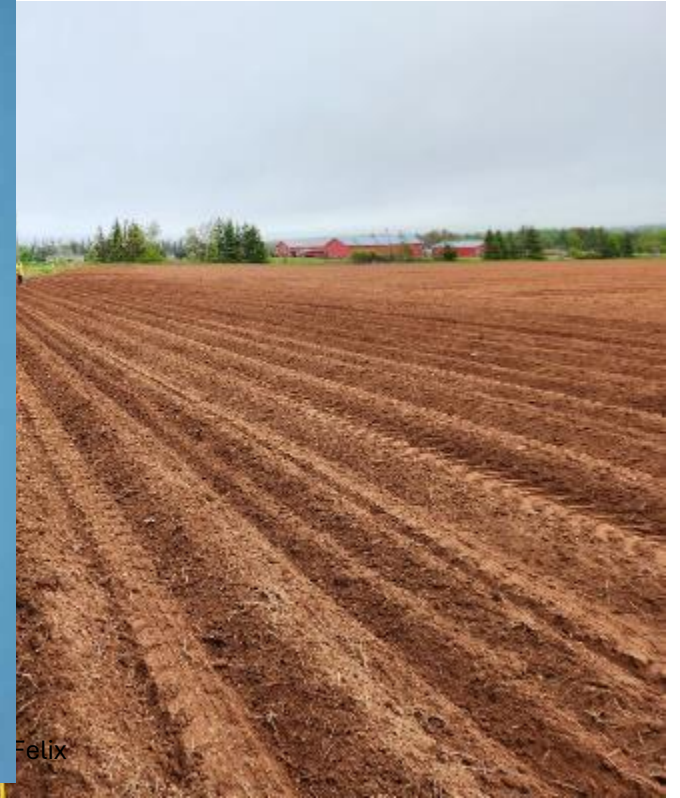
Large crabgrass hairy on both leaf surfaces

Perennial Grasses



Quackgrass or Couchgrass
(*Agropyron repens*)
Membranous ligule
Clasping auricles
Rhizomes
Hair may be present or absent

Yellow nutsedge



Chickweeds (*Caryophyllaceae*)



Mouse-ear chickweed
Cerastium fontanum



Stitchwort
Stellaria graminea



Common chickweed
Stellaria media

Corn Spurry (*Caryophyllaceae*)



Mint Family (*Lamiaceae*)



Hemp-nettle (*Galeopsis tetrahit*)



Field mint (*Mentha arvensis*)



Bedstraw, Cleavers (*Galium spp.*)



Lambsquarters & Pigweed



Lambsquarters (*Chenopodium album*)

Redroot pigweed (*Amaranthus retroflexus*)

Mustard Family (*Brassicaceae*)



Wild mustard Shepard's Purse
Sinapis arvensis *Capsella bursa-pastoris*

Stinkweed Brown mustard
Thlaspi arvense *Brassica juncea*



Smartweed Family (*Polygonaceae*)



Wild buckwheat
Polygonum convolvulus



Sheep sorrel
Rumex acetosella



Lady's thumb
Persicaria maculosa



Smartweed
Polygonum spp.



Ragweed (*Ambrosia artemisiifolia*)



Common Mugwort (Asteraceae)



Sow Thistles (*Asteraceae*)



Spiny annual sow thistle
Sonchus asper



Annual sow thistle
Sonchus oleraceus

Perennial sow thistle
Sonchus arvensis

Goldenrod & Canada thistle



Canada goldenrod
Solidago canadensis



Canada thistle
Cirsium arvense

Less common



Eastern black nightshade
Solanum ptychanthum



Field violet
Viola arvensis



Sand spurry
Spergularia rubra



Corn speedwell
Veronica arvensis



Tufted vetch
Vicia cracca



Green pigweed
Amaranthus powellii



Oxeye daisy
Leucanthemum vulgare

Volunteer Crops







Nearly half of potato fields surveyed have an herbicide resistant weed





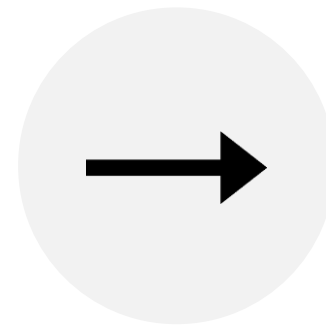
Reduced
cultivation



Shorter crop
rotations



Reliance on
single modes of
action



Herbicide
Resistance

Scouting for Herbicide Resistance

Has the same herbicide mode of action been used repeatedly on this field?

Did the same rate previously control this weed?

Are there live and dead weeds following application?

Noticed a recent decline in control?

Are other weed species being controlled by this rate?

Spotting signs of PSII-inhibitor resistance



If resistance is suspected switch up your pre-emerge



Reflex



Frontier Max



Boundary LQD

Herbicide options for managing group 5 resistant broadleaves prior to potato emergence

Product	Preemergent activity	Postemergent activity	Controls group 5 resistant species?
Sencor 75DF	X	X	No
Lorox L	X	X	Depends
Dual II Magnum	X		Better on pigweed Suppression of lambsquarters
Frontier Max	X		No
Boundary LQD	X	X	Suppression of both
Reflex	X	X	Pigweed control Suppression of lambsquarters
Prism SG		X	Suppression (4 cm max) of both
Glyphosate (various)		X	Yes

Herbicide options in potato

Pre-weed and potato emerge products can be applied from planting up to prior to ground crack

Post-weed emerge, pre-potato emerge can be applied from planting up to prior to ground crack

Post-weed, post-potato emerge products applied postemergence

Sencor
Lorox
Dual II Magnum
Boundary LQD
Frontier Max
Reflex

Sencor
Reflex
Lorox
Reflex
Glyphosate
Reglone

Sencor
Prism
Group 1s

Dual II Magnum (s-metolachlor)

- Group 15 – Inhibition of cell division
- Use rates between 1.25 and 1.75 L ha⁻¹
- Can apply from pre-planting all the way up to ground crack
- ***Has variety issues*** - potato variety responses not well studied
- Pre-emergent weed control
- Uptake in grasses through ***germinating shoot***, absorbed in ***shoots and roots of germinating broadleaves***
- Controls annual grasses and some broadleaf weeds (nightshade, suppression of pigweed)
- ***Rainfall within 10 days is required*** for maximum pre-emergence activity
- Can be soil incorporated to improve pre-emergent activity
- Provides 10-14 weeks of residual control
- Winter cereals can be planted 4-5 months post-application

Boundary LQD (s-metolachlor + metribuzin)

- Group 5 + Group 15
- Use rates of Boundary LQD between 1.85 and 2.5 L ha⁻¹
- Refer to label of Sencor and Dual if tank-mixing
- Broad spectrum of annual grass and broadleaf control
- ***Will not*** control PSII-inhibitor resistant weeds
- Resistance to s-metolachlor documented in pigweed species in the US

Results from our trials (Dual II Magnum)

Poor control of

- Lambsquarters

Moderate control of

- Redroot pigweed
- Shepard's purse
- Wild buckwheat & smartweeds
- Smooth crabgrass

Marketable yield equivalent to weed-free



Heavy weed pressure



Light weed pressure

Results from our trials (Boundary LQD)

Minimal control of PSII-inhibitor resistant species

Excellent control of all other species

See late season grasses

Marketable yield equivalent to weed-free



Heavy weed pressure



Light weed pressure

TOLERANCE OF POTATO CULTIVARS TO S-METOLACHLOR

s-Metolachlor (sold under the trade names Dual II, Magnum, Komodo, and others) is a group 15 herbicide that inhibits synthesis of long-chain fatty acids which restricts cell growth. Most uptake is by the emerging shoots of seedlings. s-Metolachlor is registered for pre-emergence applications in potato prior to ground crack.

s-Metolachlor is effective on many grasses and some small-seeded broadleaves including species resistant to other potato herbicides. Yet, potato cultivars have varying tolerance to s-metolachlor, from no injury up to complete plant death. Minimal information is currently available on potato cultivar tolerance.



Common injury from s-metolachlor including failure to emerge, drawstring effect, leaf malformation, and chlorosis

Researchers at AAFC in Charlottetown have screened a variety of potato cultivars for tolerance to s-metolachlor. Potatoes were hilled right after planting and s-metolachlor applied at a rate of 1.25 L/ha. Potato visual injury was rated six weeks after application.

Potato cultivars displayed a wide range of symptoms to s-metolachlor with typical injury involving leaf malformations including stunting, puckering, the drawstring effect, and chlorosis. In addition to Russet Burbank, Satina, Eva, and Dakota Russet also showed good tolerance to s-metolachlor. Varieties such as Kennebec, Superior, and Mountain Gem, however, were severely injured and sometimes failed to emerge. These results highlight the varied tolerance of potato cultivars to s-metolachlor. Producers should still evaluate this product on a small area when using it on a new variety and as always refer to the manufacturer's label before using any herbicide. Contact Dr. Andrew McKenzie-Gopsill for more information: andrew.mckenzie-gopsill@agr.gc.ca



Satina Eva Dakota Russet



Red Norland Payette Targhee



Kennebec Superior Mountain Gem



Satina



Eva



Dakota



Red Norland



Payette



Targhee



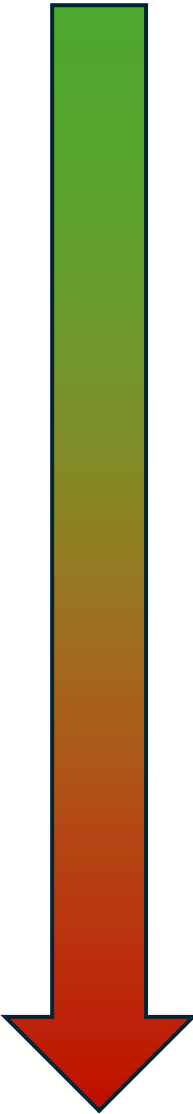
Kennebec



Superior



Mountain Gem



Frontier Max (dimethenamid-P)

- Group 15 – Inhibition of cell division
- Use lower rates with reduced OM (OM~3% use 756 g ha⁻¹, consult label)
- Applied anytime after planting as long as **potatoes have not emerged**
- **Pre-emergent** control
- **Uptake via shoots and roots** but primarily through developing **coleoptile**
- Effective on annual grasses and some broadleaf weeds (pigweed, nightshade)
- Provides **season-long** weed control
- **Rainfall is required** within 7-10 days
- Can use shallow cultivation in absence of rainfall to move product to moist soil zone

Frontier Max (dimethenamid-P)

- In cold, wet conditions, potato emergence may be delayed or stunted
- If crop fails, **do not** re-plant potato – plant corn, soybean or dry bean
- Only **a single application** may be made per year
- Do not apply within 40 days of harvest
- Re-cropping intervals –
 - 100 days for cereals
 - Next spring for potato, corn, soybean, dry bean, cabbage
 - 11 months for all other crops
- 2016 resistance documented in pigweed species in Illinois
- Consult the label before using

Results from our trials

Poor control of

- Lambsquarters
- Shepard's purse
- Wild buckwheat & smartweeds
- Smooth crabgrass

Small marketable yield boost over weed-free (~10%)



Heavy weed pressure



Light weed pressure

Reflex (fomesafen)

- Group 14 – Inhibition of protoporphyrinogen oxidase (PPO)
- Use 1.0 L ha⁻¹, if weeds are emerged add Agral 90 @ 0.1% v/v
- Can be applied at planting up to potato emergence
- Provides **pre-** and **post-**emergent control of pigweed and suppression of lamb's quarters
- **Post-emergent** control of ragweed, wild mustard, lady's-thumb, Eastern black nightshade, canola
- For post-emergent control – max of 4 leaves for most weeds, 3 for lamb's quarters

Reflex (fomesafen)

- ***Do not*** cultivate within 7 days after application
- ***Do not*** apply to soils >5% OM or fine textured soils
- ***Do not*** apply Reflex to a field more than once every two years
- ***Do not*** harvest potatoes within 70 days of application
- Resistance documented in pigweed species across the soybean/corn belt of US
- Consult the label for using

Results from our trials

Good control of early emerging weeds
but doesn't get that second flush

We noted,

- Lambsquarters
- Smooth crabgrass
- Field mint
- Common chickweed

Marketable yield equivalent to weed-free

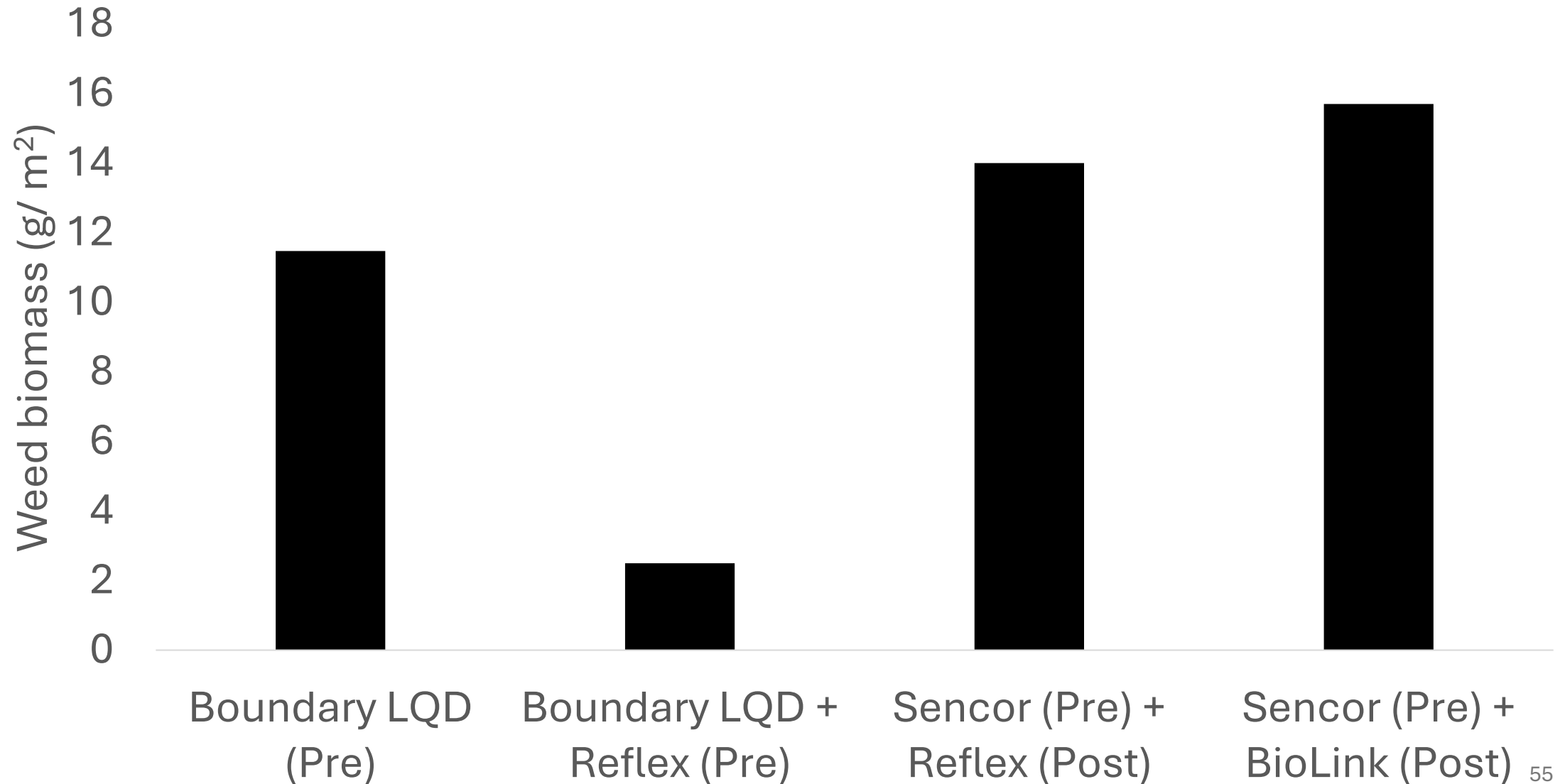


Heavy weed pressure



Light weed pressure

Improved weed control with Boundary + Reflex (Pre) over Sencor (Pre) + Reflex (Post)



Improved weed control with Boundary + Reflex (Pre) over Sencor (Pre) + Reflex (Post)



Boundary LQD (Pre)



Boundary LQD + Reflex (Pre)

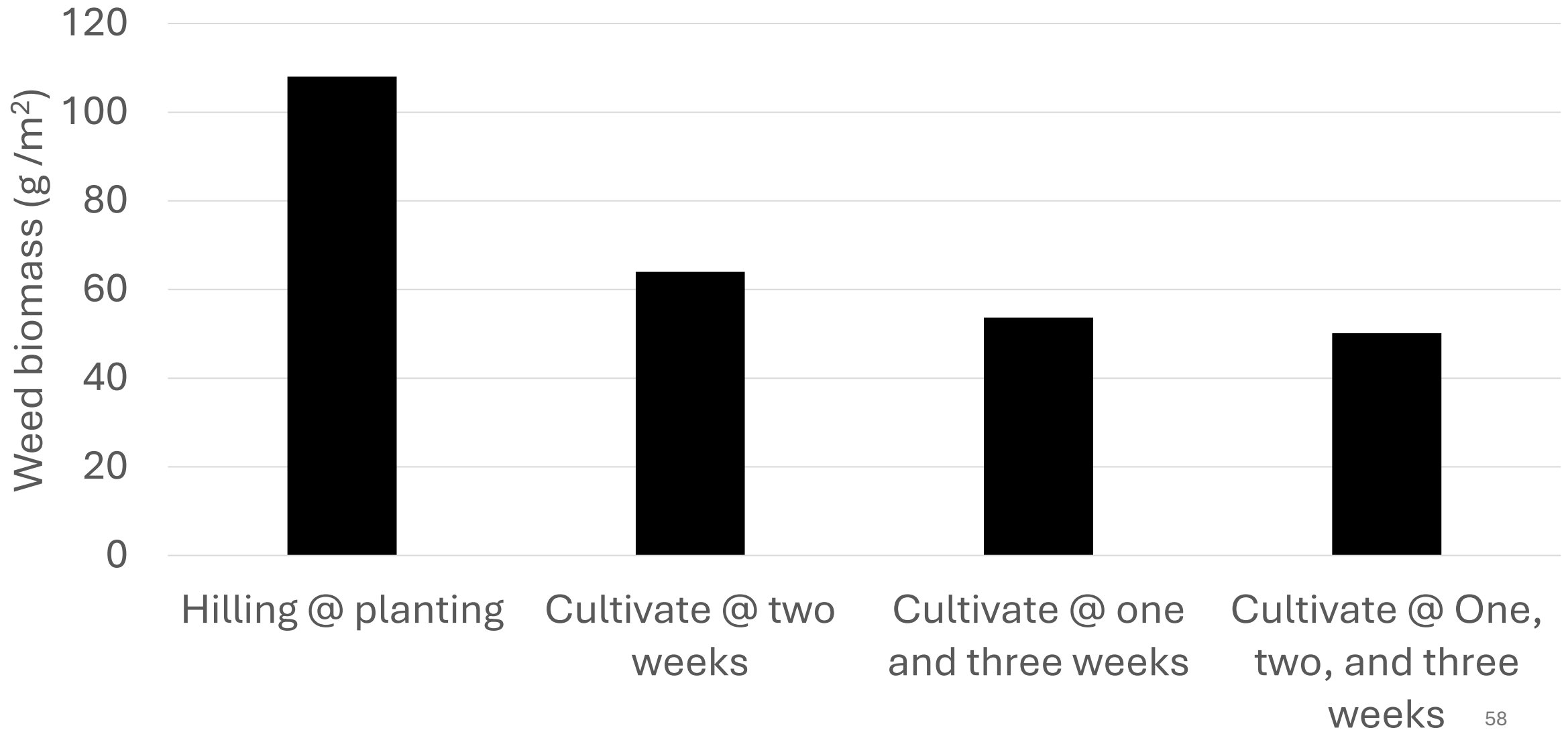


Sencor (Pre) + Reflex (Post)

Potato is very sensitive to Reflex. ***Do not apply*** when there is risk of ground crack



Weed control was similar with two and three cultivations





There are limited post-emergent chemical options available in potato



Hilling at planting demands more of your herbicide

Residual activity and efficacy of many products used in potato is reduced in low OM, low pH soils

Evaluation of pre-potato but post-weed emergence options and products is ongoing

Critical potatoes are not at ground crack or emerged at time of application

Product	Timing	Product Rate
Sencor	Weekly	140 g/ ha/ application
Reflex	14-21 DAP	1 L/ha
Sencor	14-21 DAP	225 g/ ha/ application
Reglone	14-21 DAP	1.5 L/ha



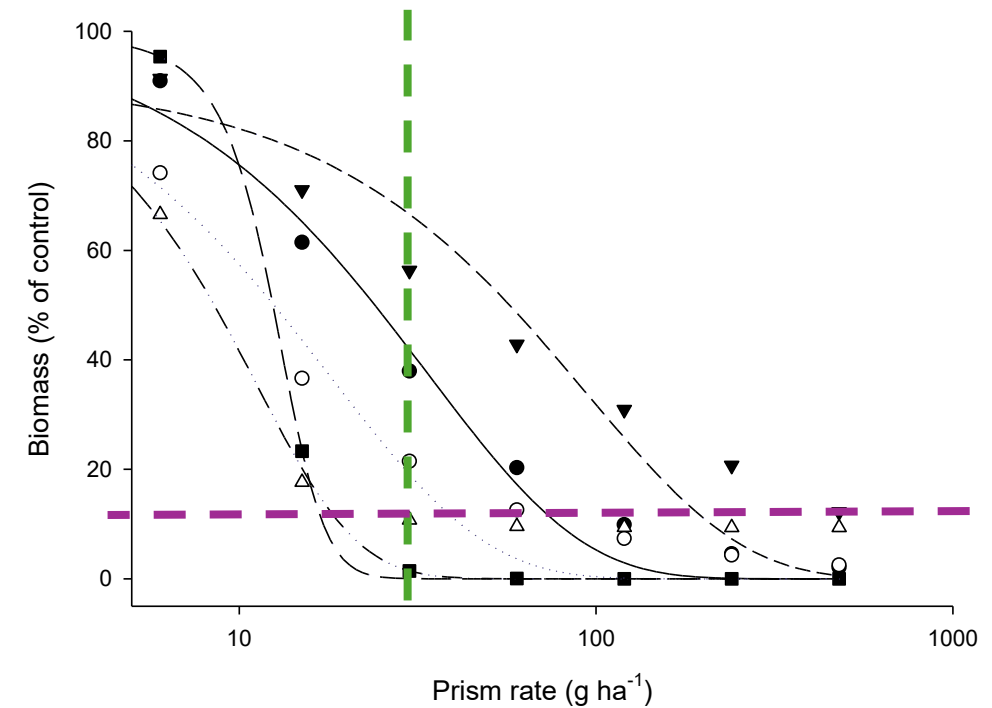
Grass Herbicides

- Group 1 – ACCase inhibitor
- Post-emergent control
- Use rates vary
- Widespread resistance has been documented Worldwide
- Consult the label

Herbicide	Grasses Controlled
Clethodim	Annual grasses
Excel	Annual grasses including crabgrass
Venture	Annual grasses including crabgrass & Couch grass
Poast	Annual grasses including crabgrass & Couch grass

Prism (rimsulfuron)

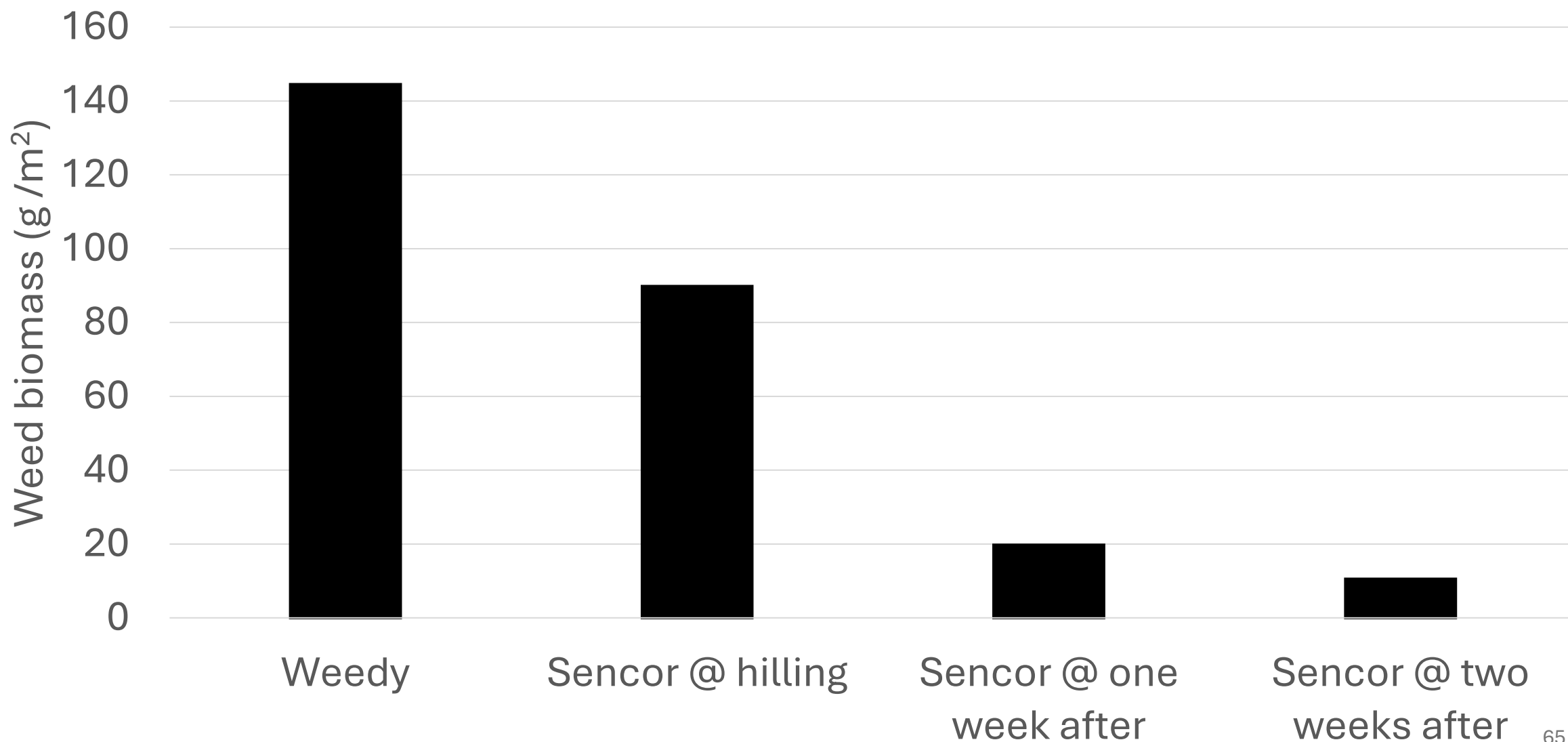
- Group 2 – ALS inhibitor
- Use rate of 60 g ha⁻¹ - ***use a surfactant***
- Can apply from emergence up to initiation of flowering
- Control of
 - Annual grasses
 - Mustards
 - Pigweed
- Suppression of
 - Lambsquarters
 - Corn spurrey



Sencor + Prism



When hilling at planting, delaying Sencor application improved weed control over application at planting



When hilling at planting, delaying Sencor application improved weed control over application at planting

Unclassified Non classifié



Sencor applied @ hilling
(0.5 lbs/acre)



Sencor applied @ one week
(0.5 lbs/acre)



Sencor applied @ two weeks
(0.5 lbs/acre)

There is a range of tolerance to metribuzin across potato varieties

Variety	Tolerance
Alverstone Russet	Susceptible
Atlantic	Moderately Susceptible
Caribou Russet	Tolerant
Dakota Russet	Tolerant
Highland Russet	Resistant
Innovator	Susceptible
Mountain Gem	Good Resistance
Norland	Moderately Resistant
Ranger Russet	Resistant
Russet Burbank	Resistant
Shepody	Very Susceptible
Targhee Russet	Good Resistance

These ratings are based on overall variety tolerance to metribuzin rather than specifically preemergence v postemergence

These ratings are based on literature Factsheet from NBDAAF with numerous varieties

Test on a small area with any new varieties

BioLink (Caprylic and capric acid)

Non-selective

Organic certified

Apply with hooded/ shielded nozzles

Use higher water volumes to ensure coverage

Three use rates: 3%, 6%, or 9%

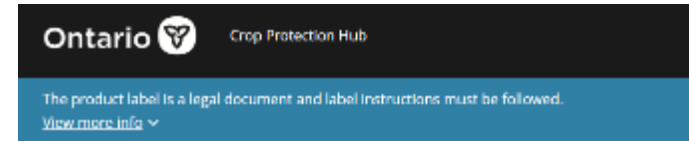
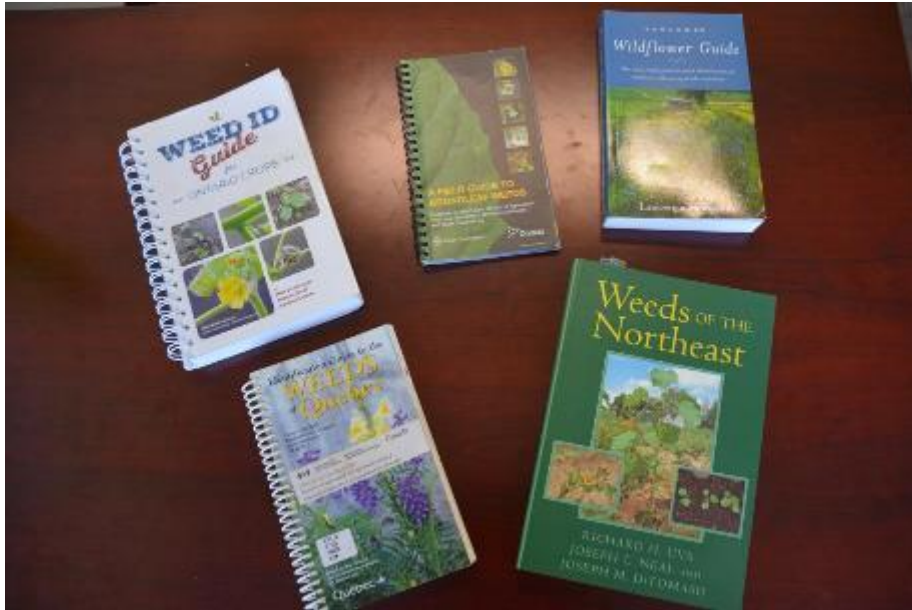
If water pH is 7 or above adjust down with acidifier (citric acid)

Can be used for weed control or as dessicant/ harvest aid

BioLink (Caprylic and capric acid)



Weed ID & management resources

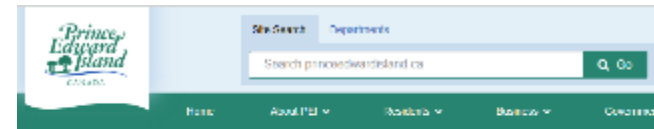


Step 1 of 3

Weed control search

Select a crop species

Search for crop species (191)



Government of Prince Edward Island

Integrated Pest Management

What is integrated pest management?



Topics News Podcast Reports Seed For Sale Partners & Contact

Topics

Pests & Diseases

Soil & Fertility

Pests & Diseases

Click on the subject headers below to view research reports, factsheets, presentations, and external resources for a number of pests and diseases affecting potato growers in Prince Edward Island.



Canada

PMRA

Label Search



Canadian Weed Science Society

Société canadienne de malherbologie

4000 rue de la Savane, Suite 100, St. John's, NL A1B 4X6
Tel: (709) 463-1111 Fax: (709) 463-1112 Email: info@cwss.ca



Herbicide Decision Tool

INSTRUCTIONS:

1. Select a crop from the dropdown list
2. Select an application timing
3. Start typing a weed and select from those available (optional but will give species specific ratings if selected)
4. Ratings will appear along with crop tolerance

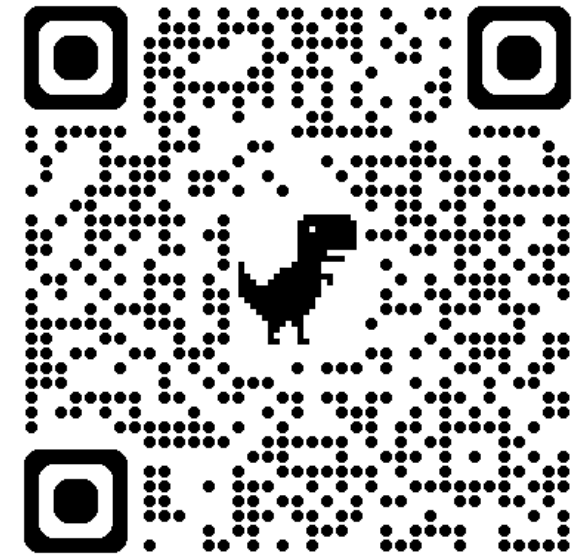
Herbicide Decision Tool

Select Crop:

Alfalfa(underseed) ▼

Application Timing:

Post ▼



Herbicide Decision Tool

Select Crop:

Enlist E3 Corn

Application Timing:

Post

Select Weed(s):

crabgrass wild.oat

Disclaimer: Weed control ratings are recommendations only and not a guarantee. Please review the herbicide label before using any of these products. The use of a trade name does not constitute endorsement of a product.

Show 10 entries

Search:

Herbicide	Tolerance	crabgrass	wild.oat	Active.Ingredient	Herbicide.Group	Rotation_Potato	Rotation_WinterWheat
Liberty		Good	Good	glufosinate ammonium	10	0	2.
Armezon Pro	Excellent	Suppression		dimethenamid-P + topramezone	15 + 27	10	
Acuron Flexi	Excellent			s-metolachlor + mesotrione + bicyclopyrone	15 + 27 + 27		4
Acuron	Excellent			s-metolachlor + atrazine + mesotrione + bicyclopyrone	15 + 5 + 27 + 27		4
Accent	Excellent	Good		nicosulfuron	2	10	
Broadstrike RC	Good			flumetsulam	2	22	



Charlottetown Weeds Tour July 29th 2026 Harrington Research Farm 1200 Brackley Point Road

Come check out all the equipment you can use to control
weeds beyond the sprayer



Agriculture and
Agri-Food Canada

Agriculture et
Agroalimentaire Canada

Questions?

Charlottetown Weeds Lab

Peter Webb

Summer students

Nicolle MacDonald

Harrington Farm Crew

Andrew McKenzie-Gopsill, PhD

Research Scientist – Weed Science

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