



# AgriARM Research Update

WEED CONTROL OPTIONS IN PULSES: THE DO'S AND DON'TS

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[WWW.WARC.CA](http://WWW.WARC.CA)

# Why Are PULSES so Difficult to GROW??

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## WEEDS!!!

A GLANCE at what's in the  
WORKS and  
what to AVOID



# UTILIZE ALL THREE WEED CONTROL CONCEPTS

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**1. CHEMICAL**

**2. MECHANICAL**

**3. CULTURAL**

# 1. CHEMICAL WEED CONTROL

## Herbicide Layering

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- Utilizing two to three herbicides **in sequence** to tackle tough-to-control weeds and to stave off weed resistance
- Research conducted throughout the province
  - volunteer canola, kochia and mustard
- Traditional in-crop weed control vs. herbicide layering PRE-seeding



A federal-provincial-territorial initiative



# UTILIZE ALL THREE WEED CONTROL CONCEPTS

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# Mechanical Weed Control Research

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## Weed Clipping & Weed Wiping

Dr. Steve Shirtliffe – Department of Plant Science, Agronomy

Lena Syrový- Research Assistant

U of S Agronomy Crew: Shaun Campbell, Taryn Zdunich, summer students

U of S Weeds Crew: Gerry Stuber, Aaron Gerein



College of Agriculture  
and Bioresources

Department of Plant Sciences



# In-Crop Weed Seed Management

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- Reduce *production* of viable weed seeds
- Reduce HR weed populations over long term
- Can target weeds that mature before the crop
- Taller weed and/or shorter crop
  - Wild oats, kochia, wild mustard, Canada thistle

**Weed clipping**

**Weed wiping**



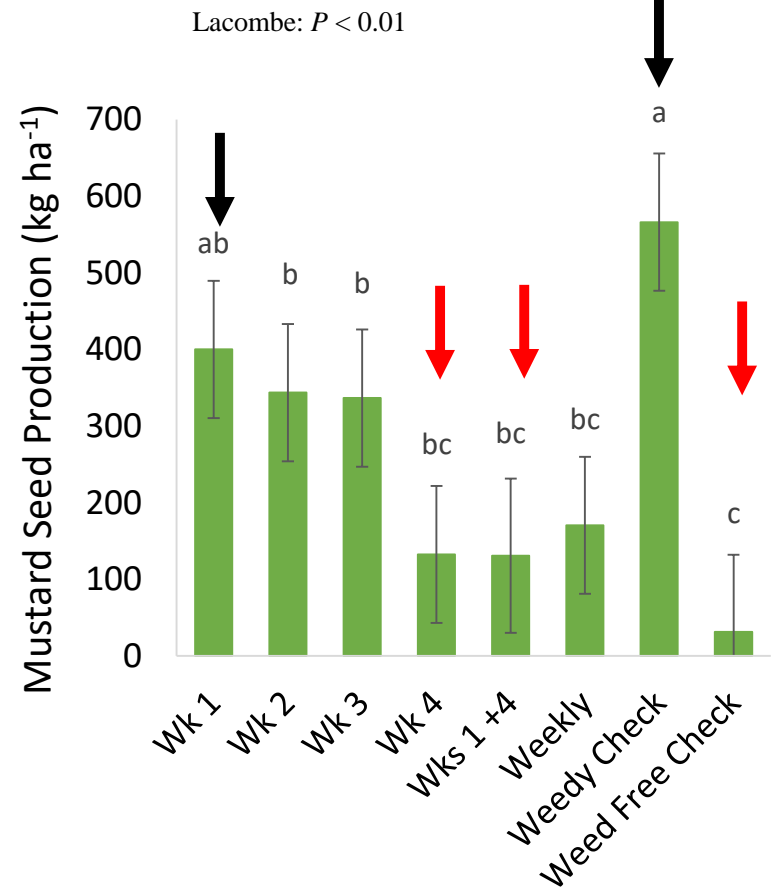
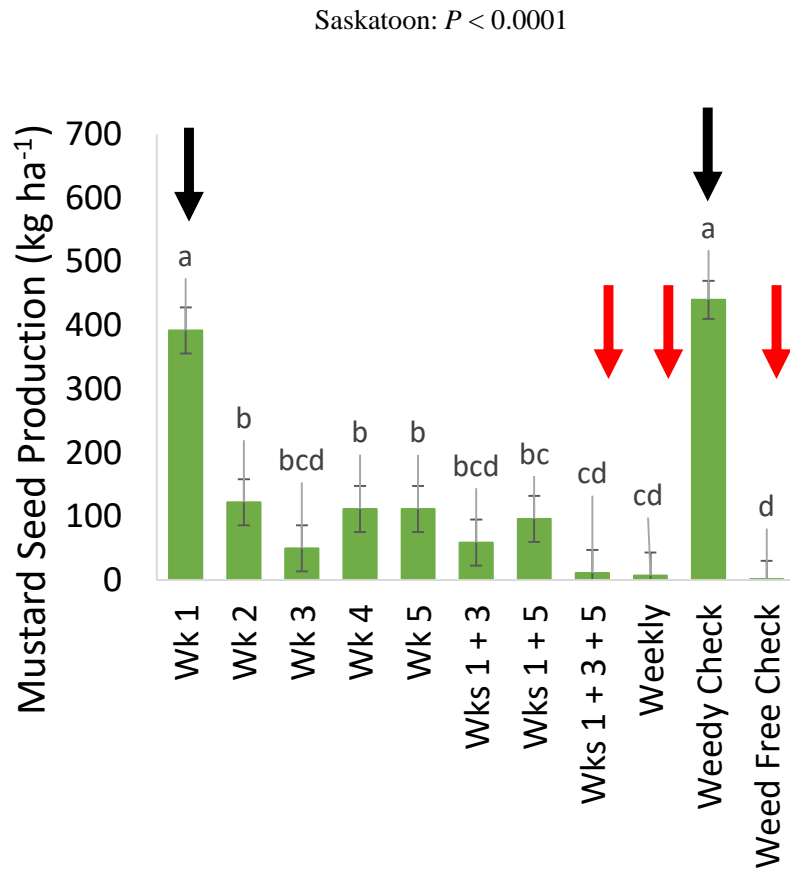
# Weed Clipping





# Weed Clipping

## Mustard Seed Production in Lentil



2-3 passes recommended

# Mustard Seed Production – Clipping Frequency

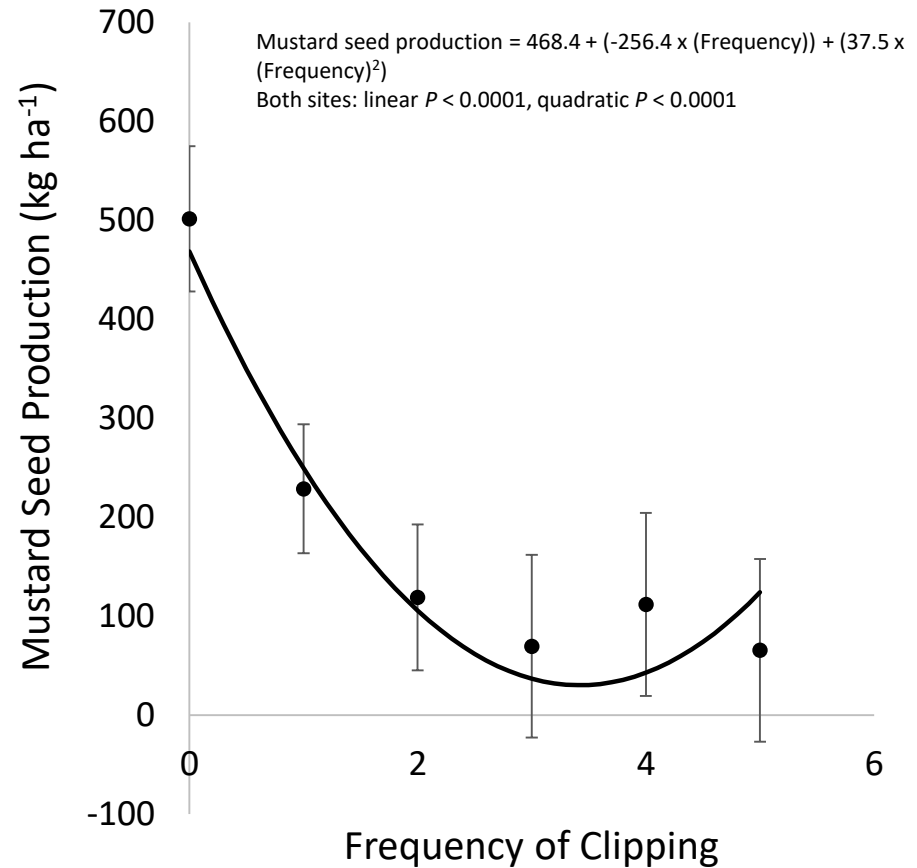


August 1st

1 clipping: 40%

2 clipping: 77%

3 clipping: 92%



# Weed Clipping

## Borgault Tillage Tools 50' weed clipper



<http://www.weedclipper.com/about/>

1.800.878.7714



# Weed Wiping



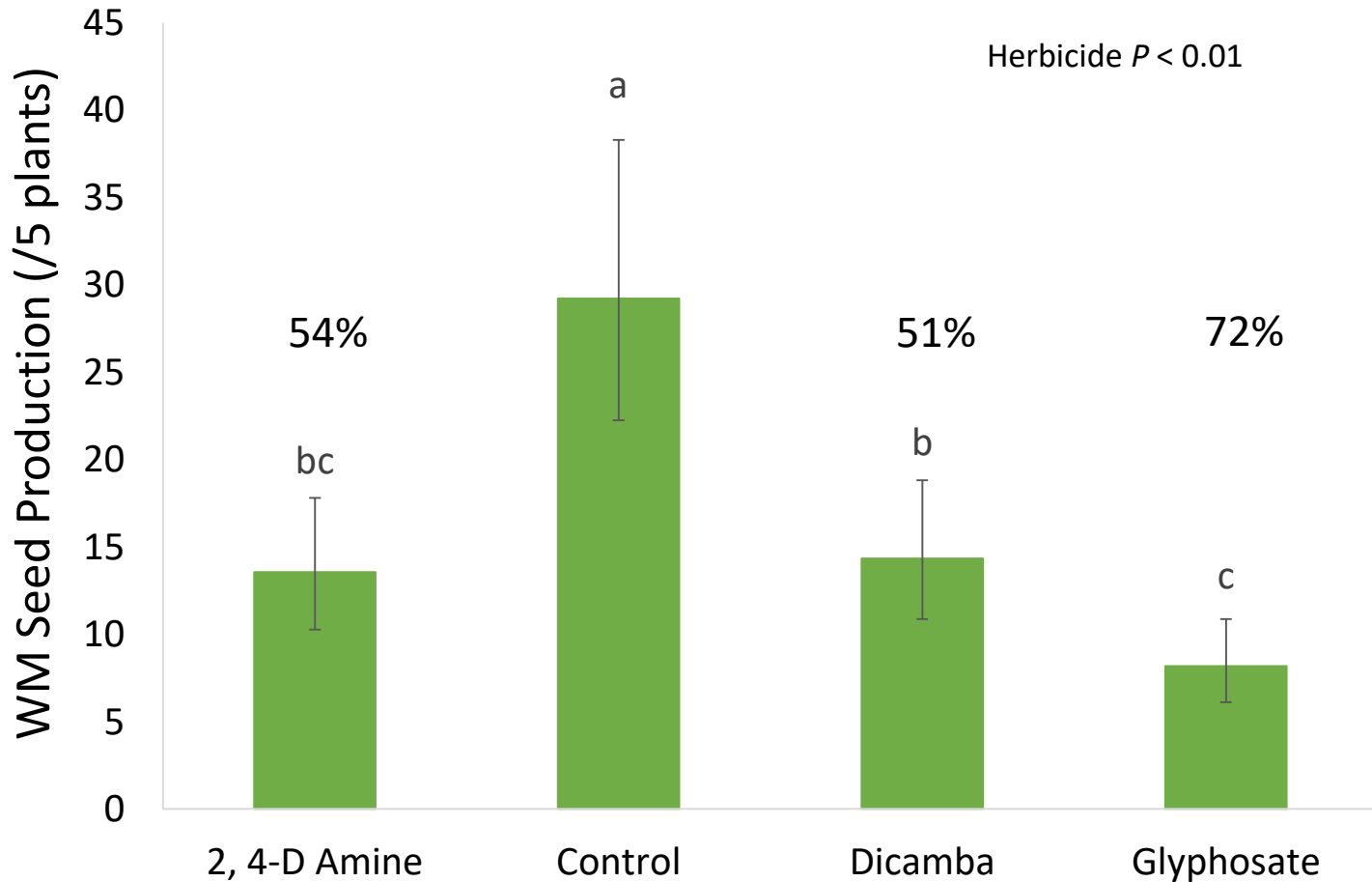
<https://www.bowmanmanufacturing.com/products/rope-wick-applicators-gravity-flow/>



# Weed Wiping

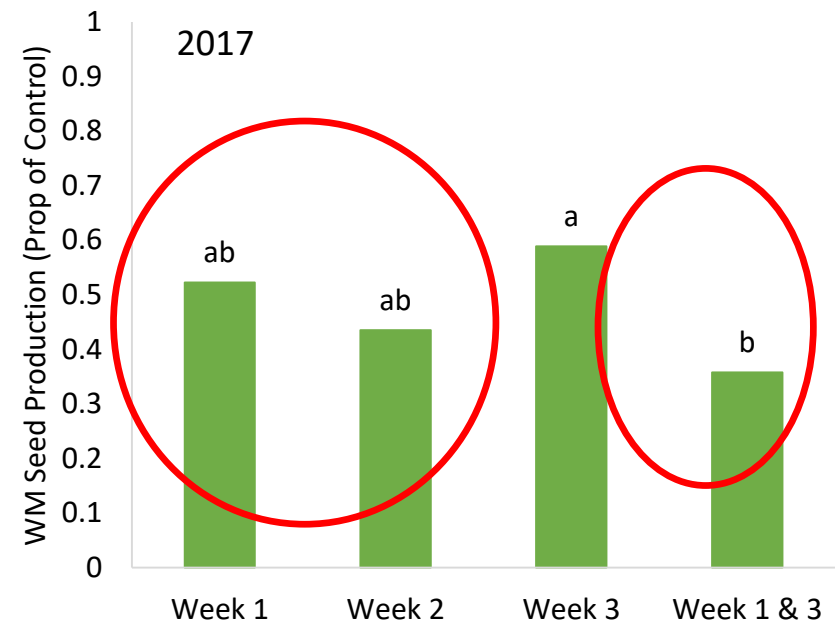
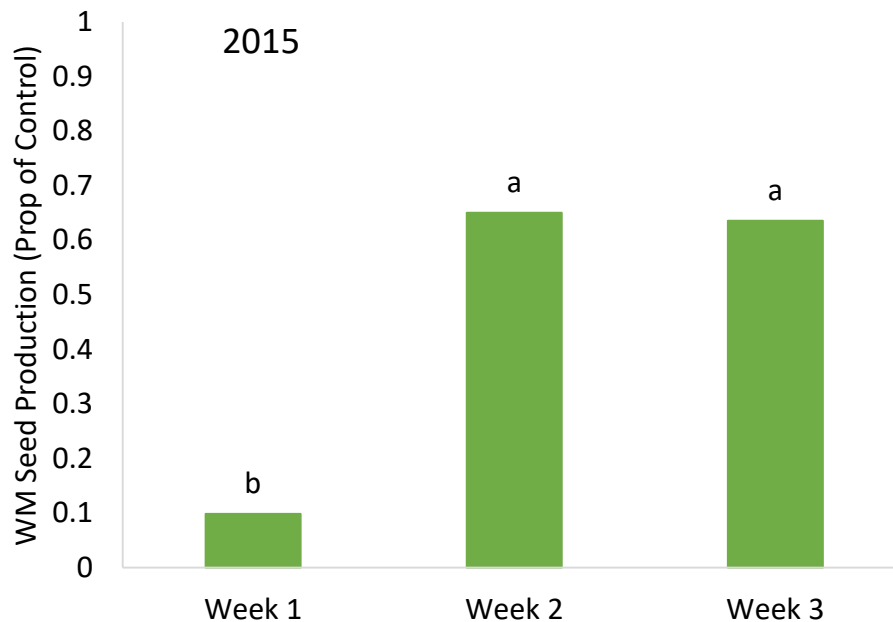


# Wild Mustard Seed Yield in Lentil – 4 site-yrs



# Wild Mustard Seed Yield - Timing

	2015	2016 N	2016 S	2017
Herbicide	0.06	0.06	0.23	<0.0001
Timing	0.02	<0.0001	0.29	0.08
Herbicide x Timing	0.33	<0.01	0.08	0.10



# Wild Mustard Seed Yield - Timing

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## Key Points:

- Timing is inconsistent
- Recommend TWO applications
- Dicamba resulted significant lentil yield loss
- 2- 4 D varied lentil yield loss
- **Glyphosate is the most recommended –**
  - earlier is better if you only do it once



# Wild Mustard Seed Production

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Untreated

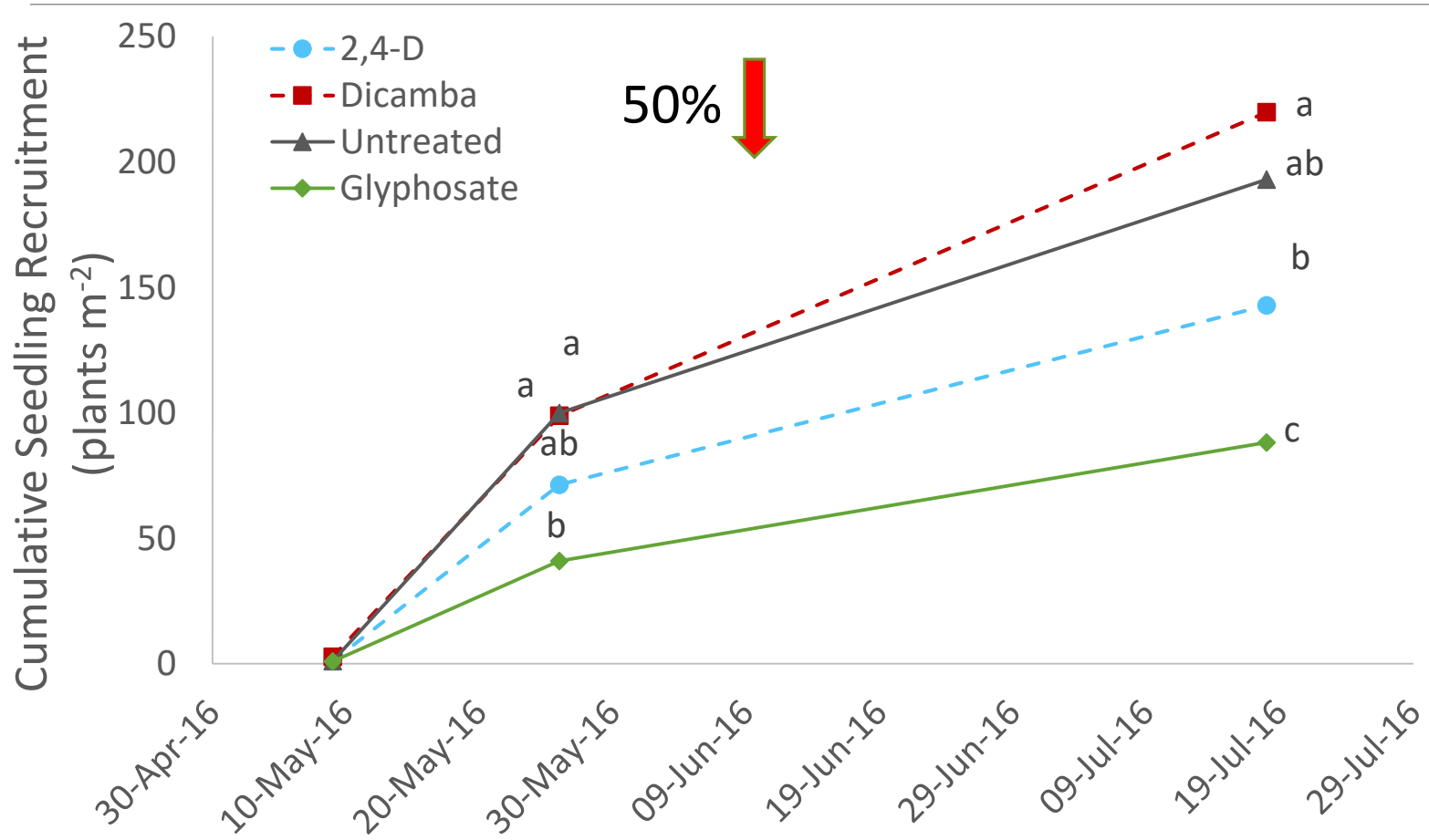
Taken 1 month after application

*Photos: H.S.N. Duddu*



Glyphosate Wk 1

# 2016 Spring Seedling Recruitment



# Mechanical Weed Control Research

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## Rotary Hoe, Harrow & Inter-row Cultivation

Dr. Steve Shirtliffe – Department of Plant Science, Agronomy

Alba Oleksandr- MSc. Graduate

Lena Syrovyy- Research Assistant

U of S Agronomy Crew: Shaun Campbell, Taryn Zdunich, summer students



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Growing Forward 2  
A federal-provincial-territorial initiative



Government  
of  
Saskatchewan  
Ministry of Agriculture

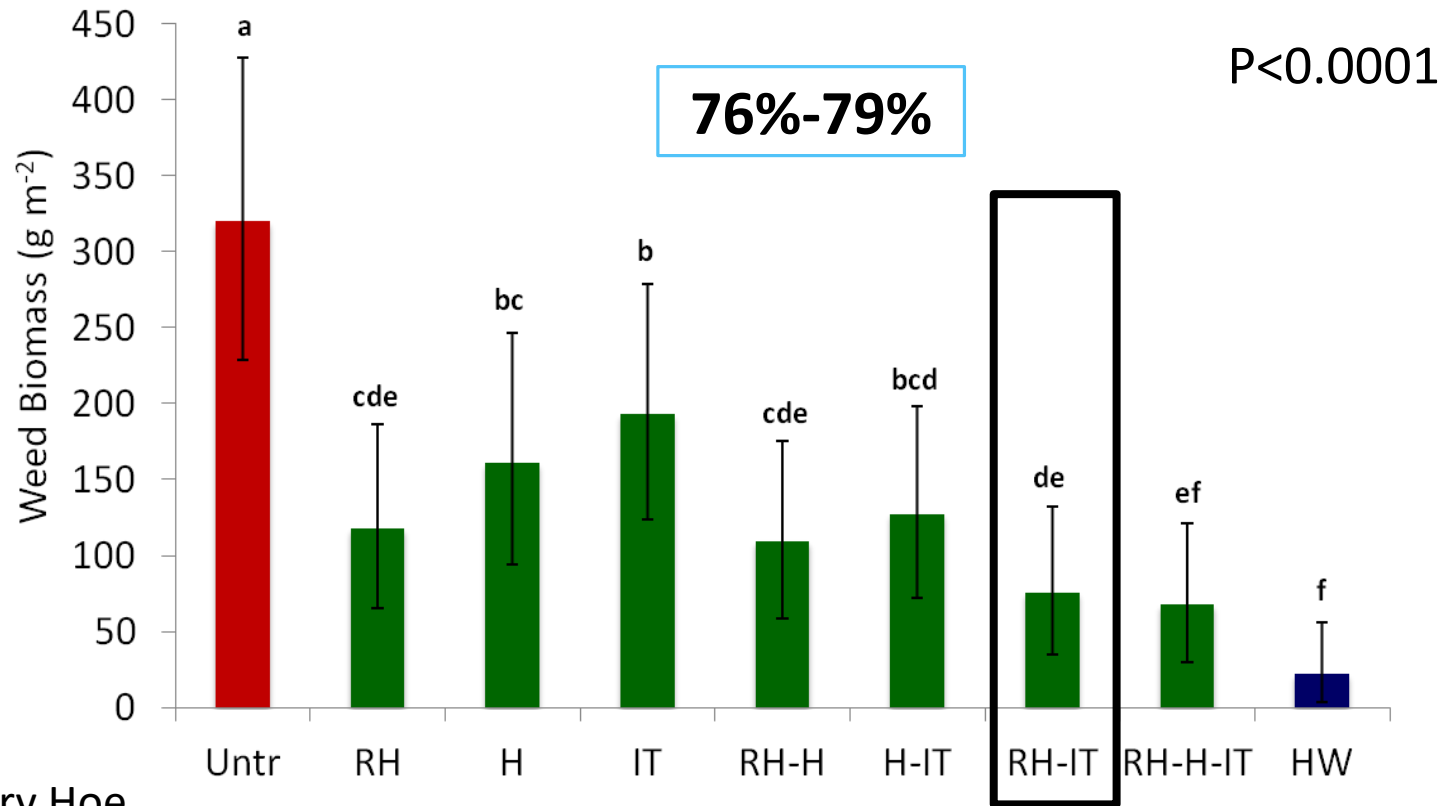
SASKATCHEWAN  
pulse  
Growers



Agriculture and  
Agri-Food Canada

Agriculture et  
Agroalimentaire Canada

# Mechanical Weed Control in Lentil

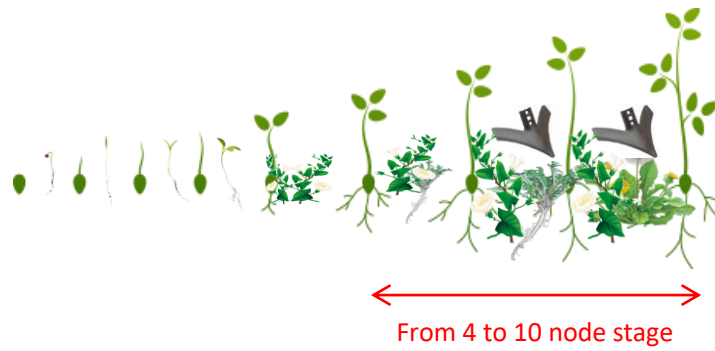
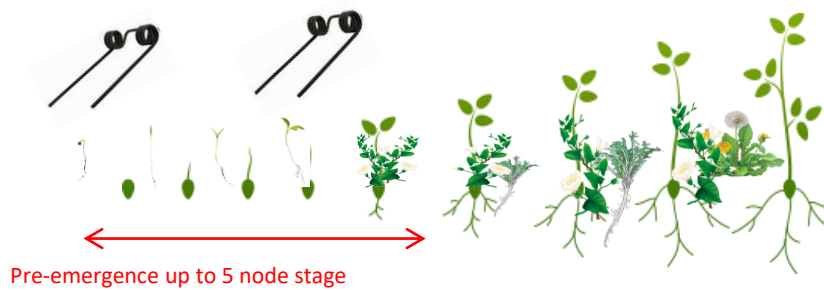
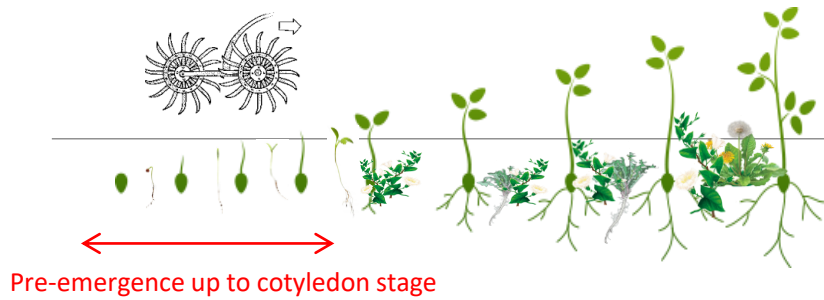


RH- Rotary Hoe

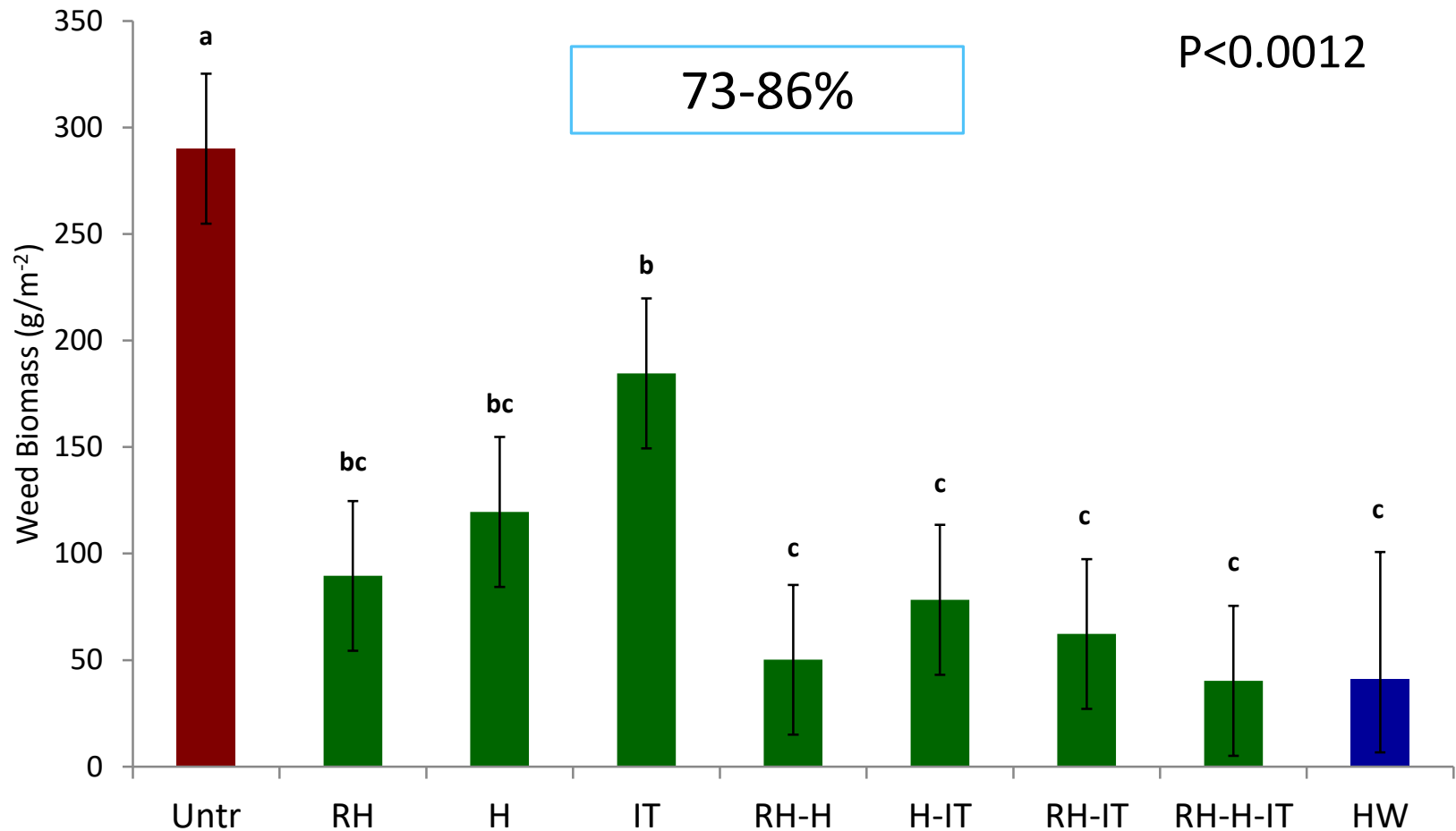
H- Harrow

IT- Inter-row Cultivator





# Weed Control in Field Pea







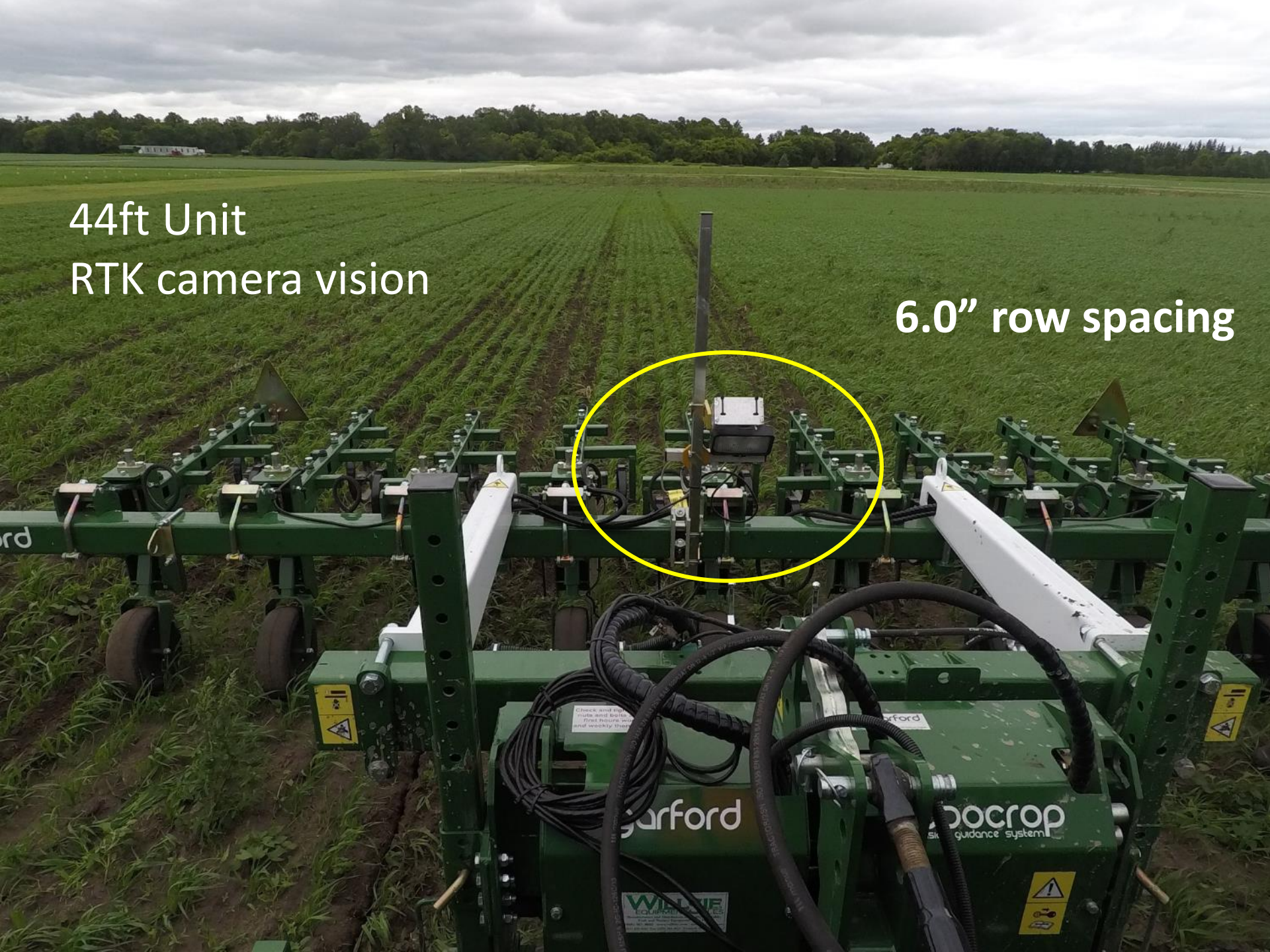
Untreated

Rotary Hoe & Inter-Row Cultivation



44ft Unit  
RTK camera vision

6.0" row spacing





# Key Findings

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- Multiple passes are required to provide great weed control
- Early season weed control paired with in-crop is most effective
  - glyphosate for early control
- Followed by inter-row cultivator to remove any remaining weeds
  - Inter-row cultivator wide range of use
  - Can be used as early as camera can detect plants
  - Ideally between 4 and 10<sup>th</sup> node stage

# Harvest Weed Seed Control

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Dr. Breanne Tidemann- Research Scientist AAFC

AAFC Lacombe Crew: Larry Michielsen, Jennifer Zuidhof, Patty Reid, Shane Sroka

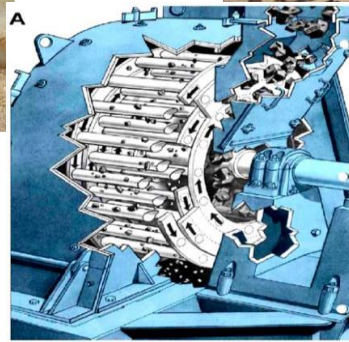
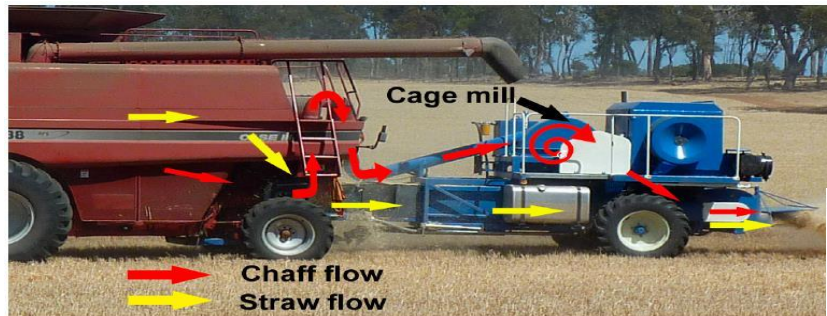
U of S Weeds Crew: Gerry Stuber, Aaron Gerein



# Harrington Seed Destructor

Cage mill to impact/grind the chaff

All residue placed back on the field



<https://weedsmart.org.au/harrington-seed-destroyer/>

# Integrated Harrington Seed Destructor (iHSD)

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- Used in various combine models



<http://www.ihsd.com/product-features>



# Seed Terminator

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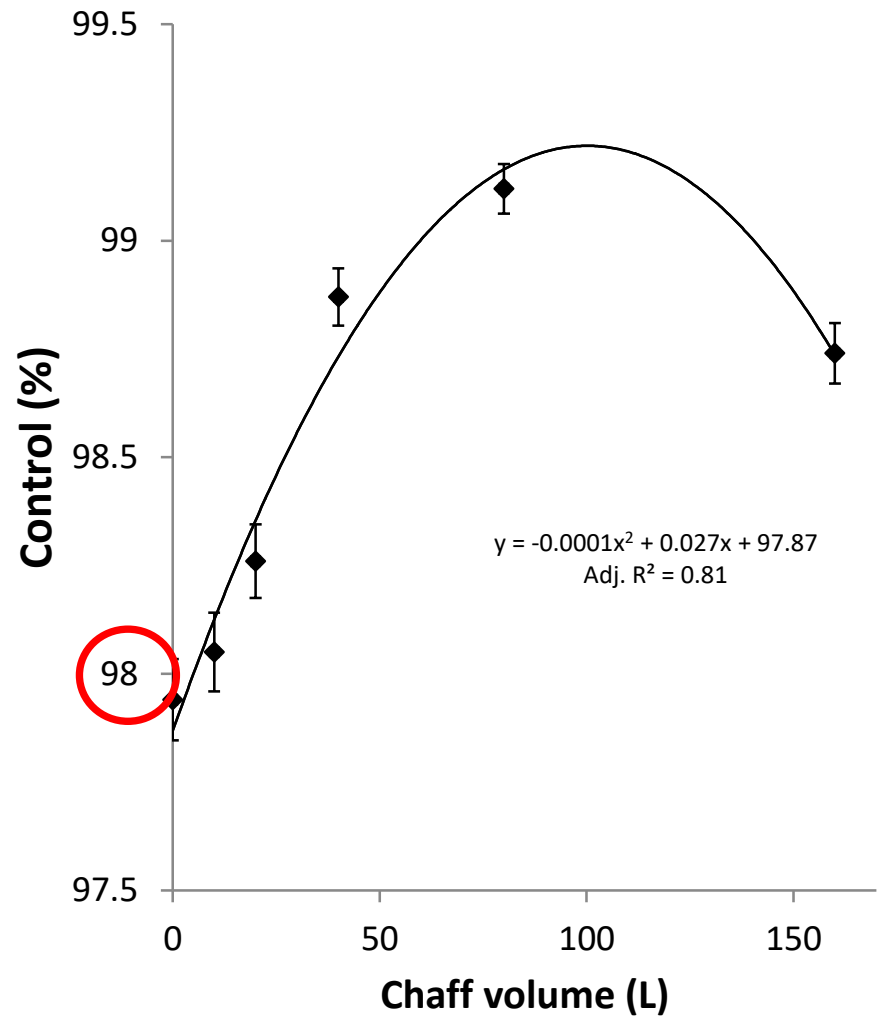
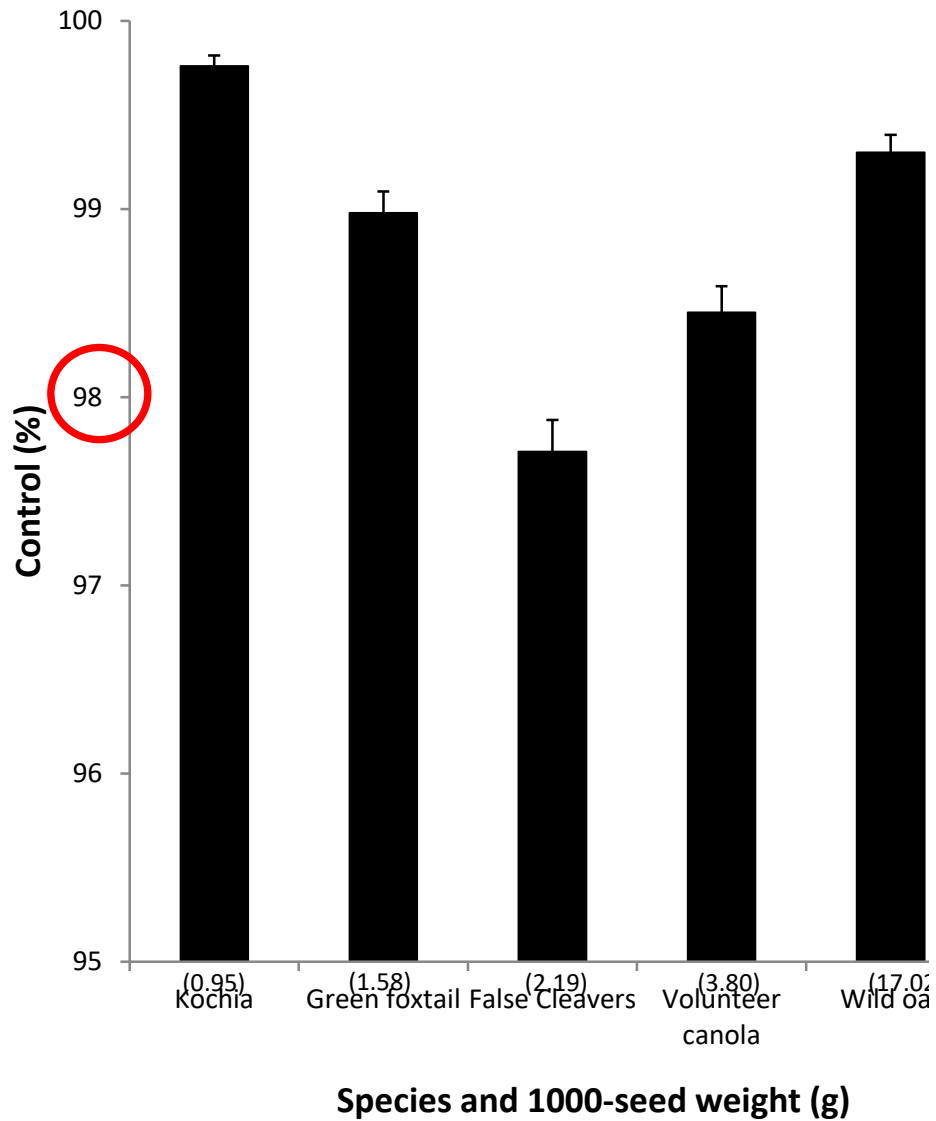
Multi-stage hammer mill

Australian & Canadian

Seed Terminator in action









# Volunteer Canola this Fall – ONLY 1 FIELD

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# UTILIZE ALL THREE WEED CONTROL CONCEPTS

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**2. MECHANICAL**

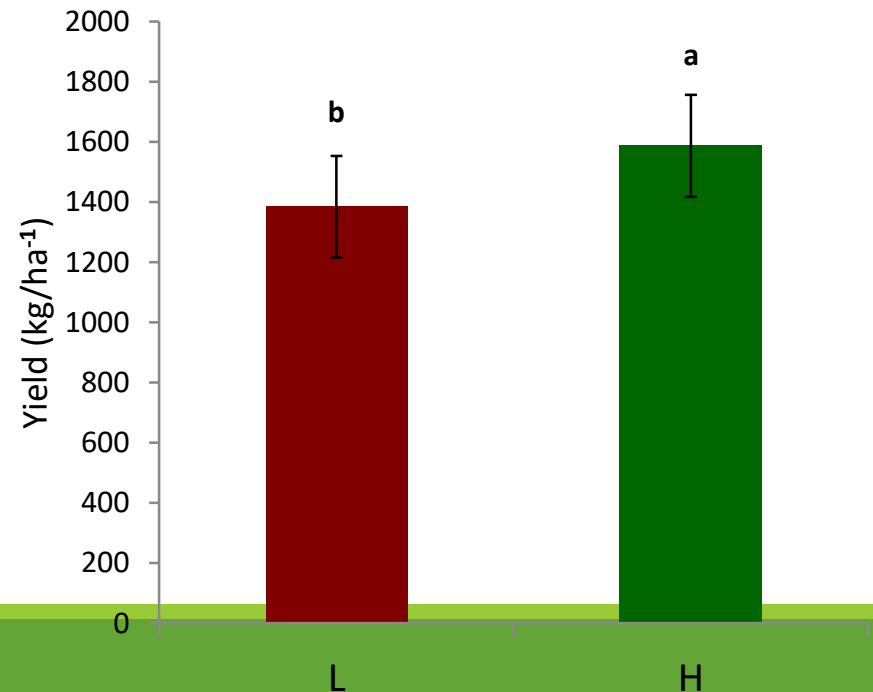
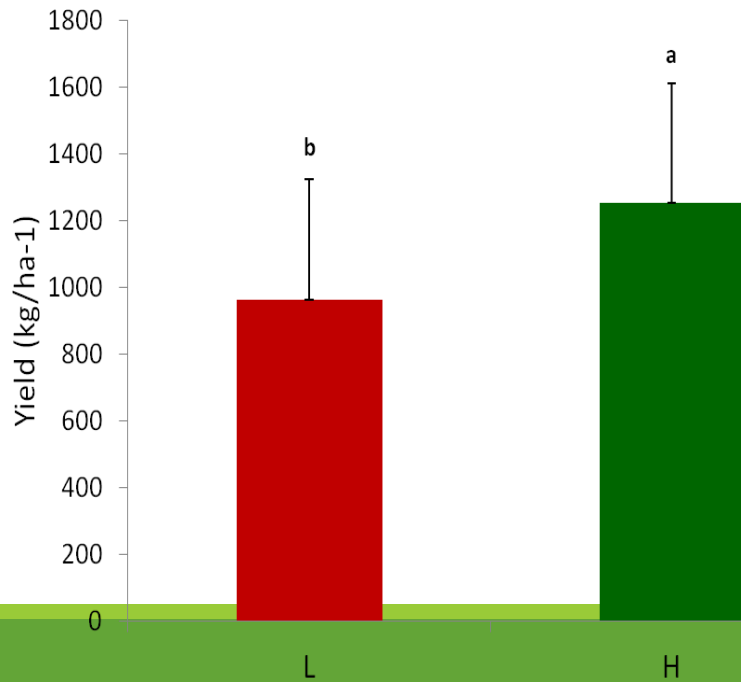
**3. CULTURAL**

# Cultural Concepts

*Don't count out **cultural** control*

## Seeding Rates

- Lentils : Current 130 seeds/m<sup>2</sup> vs. 260 seeds/ m<sup>2</sup>
- Field peas: Current 90 seeds/m<sup>2</sup> vs. 135 seeds/m<sup>2</sup>



# Literature Findings

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- Baird, J.M., Shirliffe, S.J. and Walley, F.L., 2009. Optimal seeding rate for organic production of lentil in the northern Great Plains. *Canadian Journal of Plant Science*, 89(6), pp.1089-1097.
- Paolini, R, G Colla, F Saccardo, E Campiglia. 2003. The influence of crop plant density on the efficacy of mechanical and reduced-rate chemical weed control in lentil (*Lens culinaris* Medik.). *Ital J Agron* 7:85–94.
- Redlick, C. 2015. Integrated weed management in lentil (*Lens culinaris* Medik.). M.Sc. thesis. University of Saskatchewan, Saskatoon, SK, Canada. *Publication pending*.
- Redlick, C., Duddu, H.S., Syrový, L.D., Willenborg, C.J., Johnson, E.N. and Shirliffe, S.J., 2017. Effect of Seeding Rate on Dose Response of Wild Mustard (*Sinapis arvensis*) to Fluthiacet-Methyl. *Weed Science*, 65(4), pp.525-533.
- Field Pea Input Study. 2014. Grenkow.,L, Johnson, E., Kirk, A., Brandt, S., Phelps, S., Holzapfel, C., Nybo, B.

# Don't Remove Pulses From Your ROTATION

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## Reasons why to keep pulses:

1. Use for a 3-yr rotation
  - Reduce spore load of clubroot
2. Use less fertilizer
3. Better flax crops
  - Establish levels of mycorrhiza
4. Long-term soil health benefits
  - Improve total soil microbial population
  - Improve soil organic levels
5. Rejuvenate soil N levels
  - Reduce fertilizer requirements for next season



# UTILIZE ALL THREE WEED CONTROL CONCEPTS

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*A few options to consider...*

## 1. CHEMICAL

- Herbicide Layering

## 2. MECHANICAL

- Weed Wiping
- Inter-row cultivation
- Weed Clipping
- Weed Seed (HSD/ ST)

## 3. CULTURAL

- Seeding Rates
- Crop Rotation



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