Agronomy for Chickpeas: Key takeaways from small plot trials

Amber Wall, Wheatland Conservation Area

Investigating the Impact of Herbicide Stress and Potassium Chloride Nutrition on Plant Health of Chickpea, 2022-2023

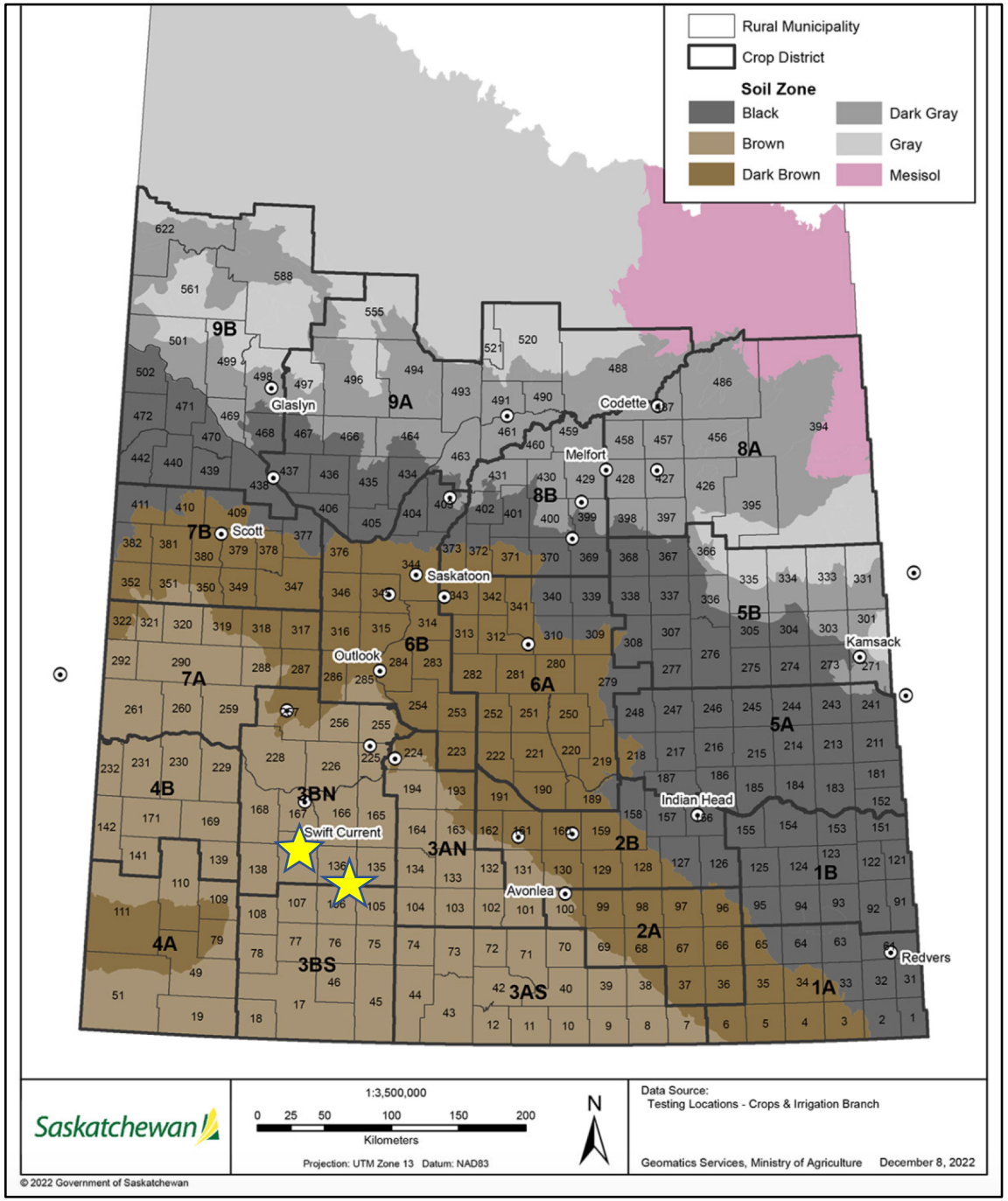
- four by two factorial in a randomized complete block design
- 4 replicates
- 2 locations

Demonstrating Biostimulant Product Applications to Mitigate Plant Stress and Improve Disease Resistance in Chickpea, 2022-2023

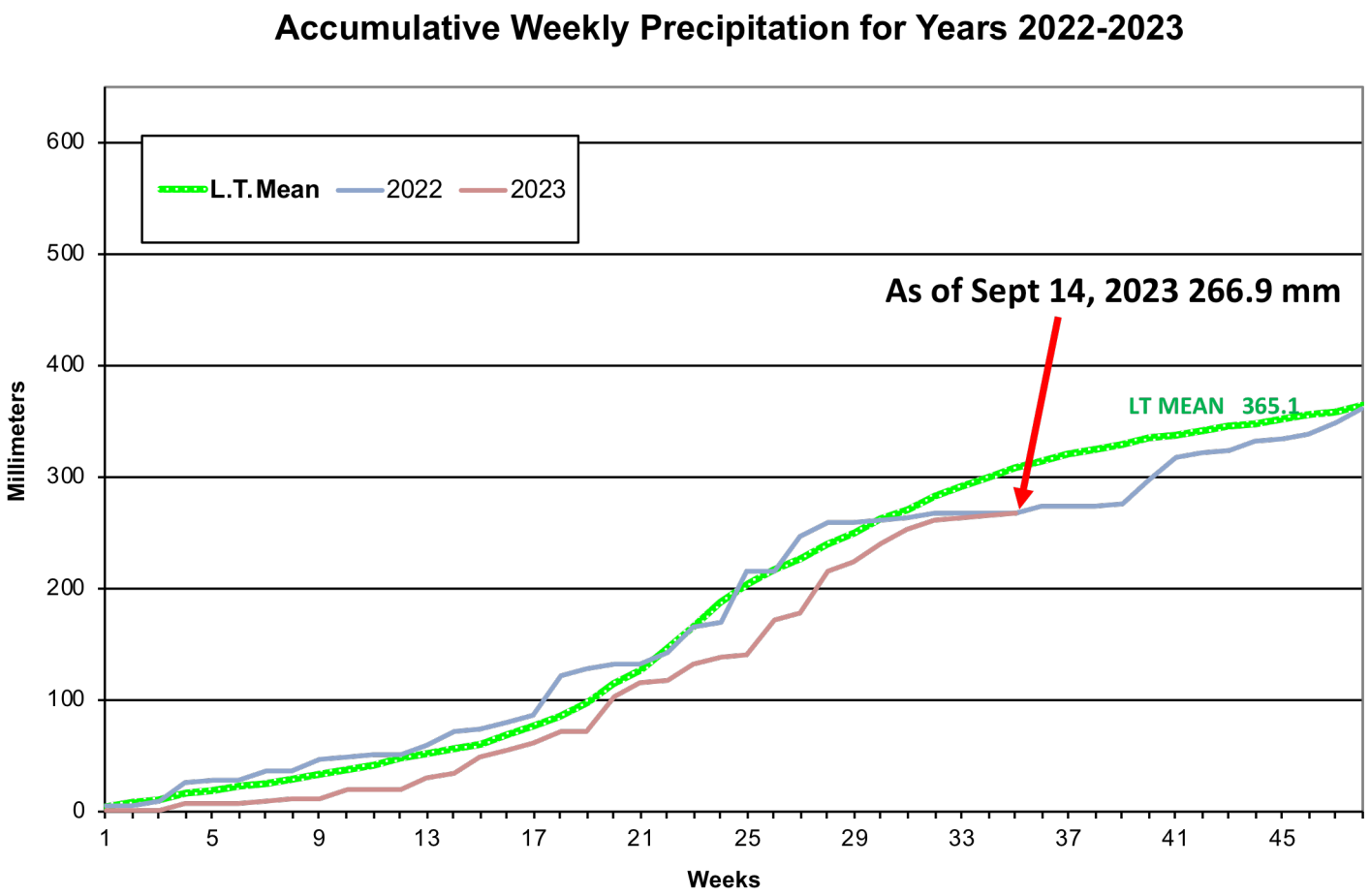
- four by three factorial in a randomized complete block design (Biological Seed treatments and foliar applications)
- 4 replicates
- 2 locations

Trial Locations

- 2022, Swift Current, SK
- 2022, Hodgeville, SK
- 2023, Swift Current, SK
- 2023, Hodgeville, SK



General Conditions



Location	Year	May	June	July	August	Avg
		----*Mean Temperature (°C)* ----				
Swift Current	2022	10.9	15.9	**19.8**	**20.9**	16.9
	2023	**14.8**	**17.8**	18.5	17.8	17.2
	LT	**10.9**	**15.4**	**18.7**	**17.7**	**15.7**

Agriculture and Agri-food Canada, Swift Current, September 14, 2023

Investigating the Impact of Herbicide Stress and Potassium Chloride Nutrition on Plant Health of Chickpea

Trt No.	Herbicide Treatment[2]	Potash Fertilization[1]
1	PRE Edge	UTC- no potash
2	PRE Authority	UTC- no potash
3	PRE Edge + POST Metribuzin	UTC- no potash
4	PRE-Authority + POST Metribuzin	UTC- no potash
5	PRE Edge	35 lbs/ac KCl (0-0-60 with 45%Cl)
6	PRE Authority	35 lbs/ac KCl (0-0-60 with 45%Cl)
7	PRE Edge + POST Metribuzin	35 lbs/ac KCl (0-0-60 with 45%Cl)
8	PRE-Authority + POST Metribuzin	35 lbs/ac KCl (0-0-60 with 45%Cl)
[1] applied as side-band application		
[2] apply Metribuzin up to 2 inches (6cm) in height, when vines have 1 to 3 above ground nodes @ 111g/ac		

Basic Soil Nutrients, 2022-2023

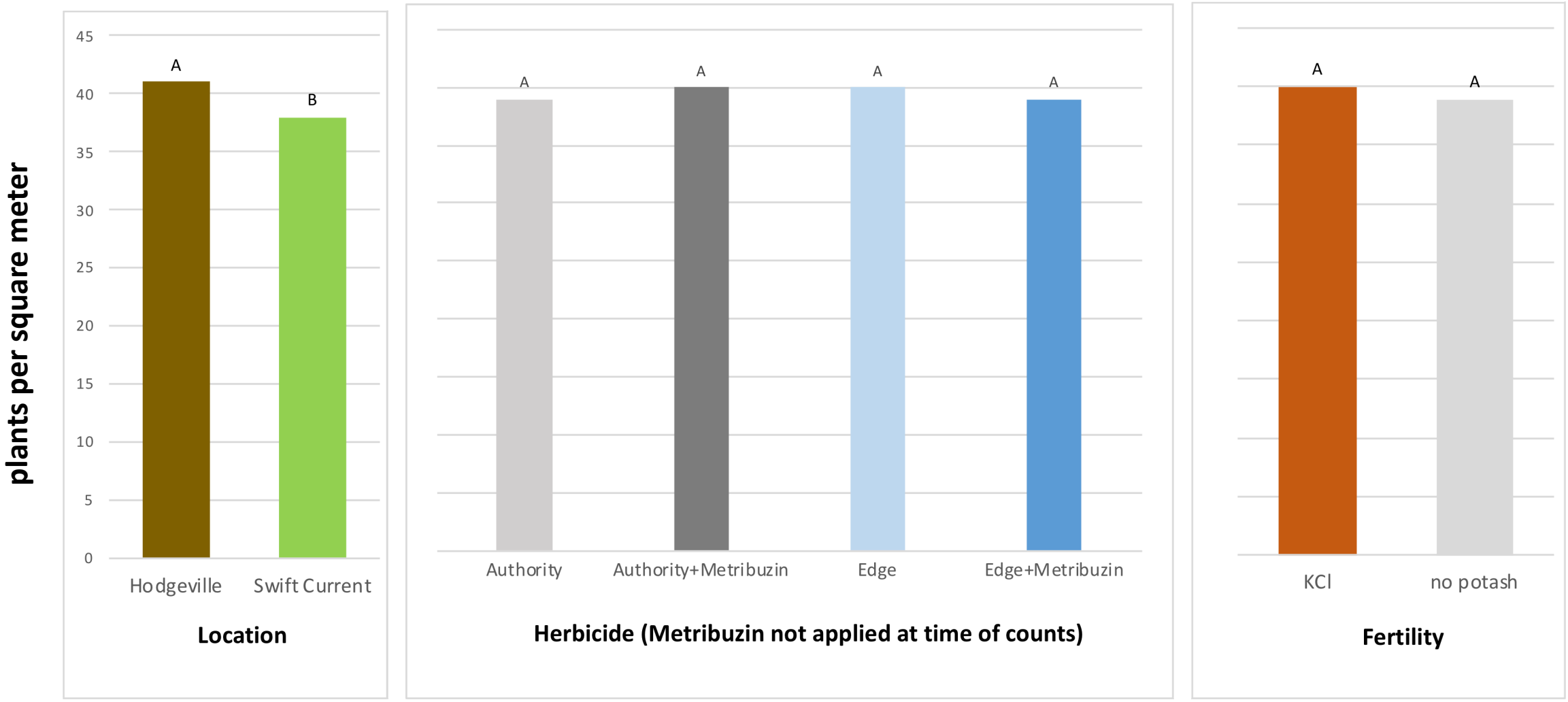
Depth	pH	OM%	CEC (meq/100g)	N (lbs/ac)	P (lbs/ac)	K (ppm)	S (lbs/ac)	Cl (lbs/ac)
Swift Current 2022								
0-6"	6.2	2.8	14.3	14	30	251 (H)	12	20 (M)
6-12"	7.7	-	-	35	-		15	8
Swift Current 2023								
0-6"	7.7	2.6	20.4	6	20	217 (H)	8	2 (VL)
6-12"	7.9	-	-	4	-		10	2
Hodgeville 2022								
0-6"	6.4	3.1	21.5	20	48	411 (H)	16	18 (M)
6-12"	7.4	-	-	24	-		27	8
Hodgeville 2023								
0-6"	7.5	2.1	32.8	7	22	217 (H)	14	4 (VL)
6-12"	7.7	-	-	8	-		15	8

Data Collection

- **Emergence** and **vigor**: appearances of nutrient deficiencies that may lead to poor health
- **Crop stress:** Visually rate each plot for symptoms before and after metribuzin application
- **Weed control**: Visually assess for differences in weed biomass among herbicide treatments
- **Leaf Disease and root evaluation:** symptoms of chickpea health issue
- **Yield**
- Evaluating **return-on-investment**

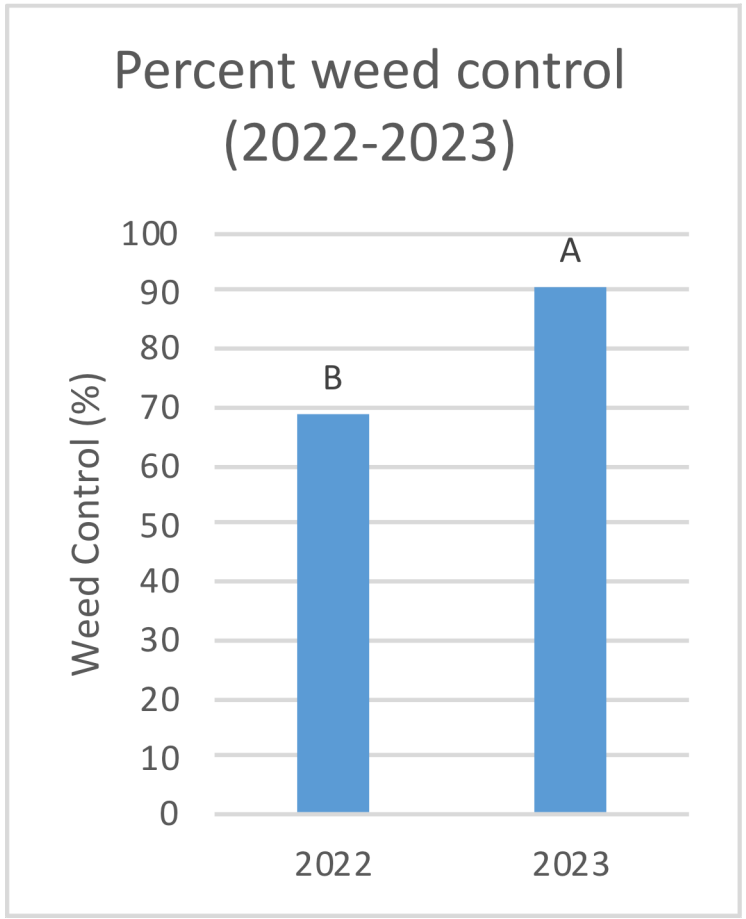
Plant Density (plants per square meter)

4 site years



Visual Weed Control 0-100% (100=complete control)

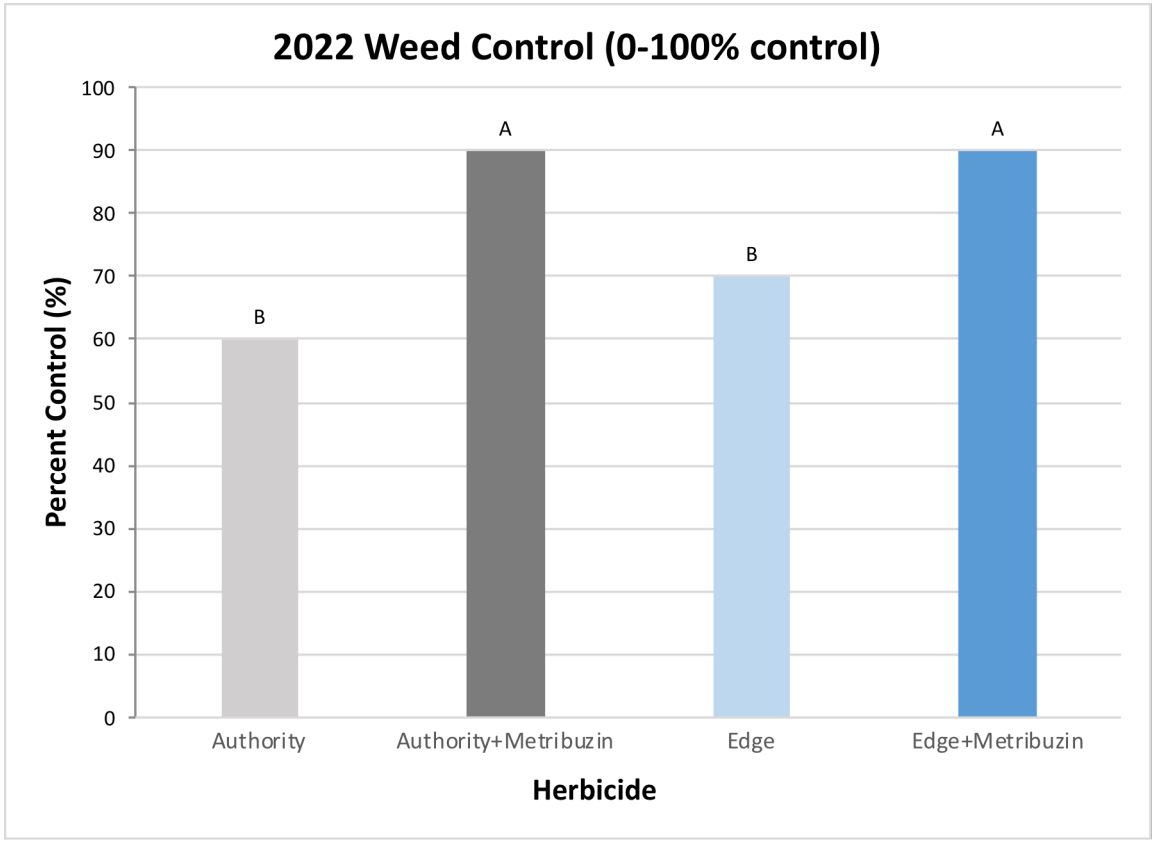
July 7, 2022

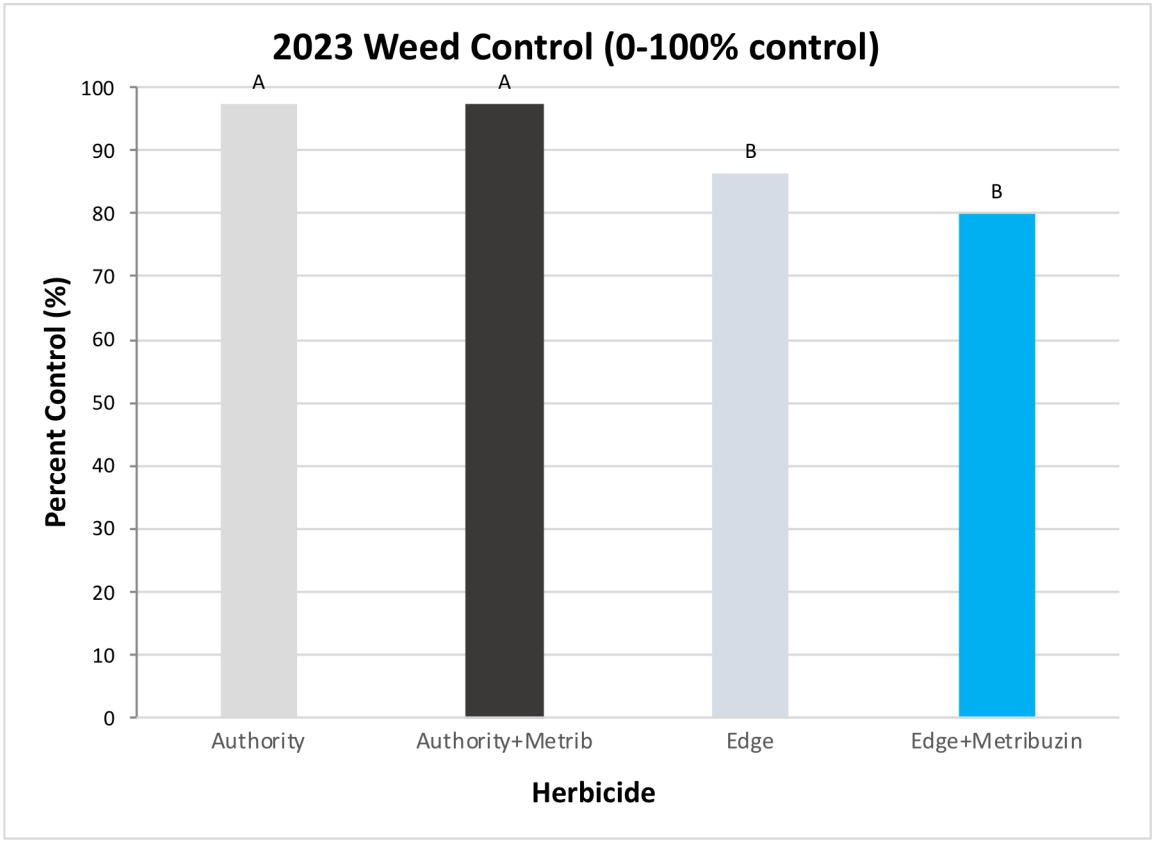


July 21, 2023

Visual Weed Control 0-100% (100=complete control)

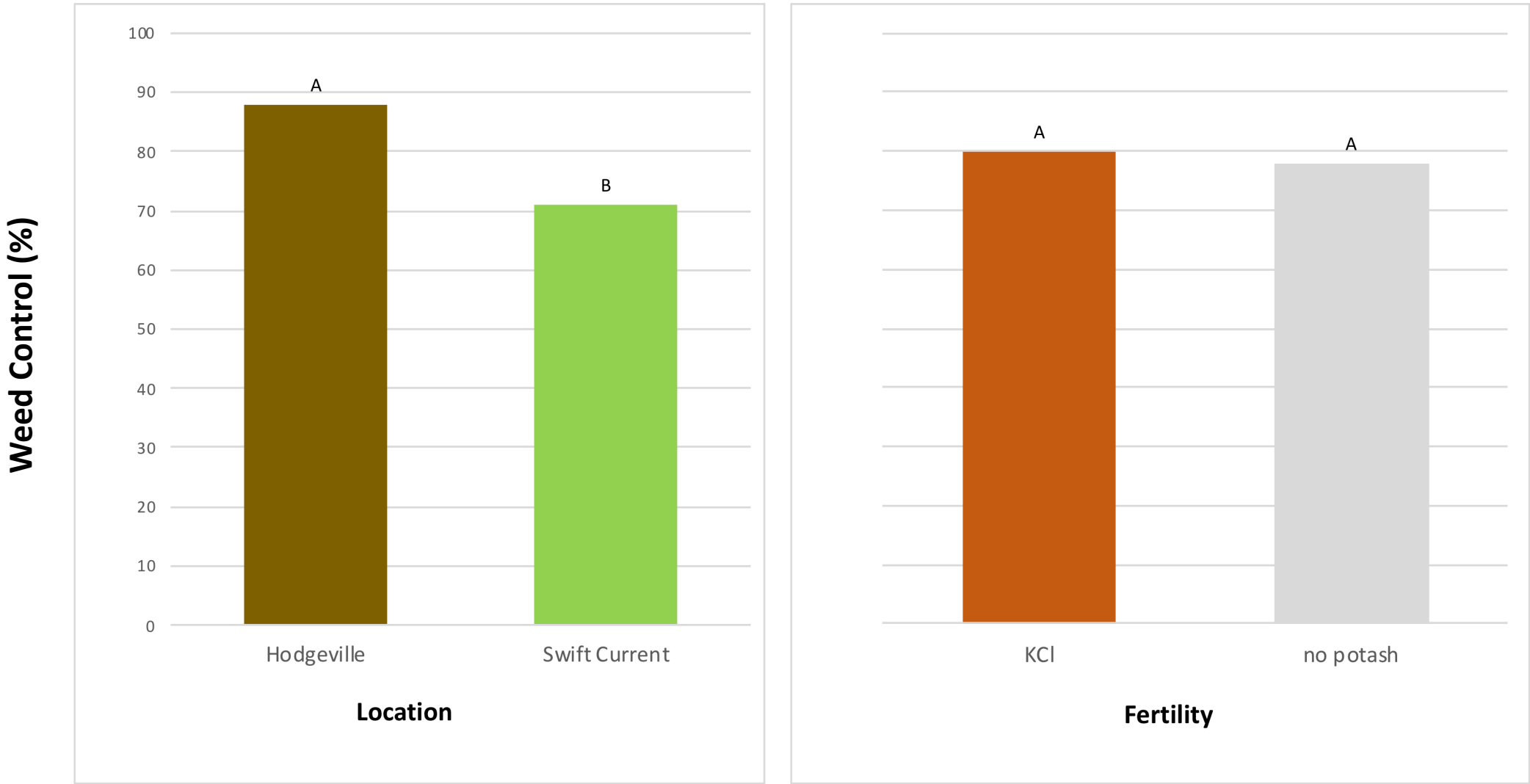
4 site years





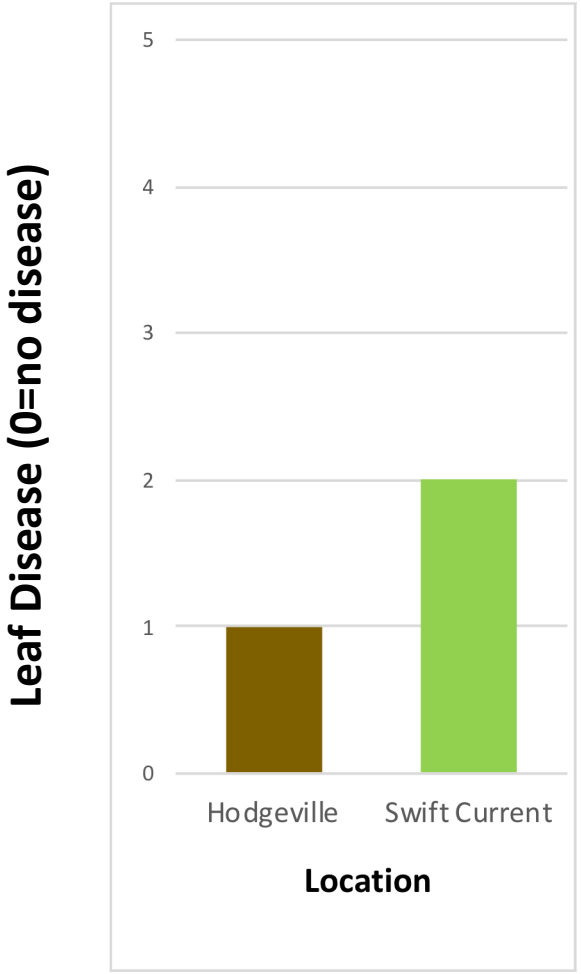
Visual Weed Control 0-100% (100=complete control)

4 site years



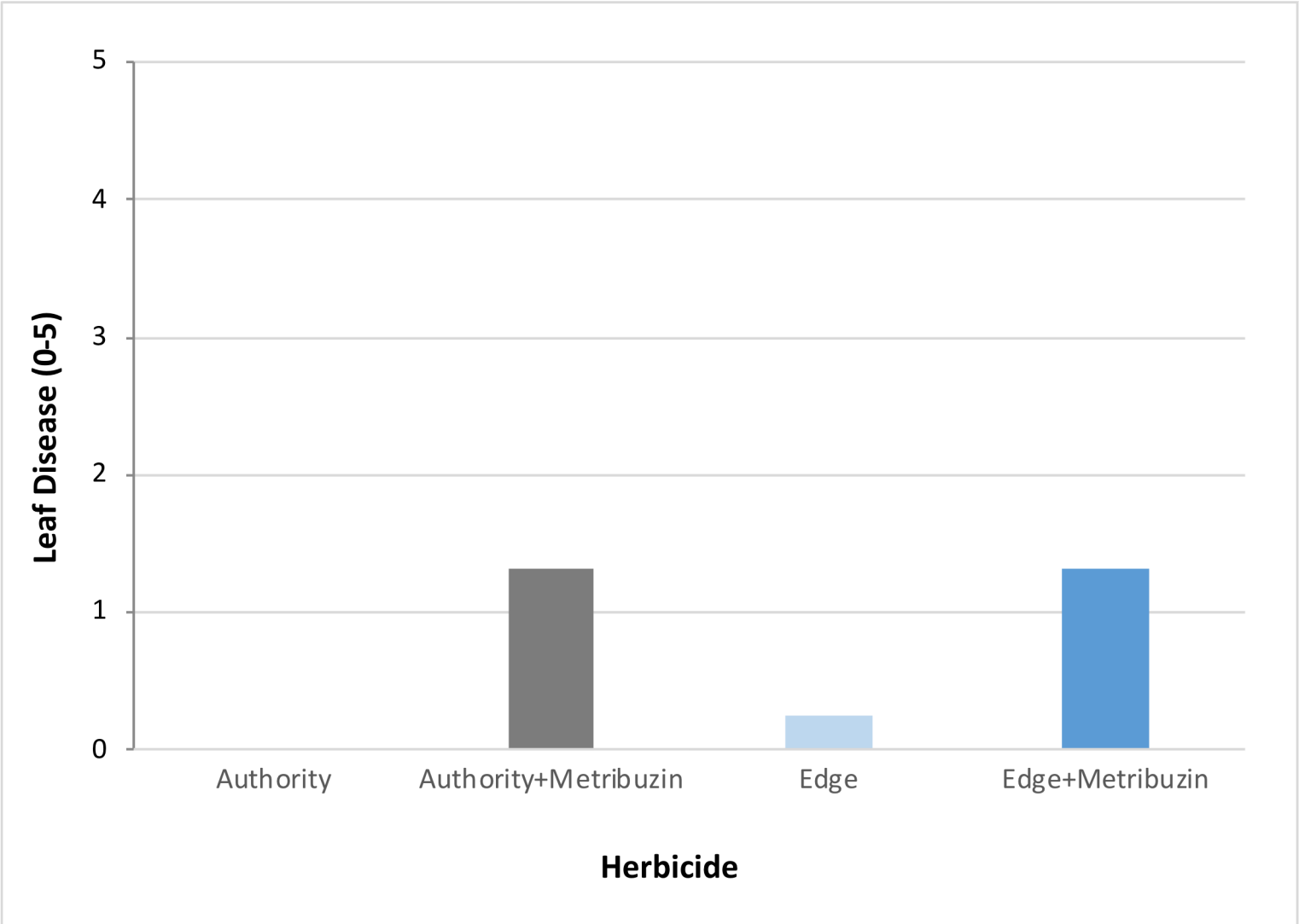
Visual Leaf and Root Disease (0-5, 0=no disease)

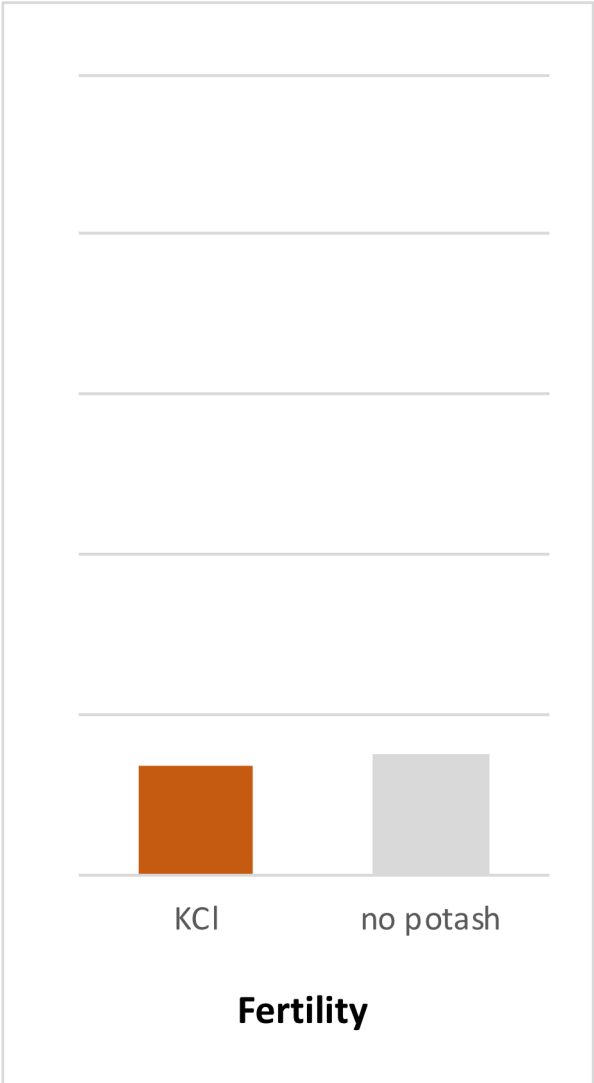
4 site years



Leaf Disease Ratings and root sampling at Hodgeville, SK

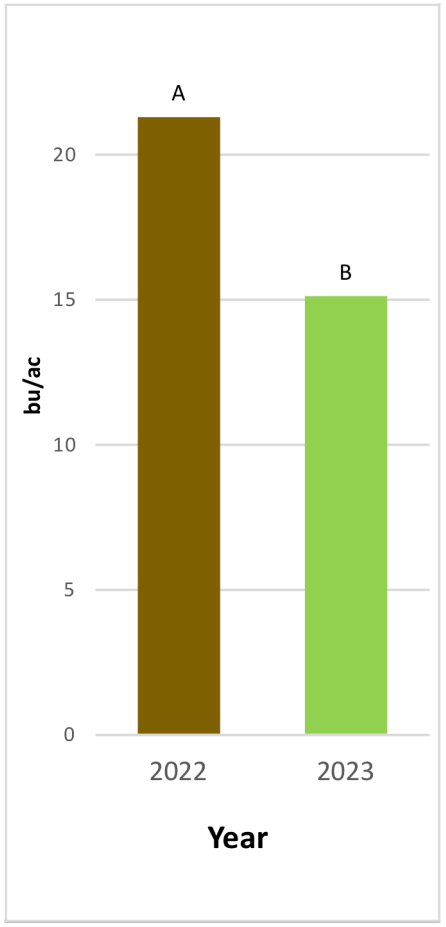
2023 Visual Leaf Disease Ratings (0-5, 0= no disease)

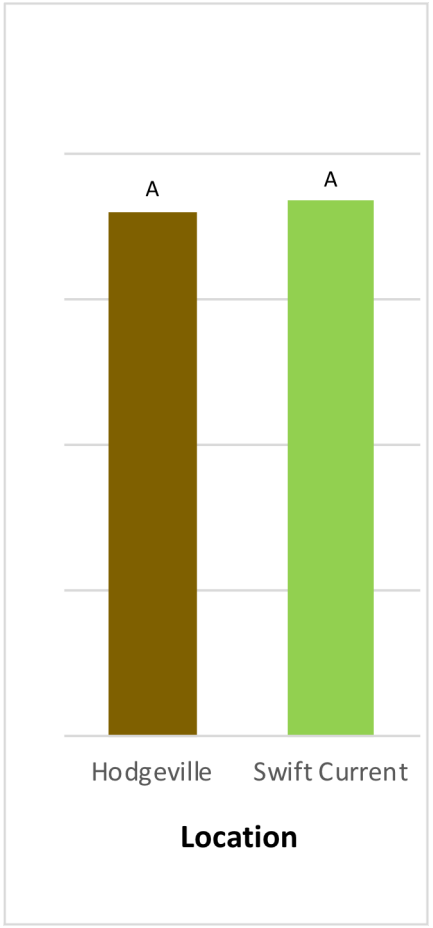


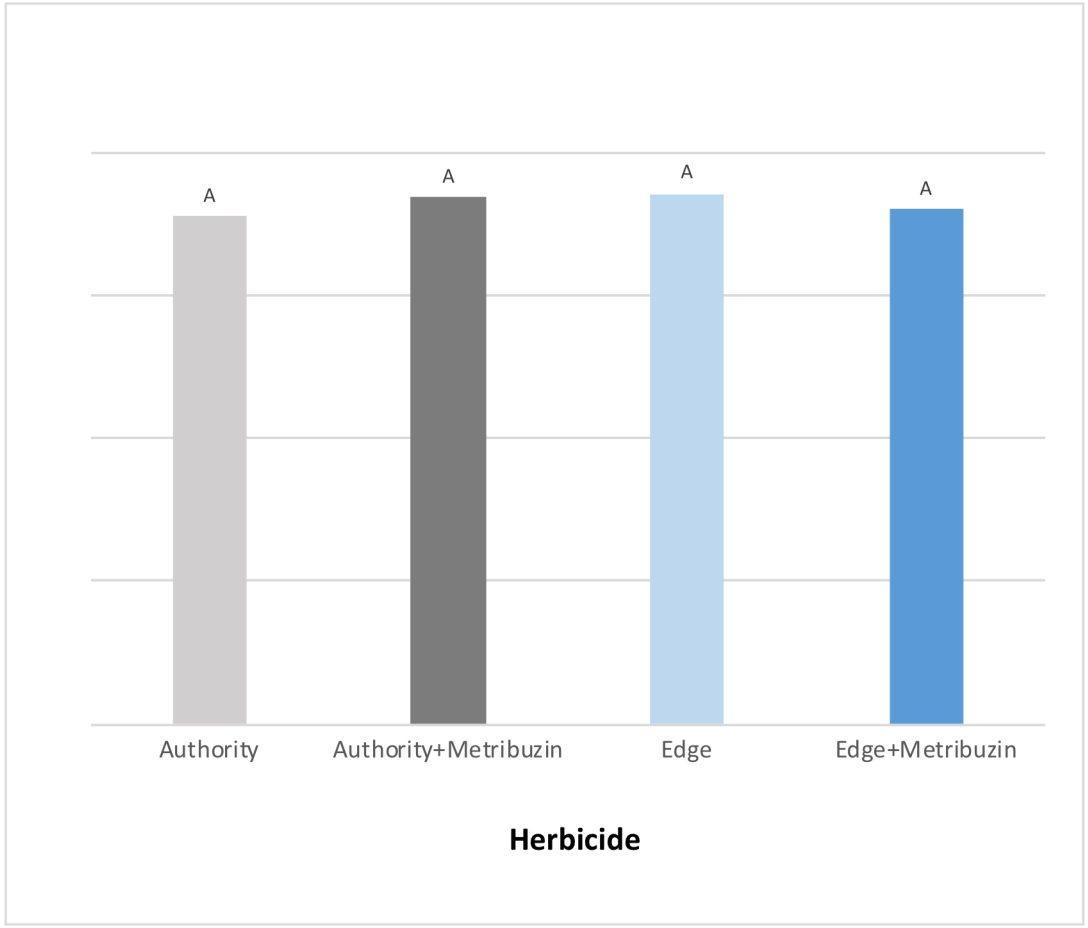


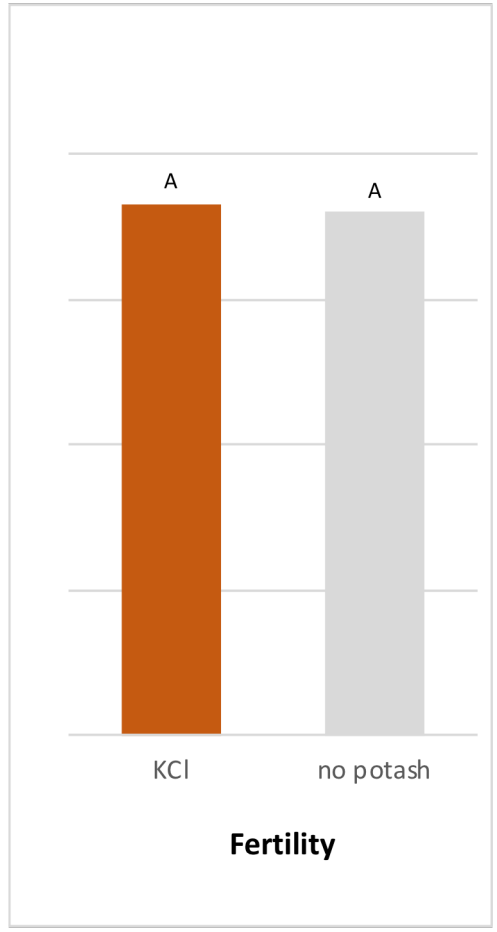
Chickpea Yield (bu/ac)

4 site years



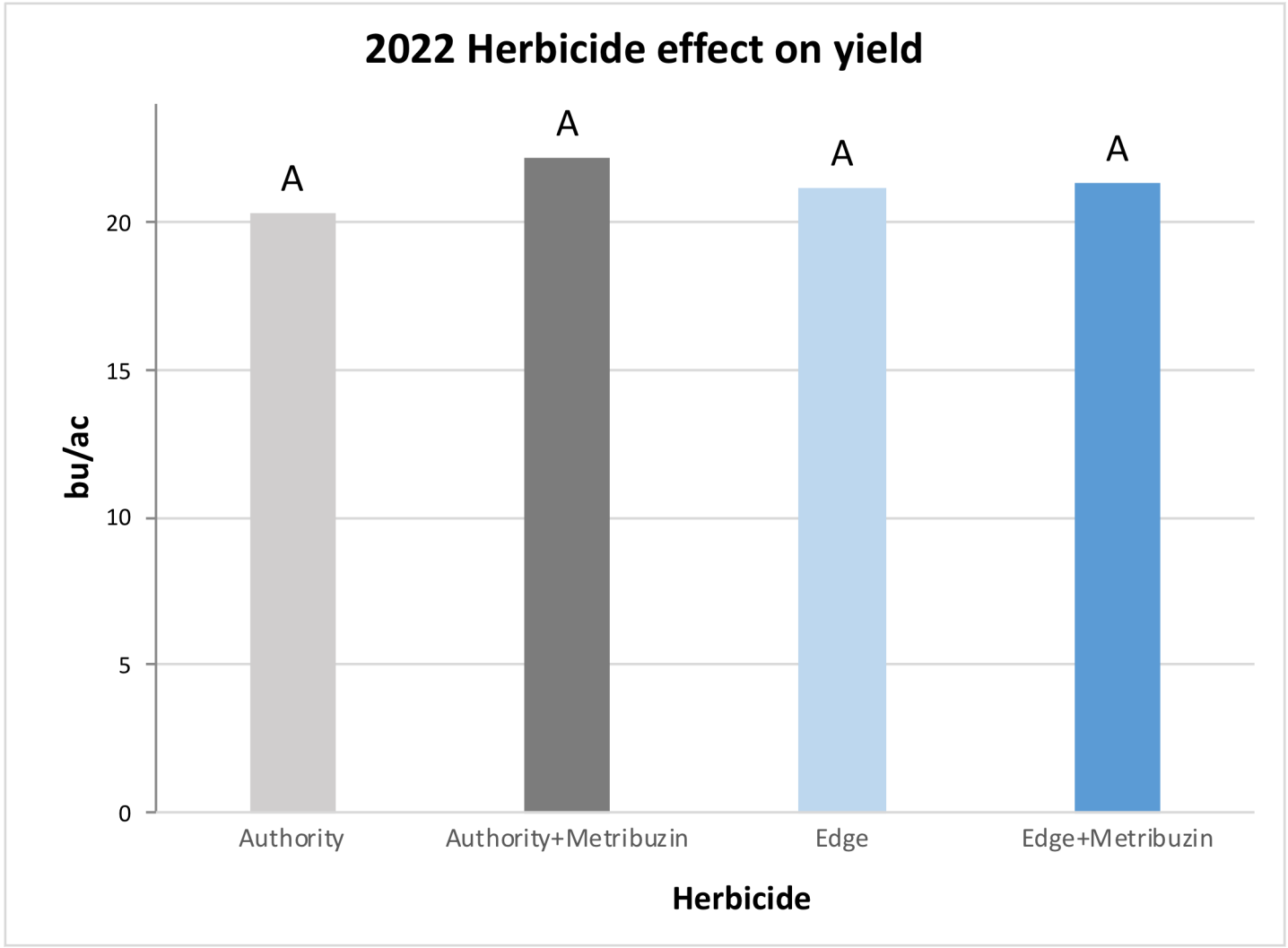


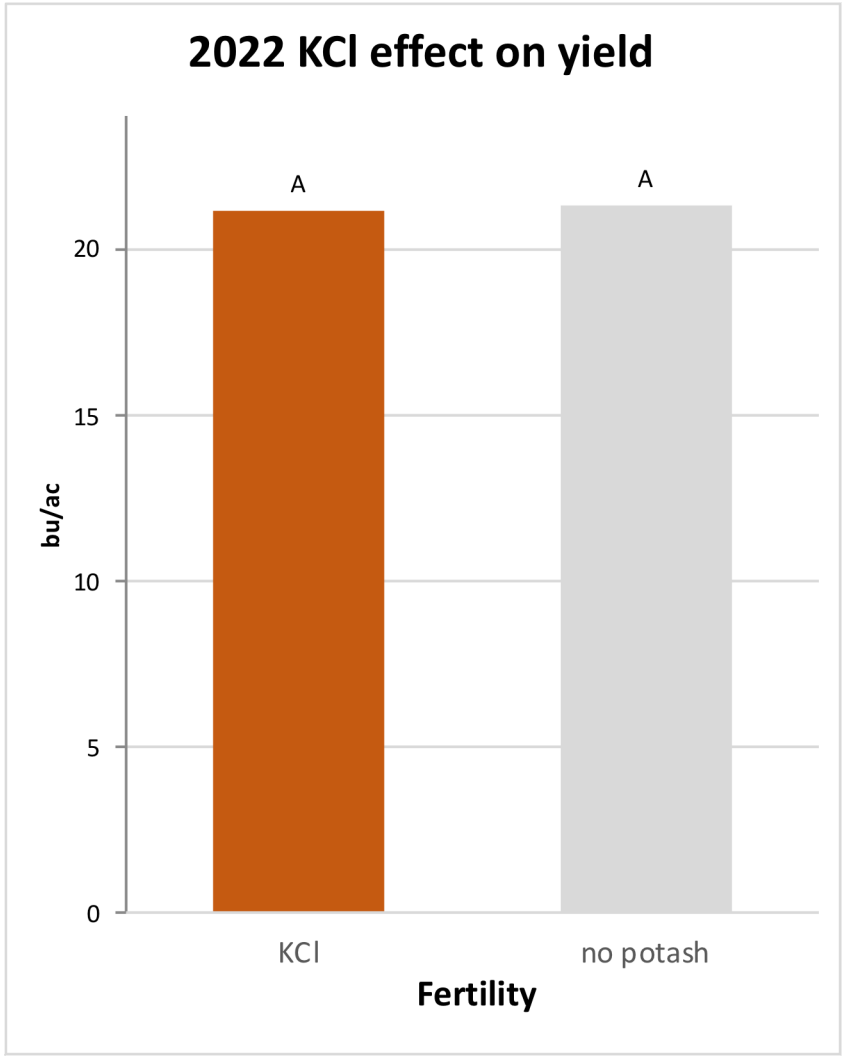




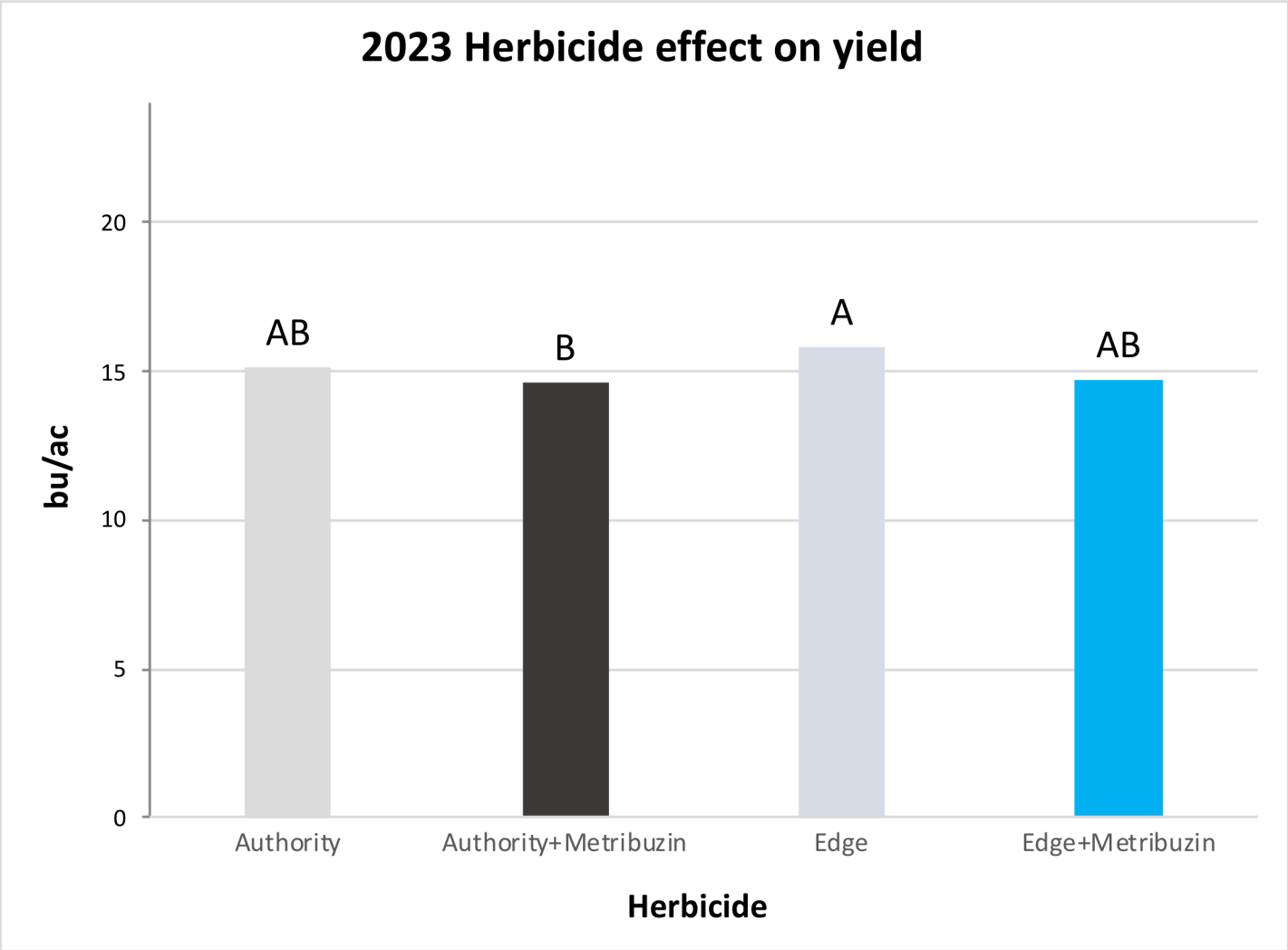
NO SD between location, herbicide, or fertility

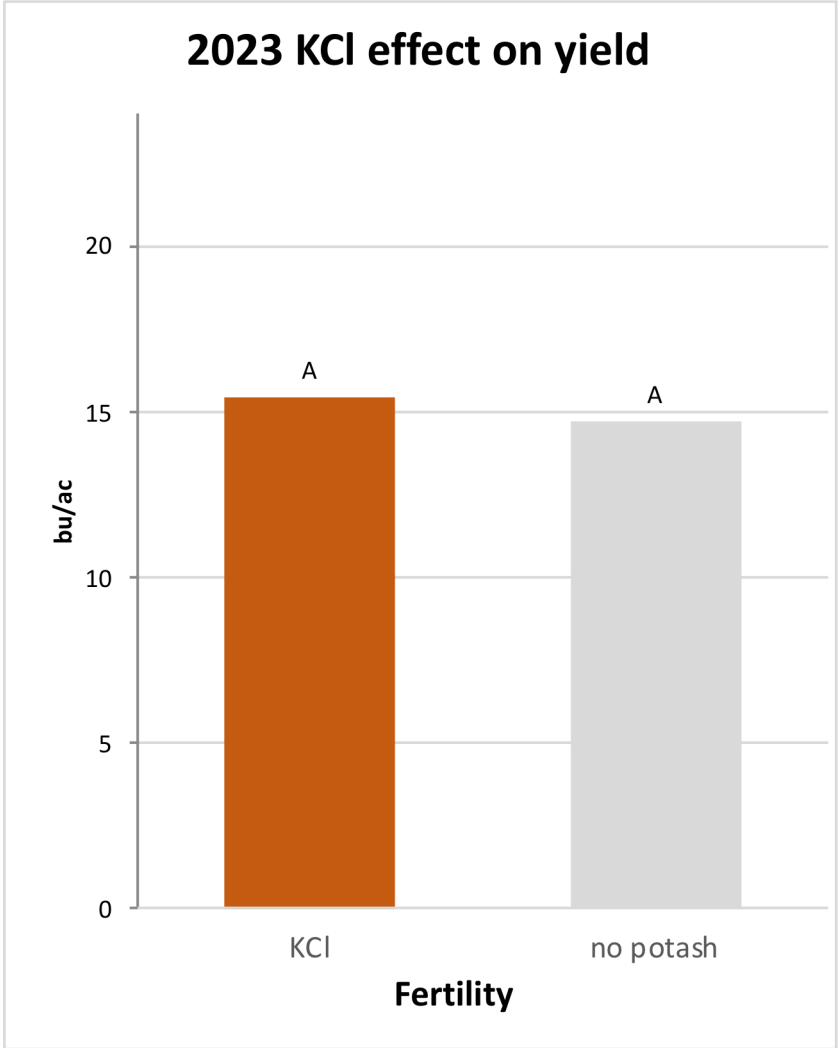
2022 Chickpea Yield (bu/ac)

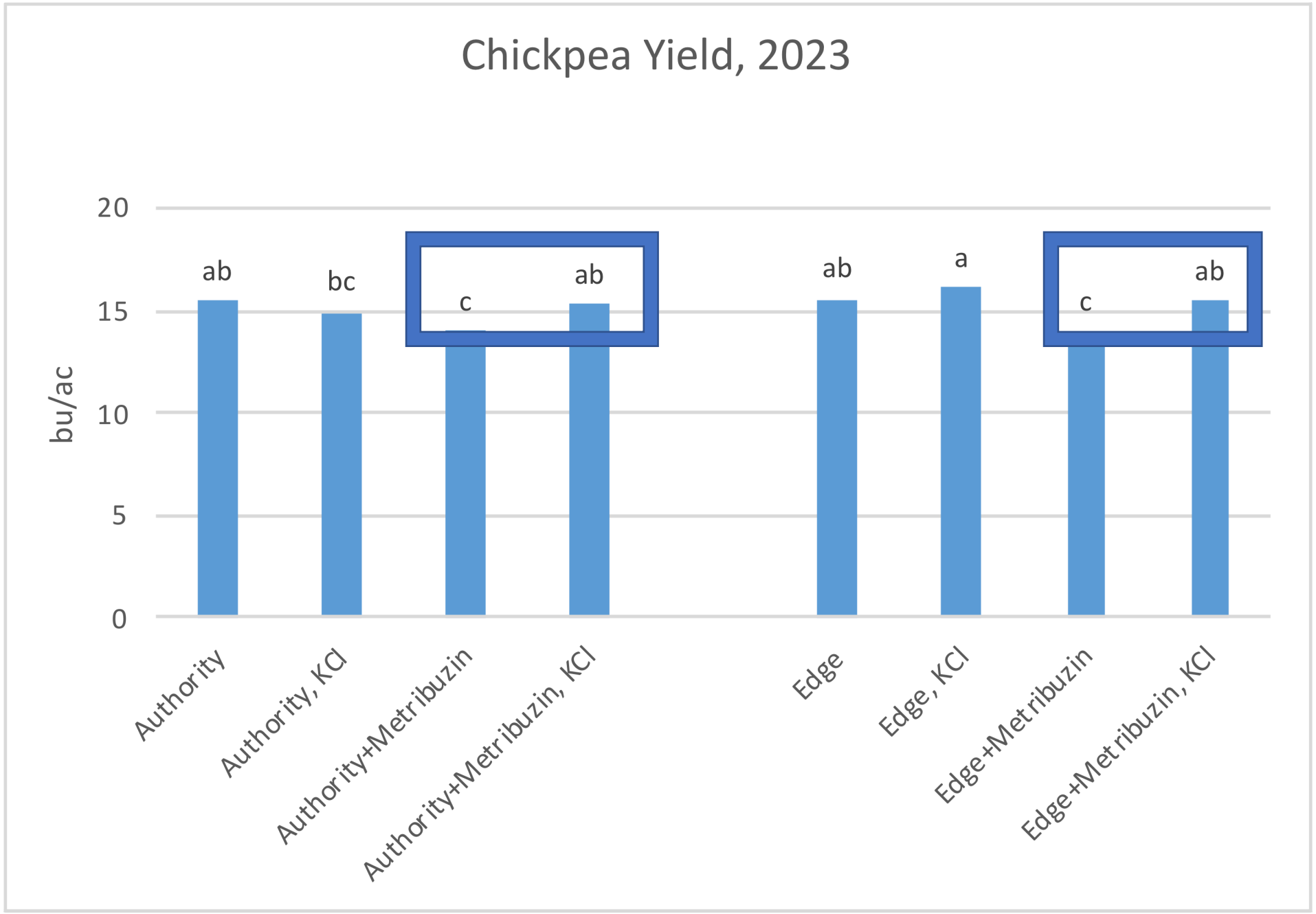




2023 Chickpea Yield (bu/ac)






Chickpea Yield, 2023
bu/ac
20
15
10
5
0
ab
bc
c
ab
ab
a
c
ab
Authority
Authority, KCl
Authority+Metribuzin
Authority+Metribuzin, KCl
Edge
Edge, KCl
Edge+Metribuzin
Edge+Metribuzin, KCl

Basic Economic Analysis

A basic economic analysis using a template from the Saskatchewan Ministry of Agriculture.

.	Edge, 0K	Auth, 0K	Edge + Met, 0K	Auth + Met, 0K	Edge, 35K	Auth, 35K	Edge + Met, 35K	Auth + Met, 35K
Revenue Per Acre, 2022								
Yield (lb/ac)	1234	1193	1357	1336	1311	1244	1200	1325
Gross revenue ($/ac) at .58/lb (Dec. 22/22)	**716**	**692**	**788**	**775**	**761**	**722**	**696**	**769**
Return/ac over total expenses	**390**	**394**	**460**	**475**	**391**	**379**	**324**	**424**
Revenue Per Acre, 2023								
Yield (lb/ac)	1045	1043	937	945	1089	1004	1045	1033
Gross revenue ($/ac) at .58/lb (Dec. 22/22)	**606**	**605**	**543**	**548**	**632**	**582**	**606**	**599**
Return/ac over total expenses	**281**	**307**	**216**	**248**	**262**	**240**	**234**	**255**

Summary

- A post-emergent Metribuzin application may increase symptom severity
  - Provided good control and best return on investment when weed pressure was high and disease pressure was low
  - Increased disease pressure and and side-banded Potassium Chloride at seeding may prevent yield loss from Metribuzin injury
- Potassium Chloride side-banded at seeding may increase plant stand and vigor
  - This may have translated to yield if disease or weed pressure was higher
- An application of Pre-seed Edge, or pre-seed Authority was often sufficient for weed control

wcawall@sasktel.net

www.wheatlandconservation.ca
X: @wheatlandsask
Facebook: Wheatland Conservation Area

Cropportunities March 14, 2024
Annual field tour July 18, 2024