UNIVERSITY OF SASKATCHEWAN

Response of *Galium* species (cleavers) to herbicides

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Galium species (cleavers)

- *Rubiaceae* Family

- Annual weed which causes economic losses in agriculturally managed ecosystems around the world.

Galium species

- Annual or winter annual
- Twining stems
- Dispersion by animals
- Highly adaptable

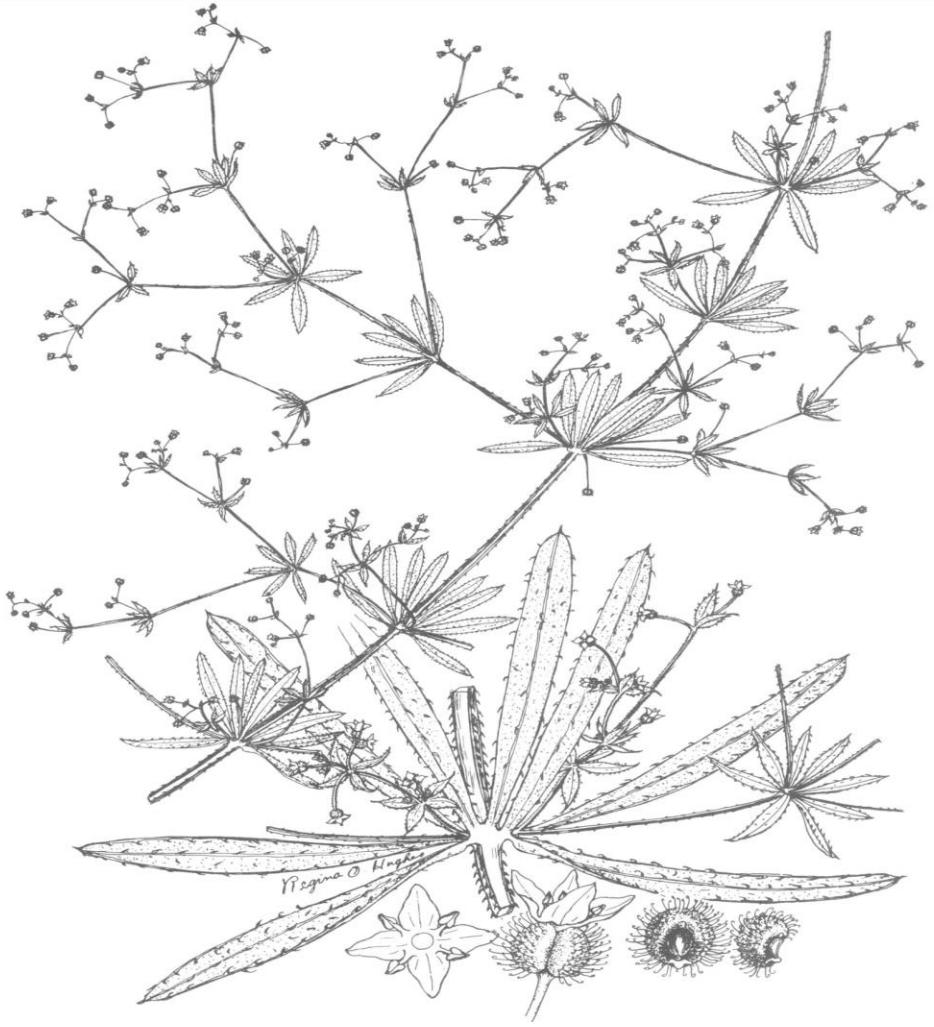


Figure 1. Distinguishing features of Galium species (Defelice, 2002)

Galium species of Canada

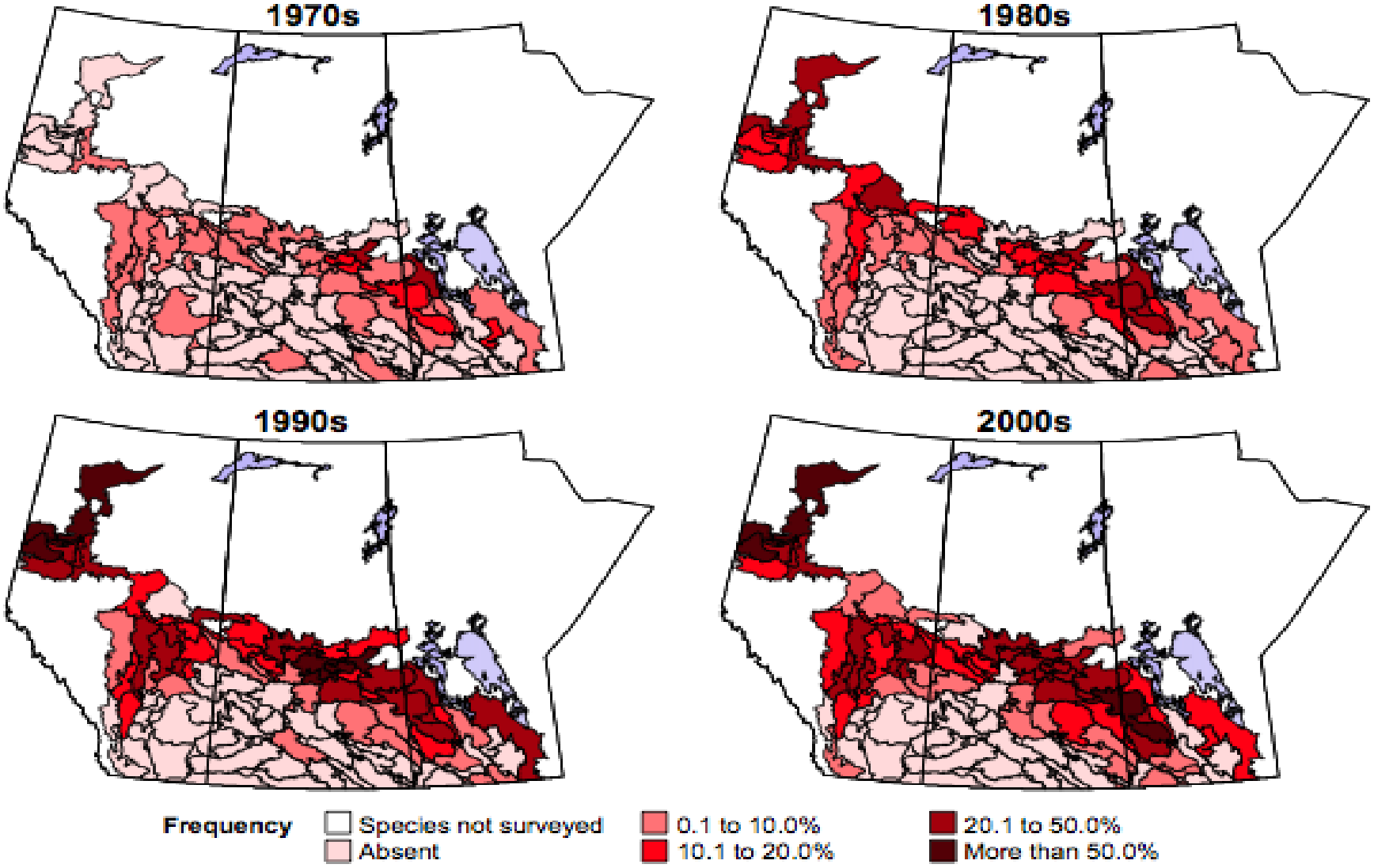
- *Galium borealis L.* (Northern Bedstraw)
- *Galium spurium L.* (False cleavers)
- *Galium aparine L.* (Catchweed Bedstraw)

Galium population growth

- 21st in 1980's weed survey of Western Canada
- 9th in 2000's weed survey of Western Canada
- Growth correlated with increasing canola acres

(Leeson et al, 2005)

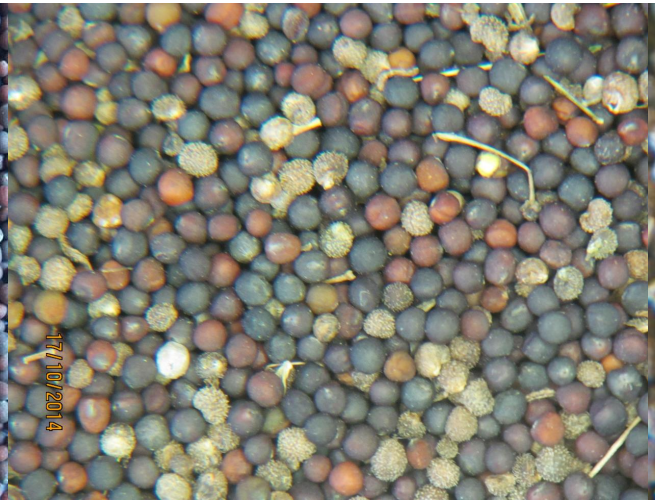
Cleavers, *Galium spp.*



Cleavers frequency and distribution in Western Canada. (Beckie et al 2005)

Cleavers in canola

- Highly competitive at low densities
- Seed is difficult to remove from canola seed
- Significantly affect canola grading
- Increased harvest difficulty

Existing herbicides

- **Glyphosate**
  a) Registered for control on plants up to 15cm

- **Glufosinate ammonium**
  a) Variable efficacy

- **Imazamox + Imazaphyr (ares)**
  a) Group 2 resistance

Potential new herbicides

- **Quinclorac**
  a) Group 4

- **Clomazone**
  a) Group 13
  b) Preplant, soil activated

Field Experiment

- Objective: Assessing the efficacy of several common herbicides and potential new herbicides on cleavers

Methodology

- Separate trials for each herbicide system

  (Liberty-link, Roundup-Ready, Clearfield)

- RCBD with 8 treatments
- Four replications
- Experiment run in 2013 and 2014

  a) Scott Research Farm
  b) Kernen Research Farm
  c) Rosthern

Treatment list

	*FB = followed by
1	Control (untreated check)
2	Herbicide standard
3	Quinclorac
4	Clomoazone
5	Clomoazone FB quinclorac
6	Herbicide standard FB quinclorac
7	Clomoazone FB herbicide standard
8	Clomoazone FB herbicide standard + quinclorac

Data collection

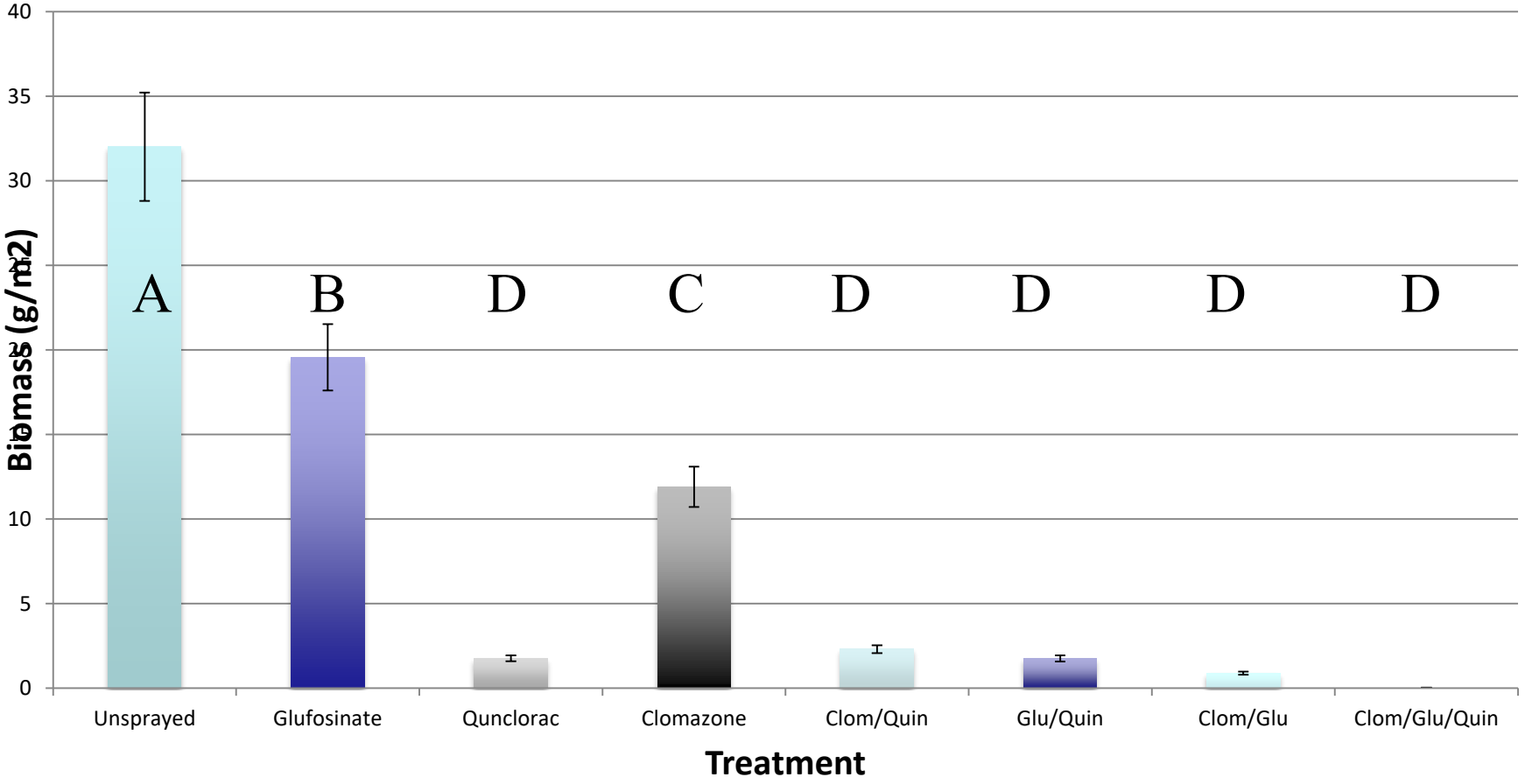
Variable	Collection Details
Cleaver Control Rating	Rate pre-seed treatment prior to in-crop herbicide and others @ 7-10, 14-21, > 28 days after herbicide application on CWSS scale.
Crop Injury Rating	Rate pre-seed treatment plots prior to in-crop herbicide and others @ 7-10, 14-21, > 28 days after herbicide application on CWSS scale.
Biomass	Cut all plants (at canola pod fill) at soil surface in 2 x 0.5m^2 .
Plant Height	During the podding stage, measure the height of 5 individual canola plants.
Crop Yield	Seed yield, % moisture at harvest, determine dockage, separate cleavers from canola in 100g samples.
Thousand Seed Weight	Count 250 seeds from each sample, multiply 4X.

Unsprayed check

Glyphosate

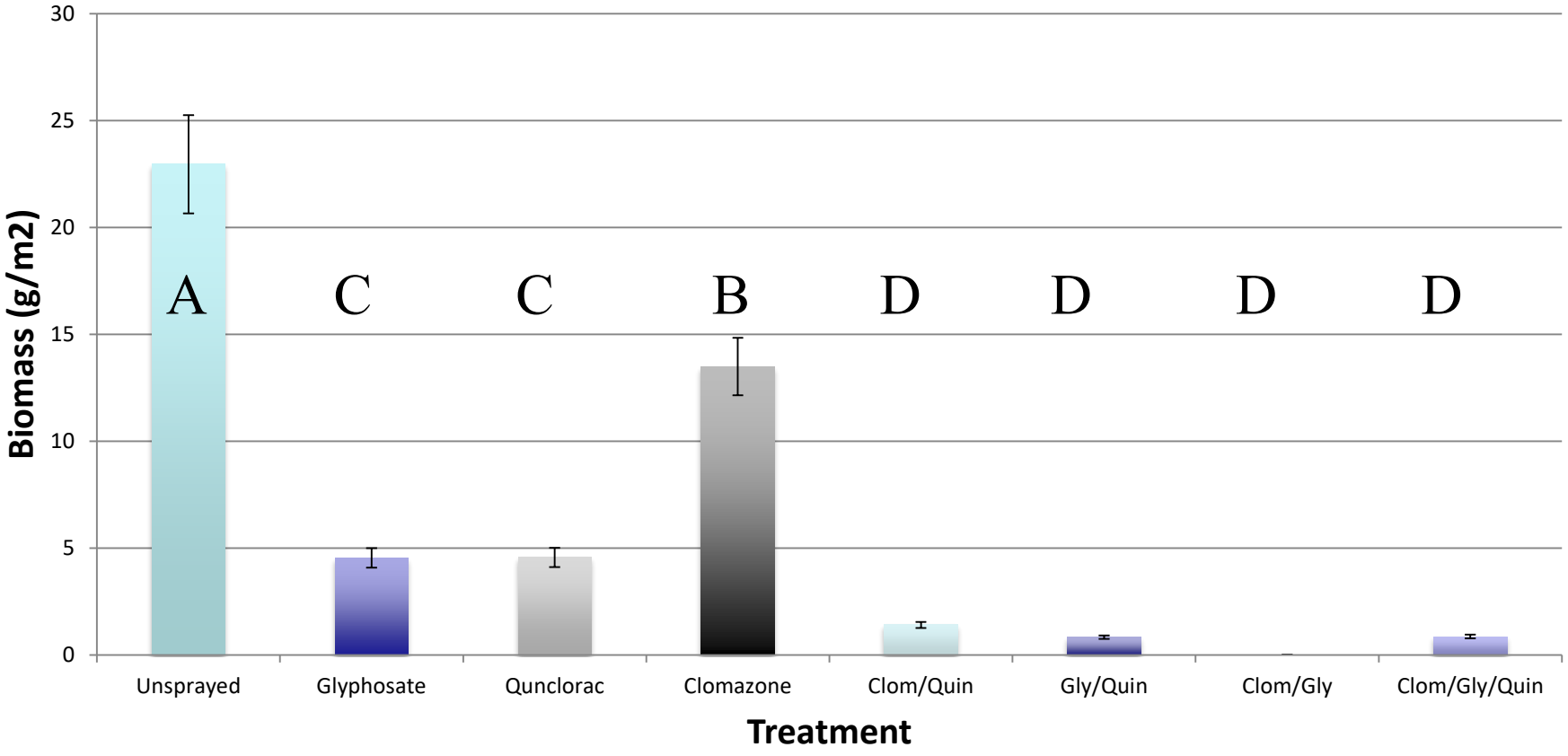
Glyphosate + Quinclorac

Cleavers biomass in glufosinate tolerant canola (2013 & 2014)



Note: Means with the same letter in the same row are not significantly different (P>0.05). The multi-treatment comparisons completed using Tukey method. SEM = standard error of mean.

Cleavers biomass in glyphosate tolerant canola (2013 & 2014)



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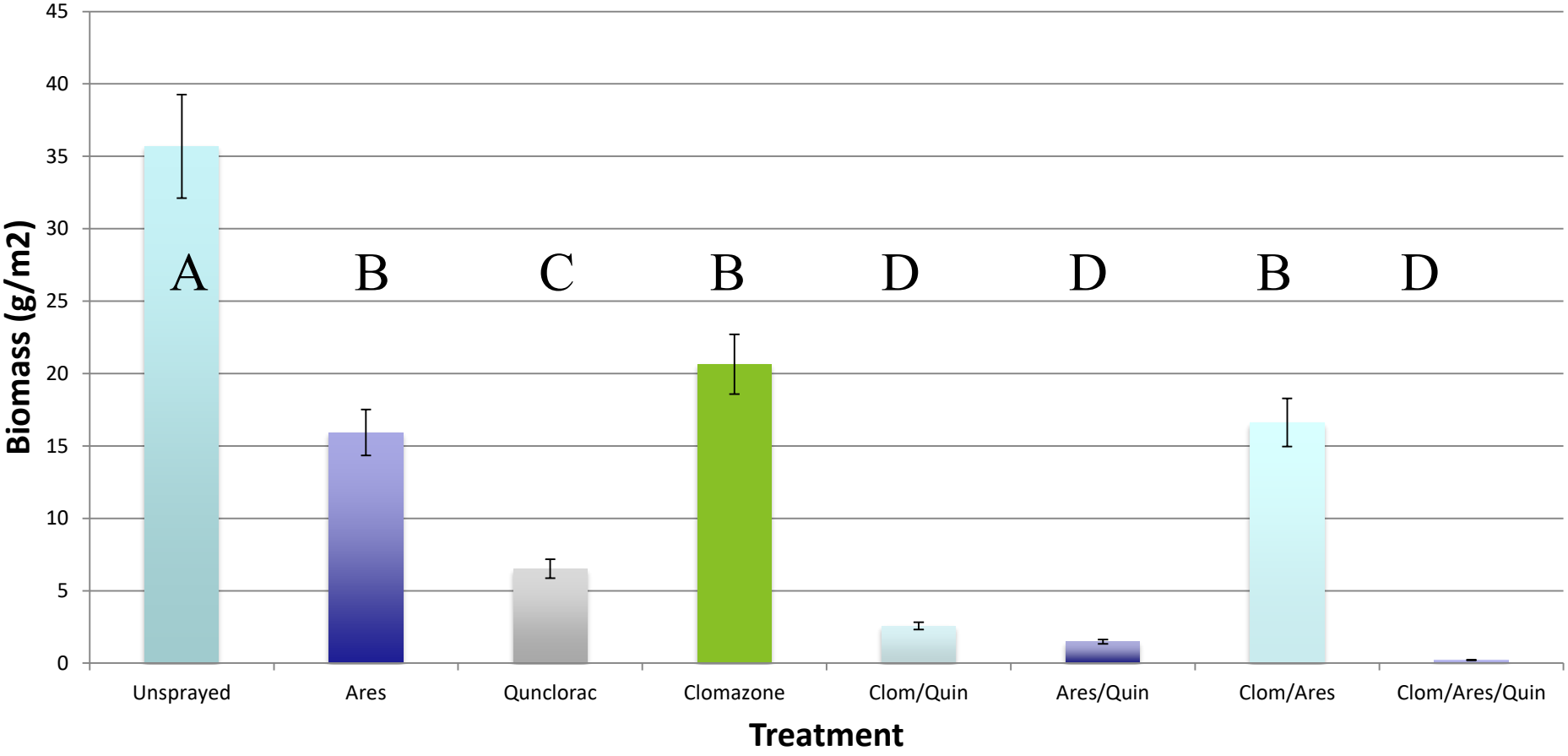
Cleavers biomass in imidazolinone tolerant canola (2013 & 2014)



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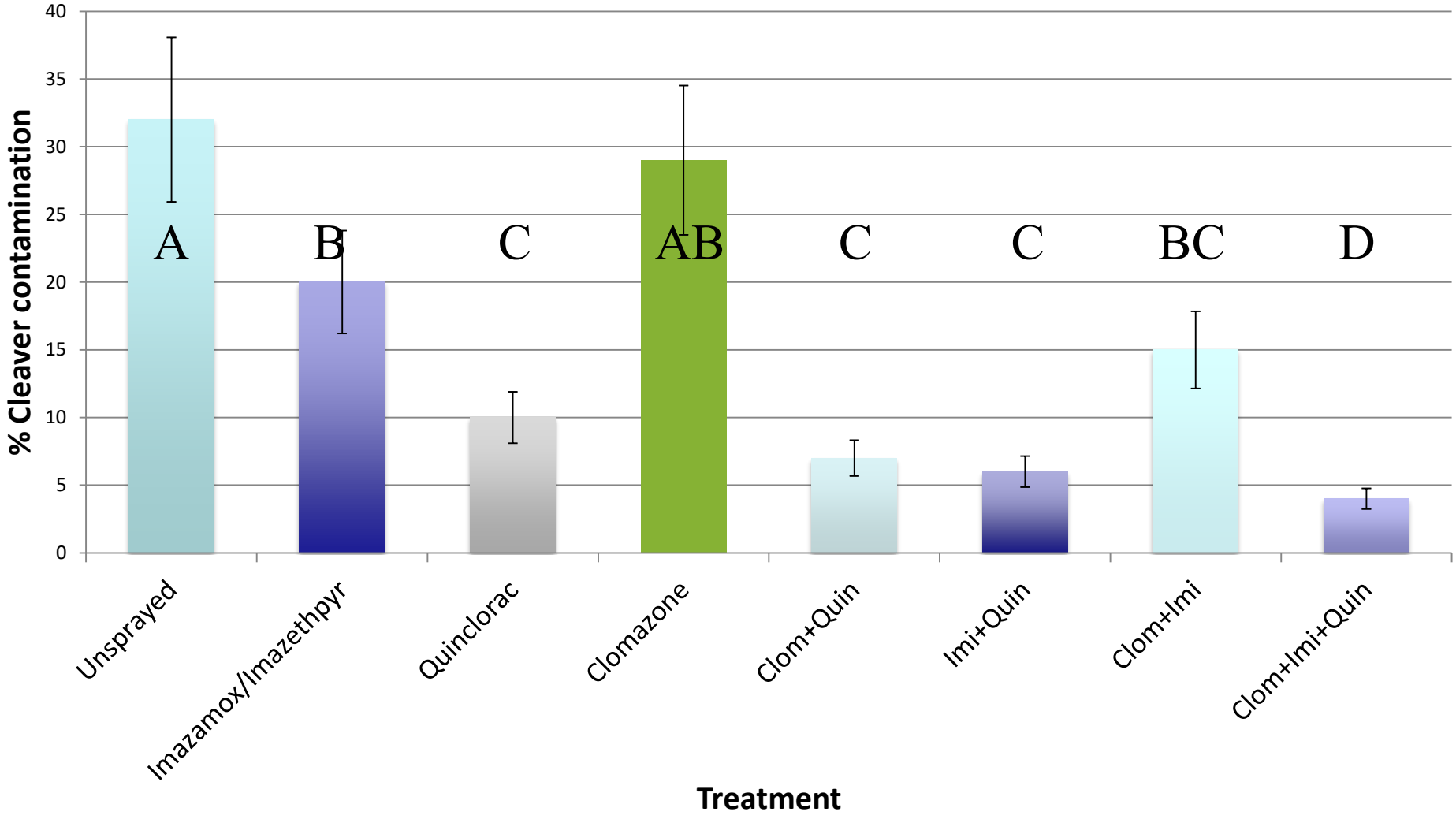
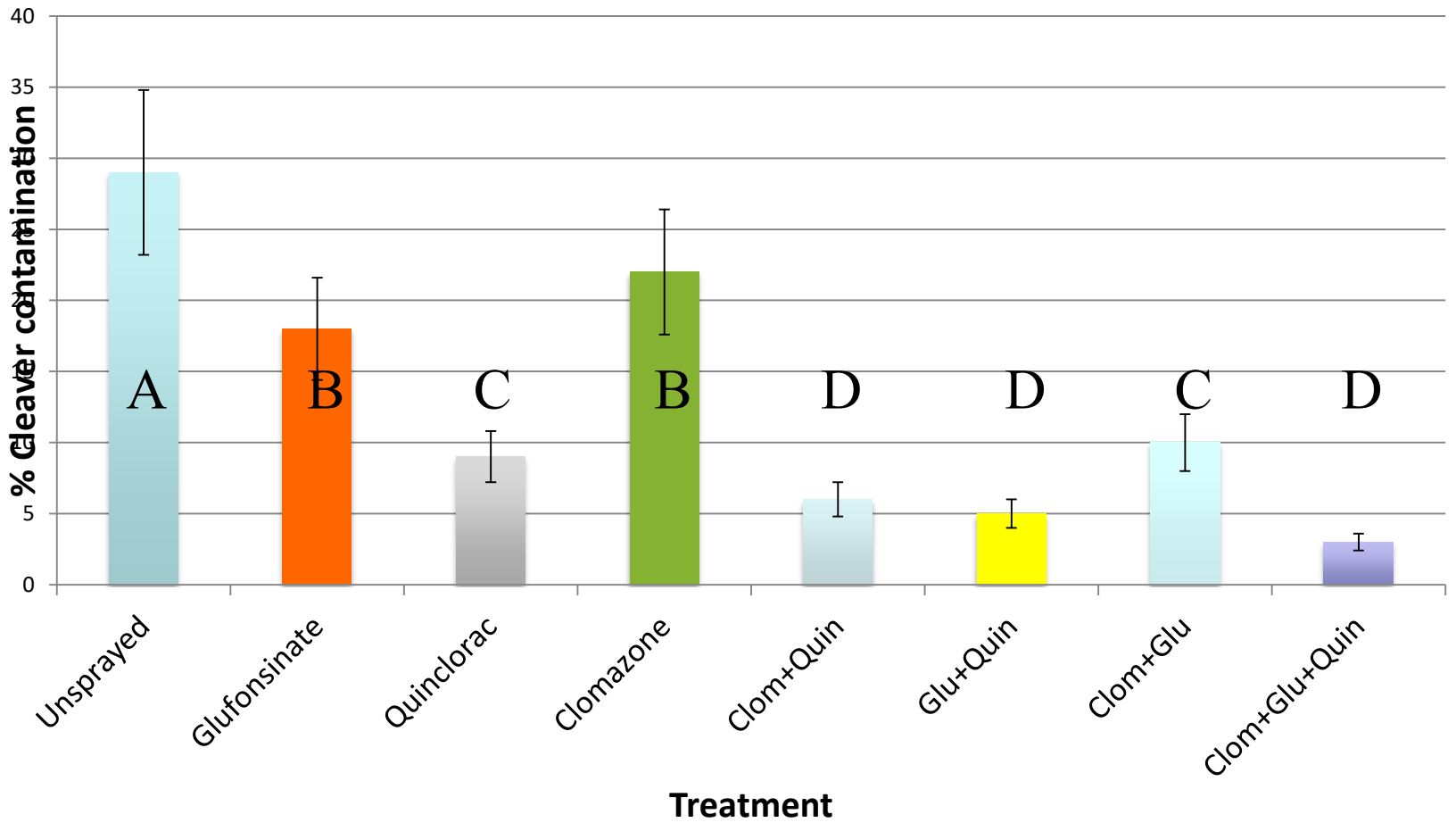
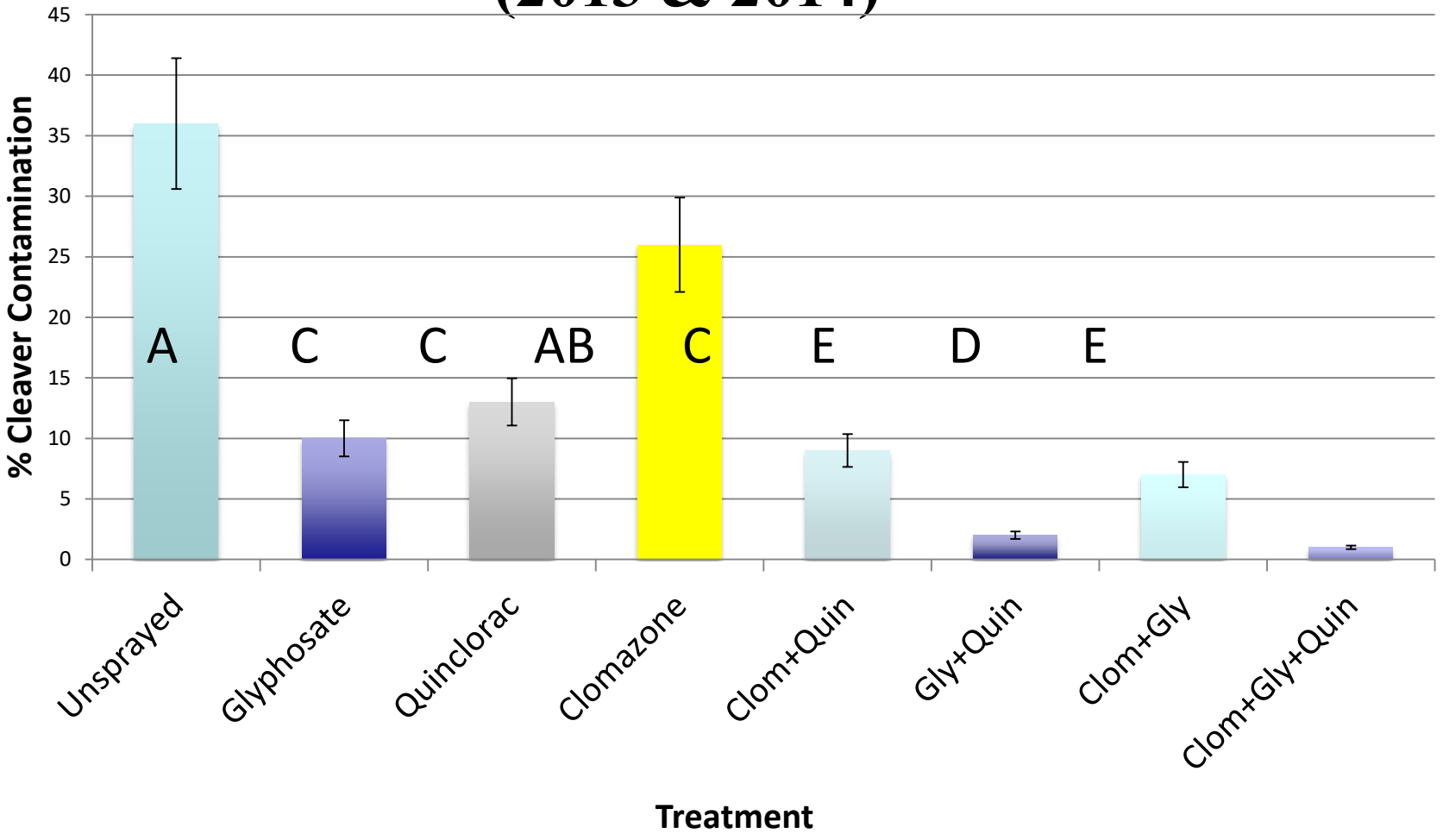
Cleaver contamination in imidazolinone tolerant canola (2013 & 2014)



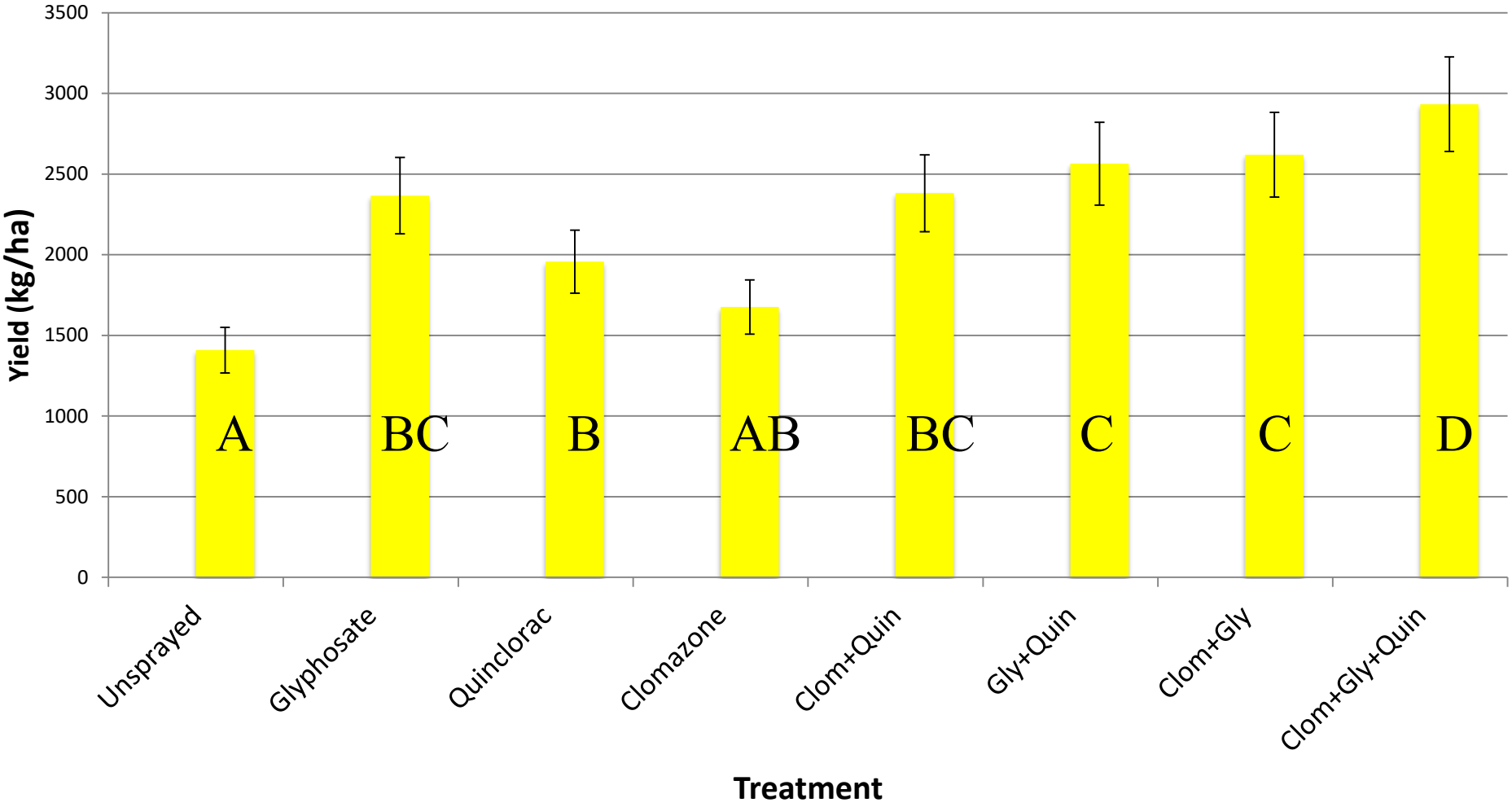
Cleaver contamination in glufosinate tolerant canola (2013 & 2014)



Cleaver contamination in glyphosate tolerant canola (2013 & 2014)



Effects of herbicide treatment on yield in glyphosate tolerant canola 2013 & 2014 (Kernen only)



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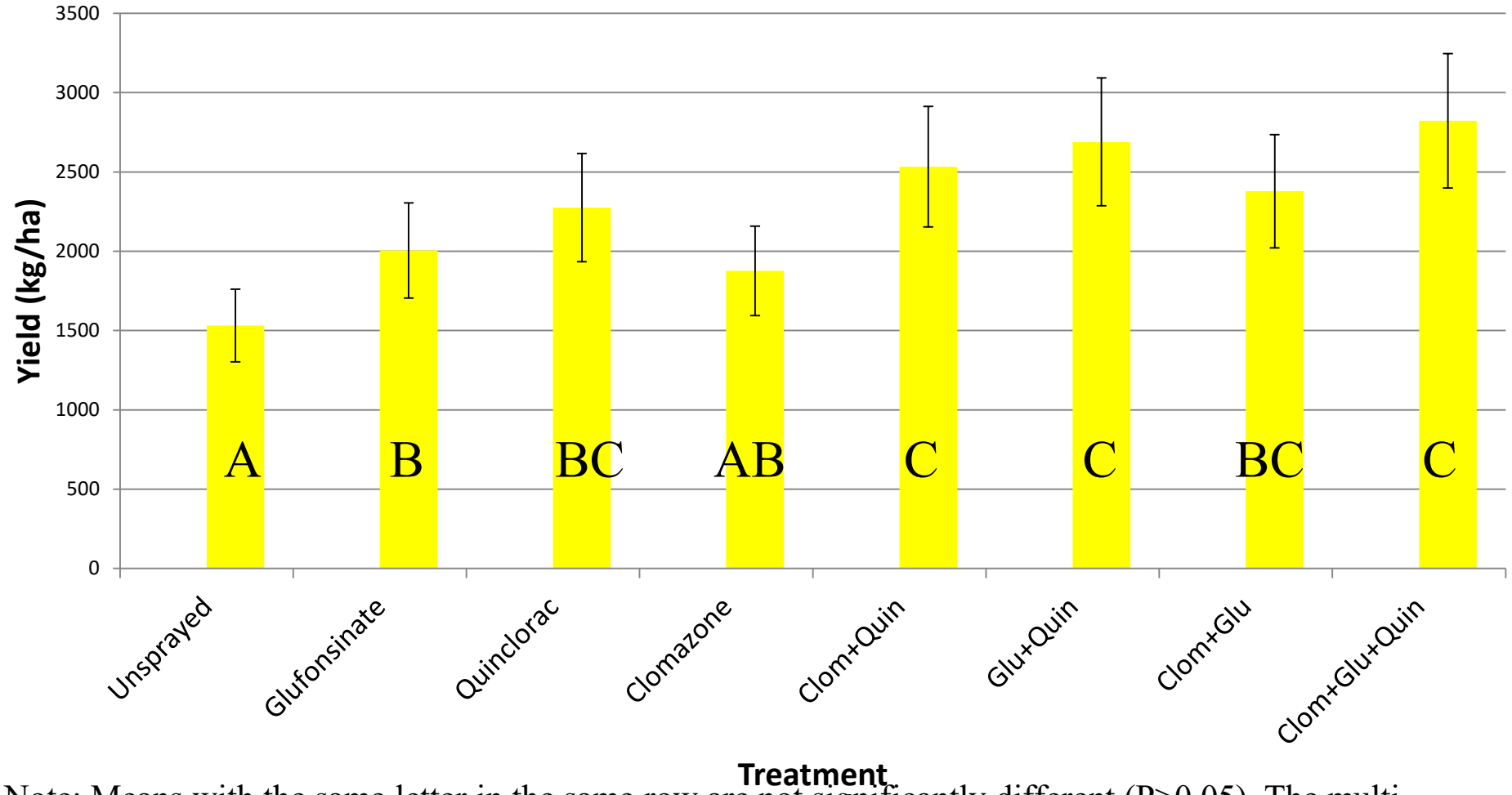
Effects of herbicide treatment on yield in glufosinate tolerant canola 2013 & 2014)



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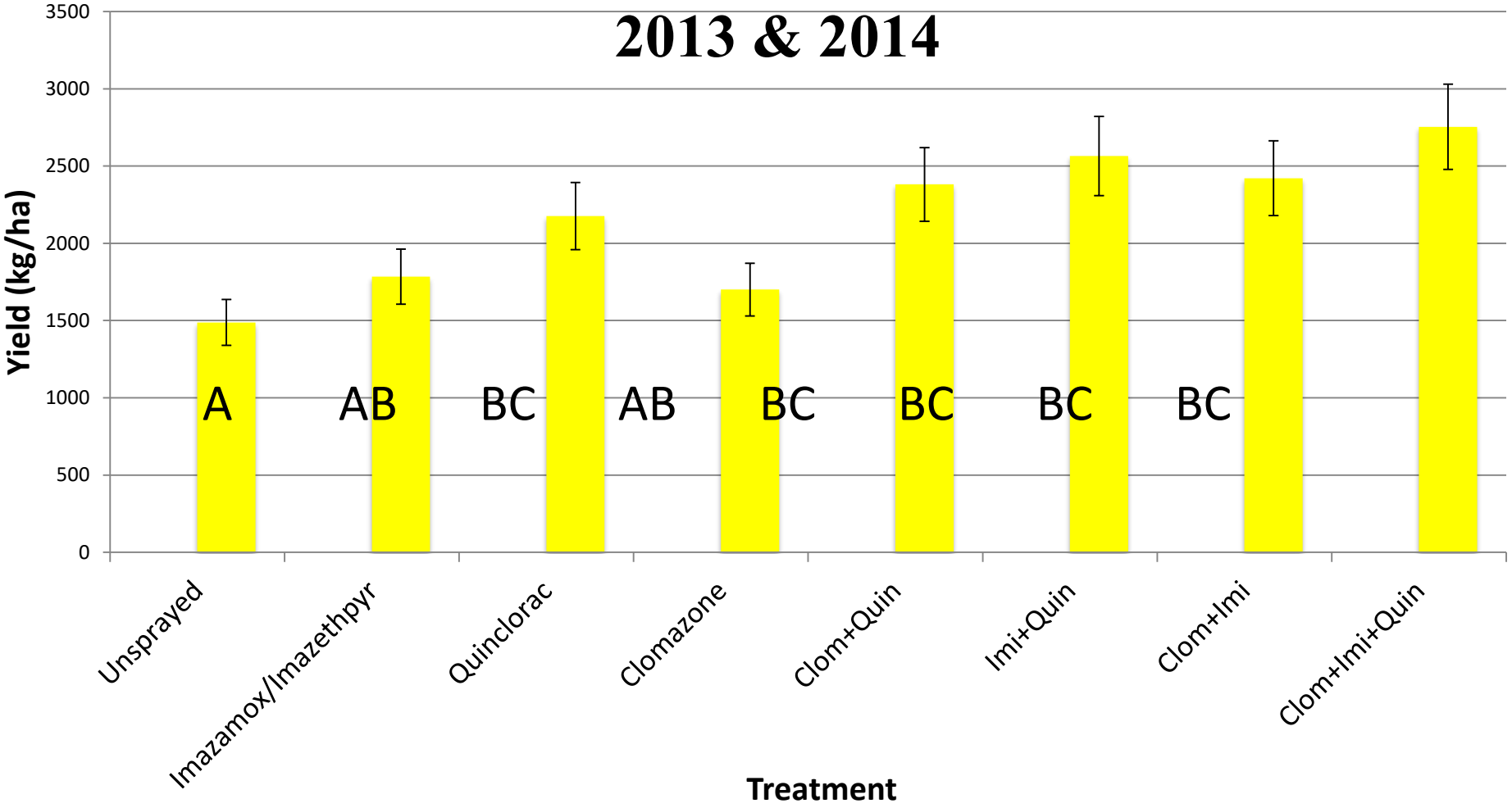
Effects of herbicide treatment on yield in imidazolinone tolerant canola

2013 & 2014



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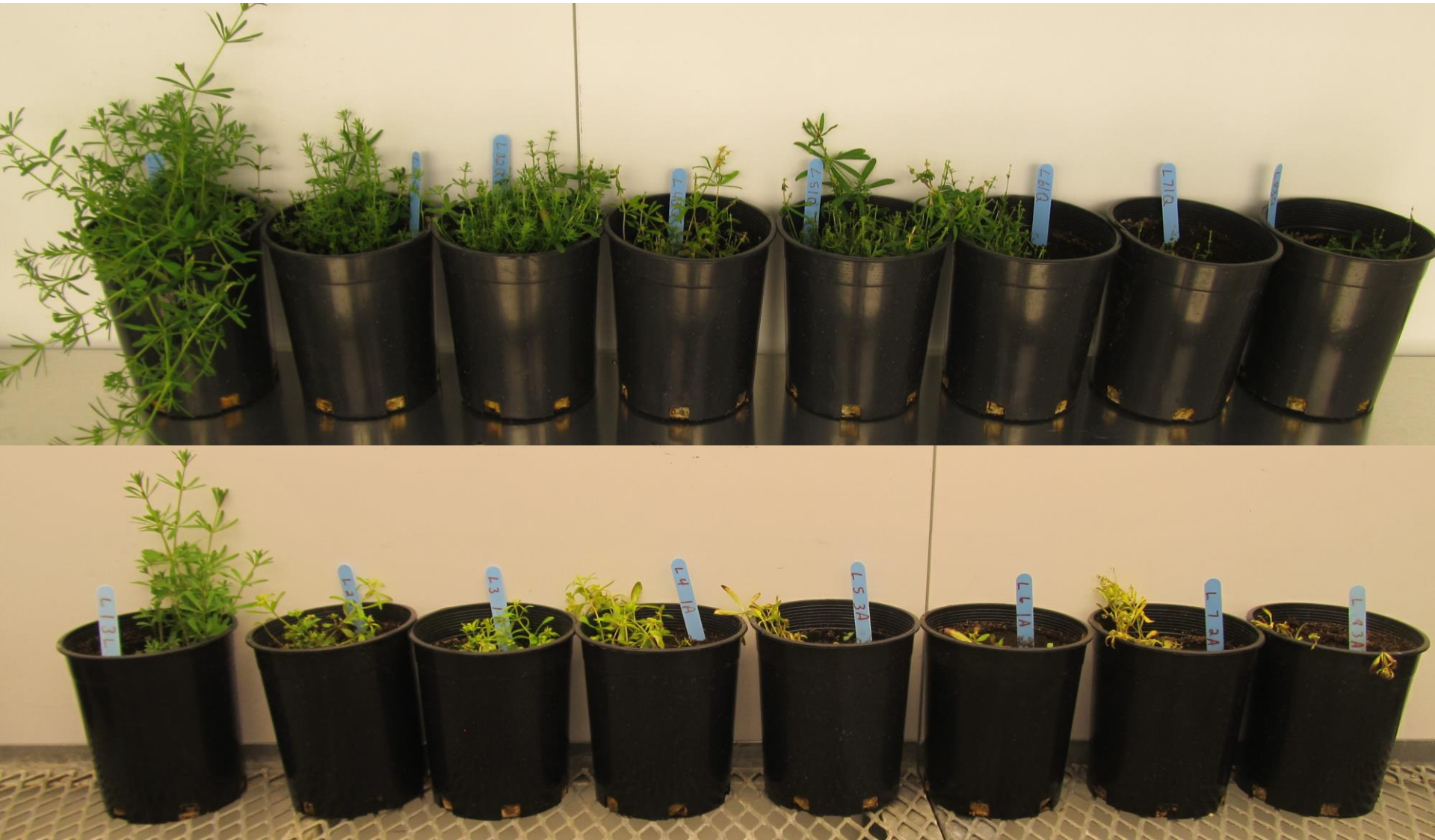
Discussion

- Existing herbicides exhibit marginal control of cleavers
- Quinclorac is highly efficacious on cleavers
- Clomazone provides early season control and can improve the efficacy of in-crop herbicides

Dose Response Experiment



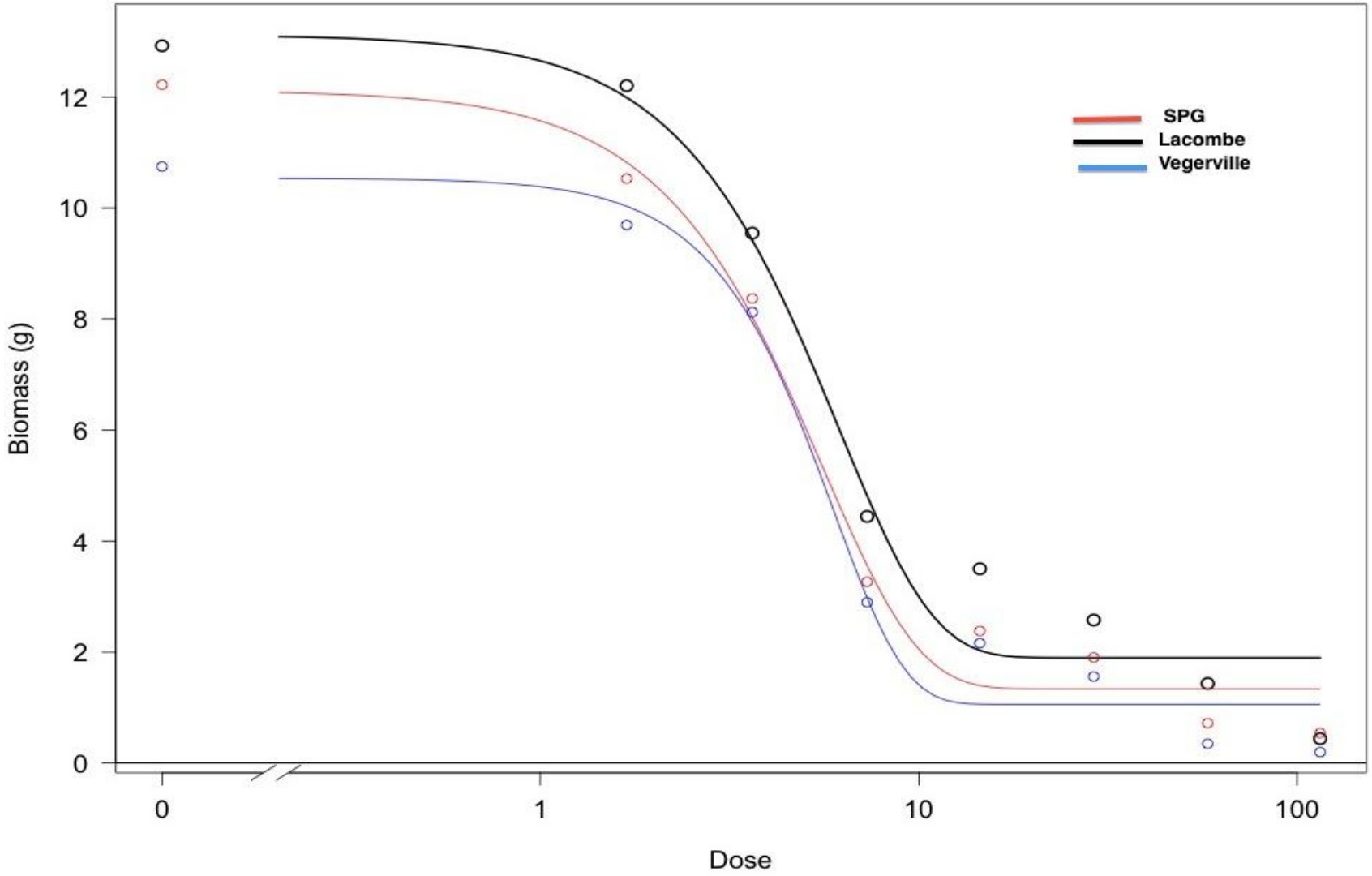
Methodology

- Separate dose response experiment for each herbicide
  (Glufosinate, Quinclorac, Ares)
- Three replications
- Experiment run in 2013 and 2014 at the U of S

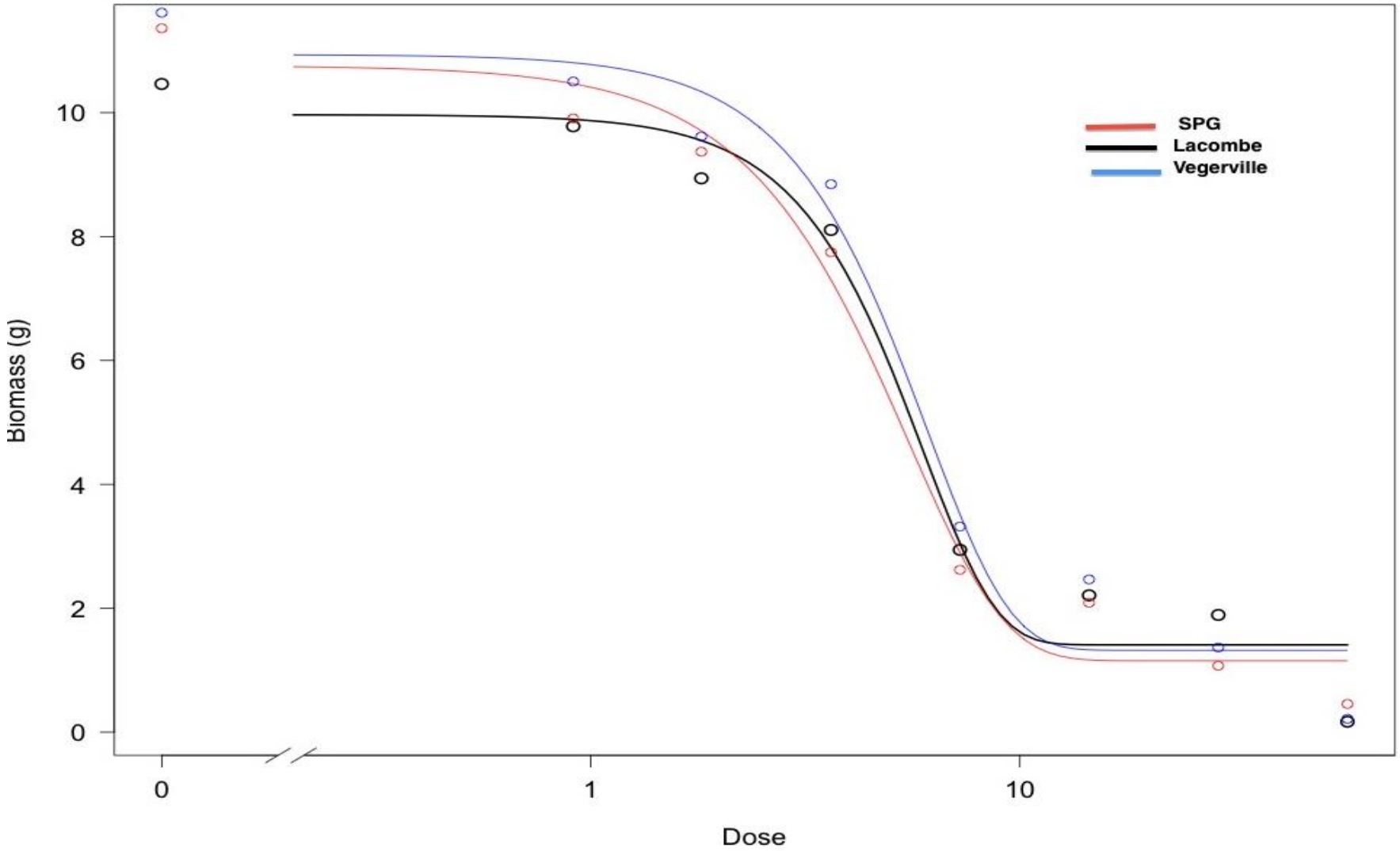
Data collection

Variable	Collection Details
Crop Injury Rating	Rate all pots @ 7-10, 14 days after herbicide application on CWSS scale.
Biomass	In all dose response trials, aboveground biomass was harvested 21 days after herbicide application, oven dried, weighed and expressed as a % of the untreated control.

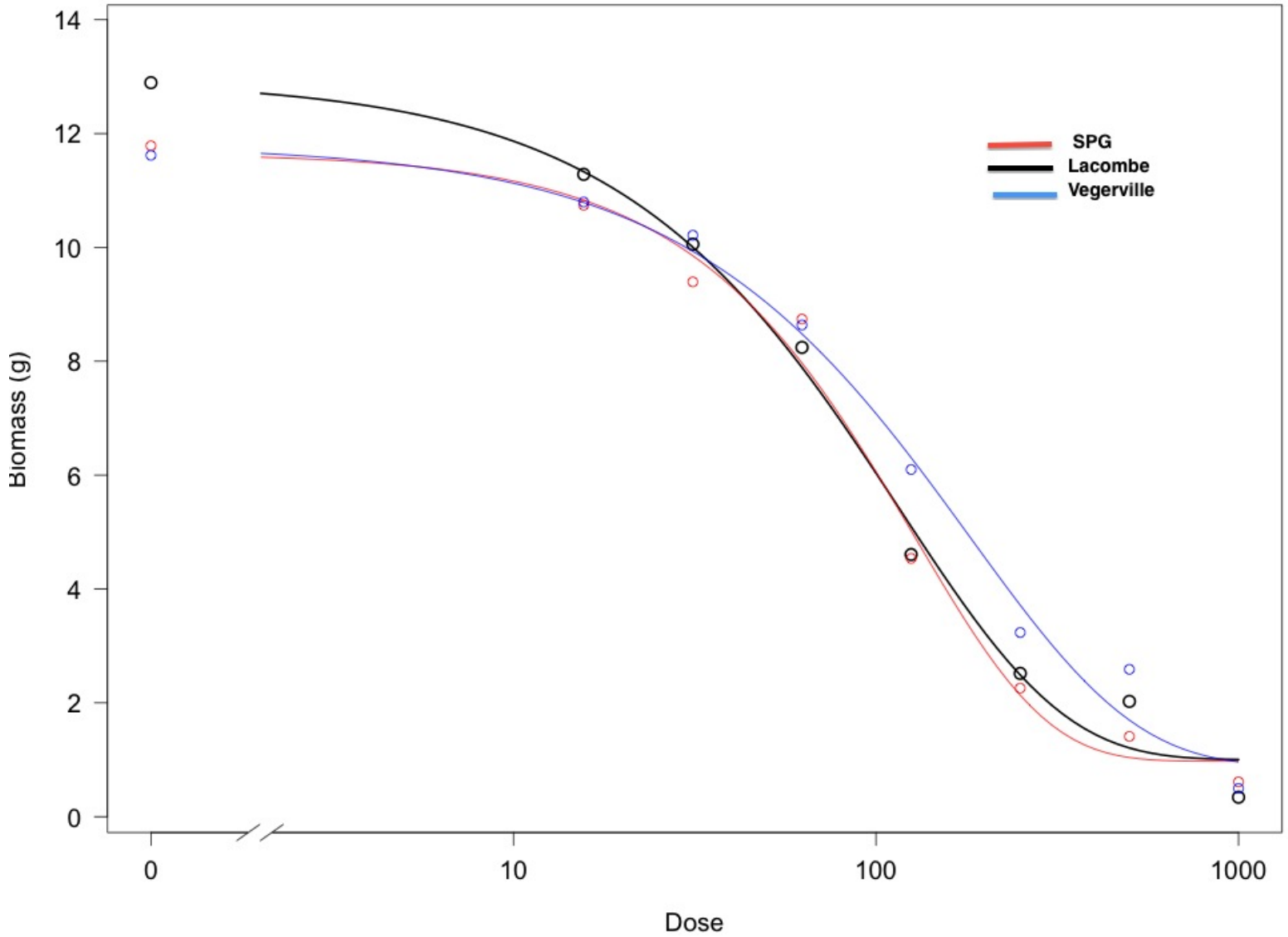
Ares



Quinclorac



Glufosinate



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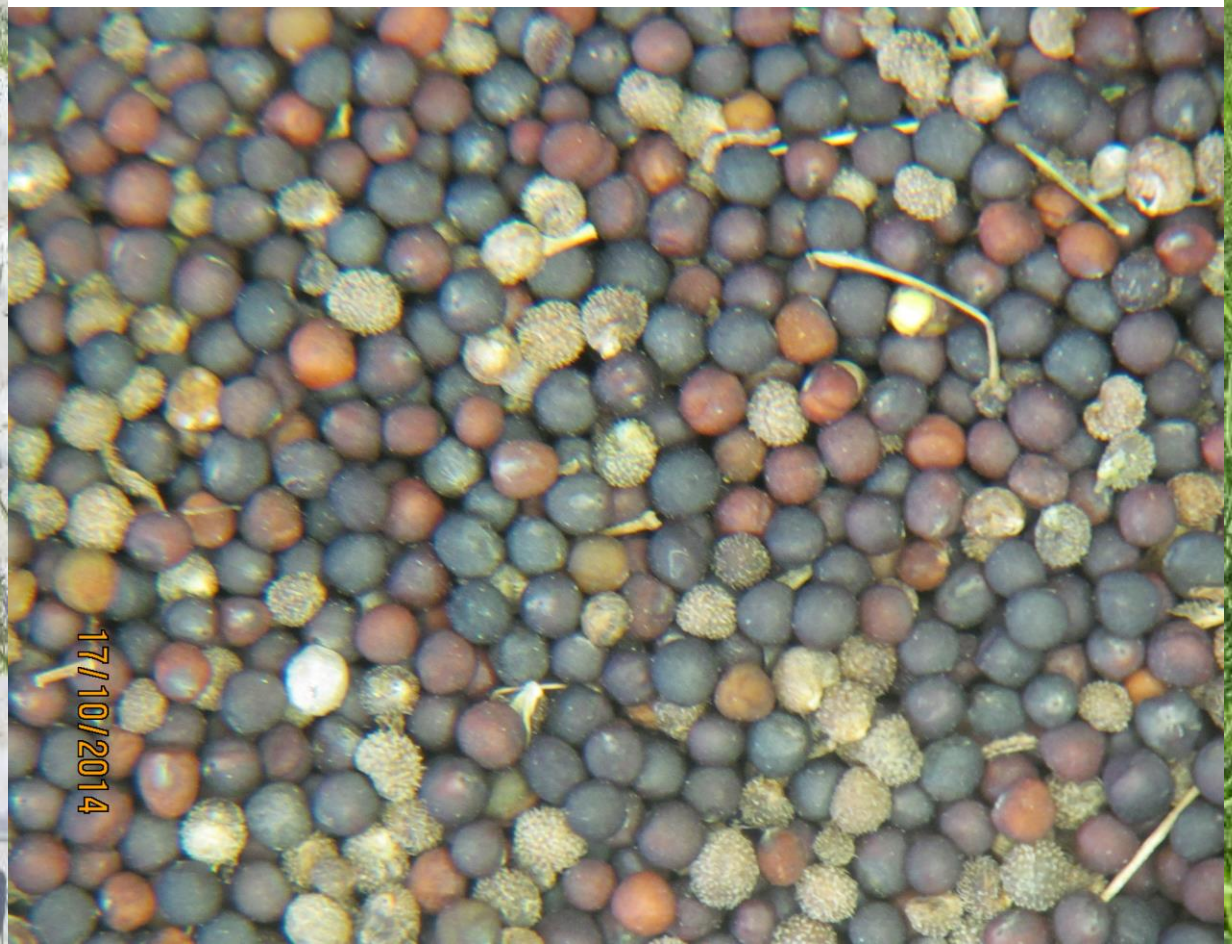
Questions ?



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