

Introduction

- Kochia that emerges early in the growing season and is not controlled in sugarbeet production has a detrimental effect on yield (Weatherspoon and Schweizer 1969).
- Post emergence weed control in sugarbeet production relies almost exclusively on glyphosate due to its superior weed control (Wilson et al. 2002) and greater economic return (Kniss et al. 2004).
- As glyphosate-resistant kochia becomes more common, there is increasing need for alternative control options.
- Focusing on kochia control in rotational crops will help to reduce the occurrence of kochia in a subsequent sugarbeet crop.

Objective

- Evaluate the effect of crop and herbicide over multiple years on the density of kochia in sugarbeet rotations.
- Find optimal herbicide combinations for kochia control in common rotational crops for sugarbeet production.

Materials & Methods

- Three common rotational crops for this geographic area include: corn, dry bean, small grain cereal. Spring wheat was used as a small grain crop.
- Each crop was treated with three different herbicide combinations and an untreated check was included.
- This study was a randomized complete block design with four replications. Plot size was 9 by 10 meters.
- Weed control was estimated visually and weed density by species was assessed two and four weeks after the last herbicide treatment. Crop yield was recorded at the end of the growing season.
- Weed control, weed density, and crop yield was analyzed using ANOVA and Tukey's protected HSD was used for mean separation.

Trt.	Herbicide	Timing	Rate
Small Grains			
1	Non-treated Check		
2	Pyrasulfotole + Bromoxynil	POST 1	38 ^a + 216
3	Pyrasulfotole + Bromoxynil + MCPA	POST 1	38 + 215 + 389
4	Pyrasulfotole + Bromoxynil + Fluroxypyr	POST 1	38 + 215 + 157

Dry Bean

1	Non-treated Check		
2	EPTC + Dimethenamid-P	PPI ^b	2452 + 841
3	EPTC + Dimethenamid-P Bentazon	PPI POST 1	2452 + 841 560
4	EPTC + Dimethenamid-P Bentazon fb Bentazon	PPI POST 1 fb POST 2	2452 + 841 560 + 560

Corn

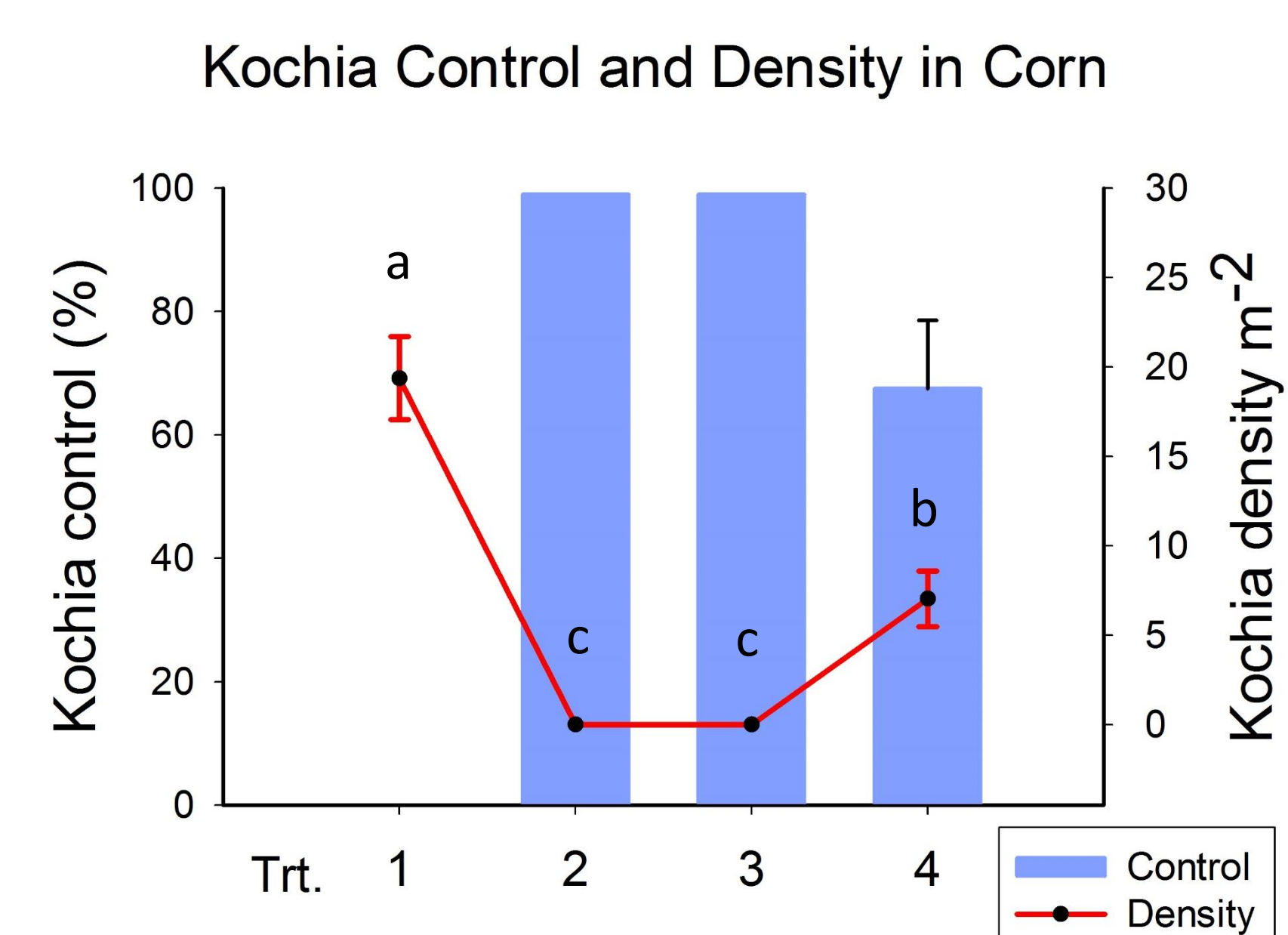
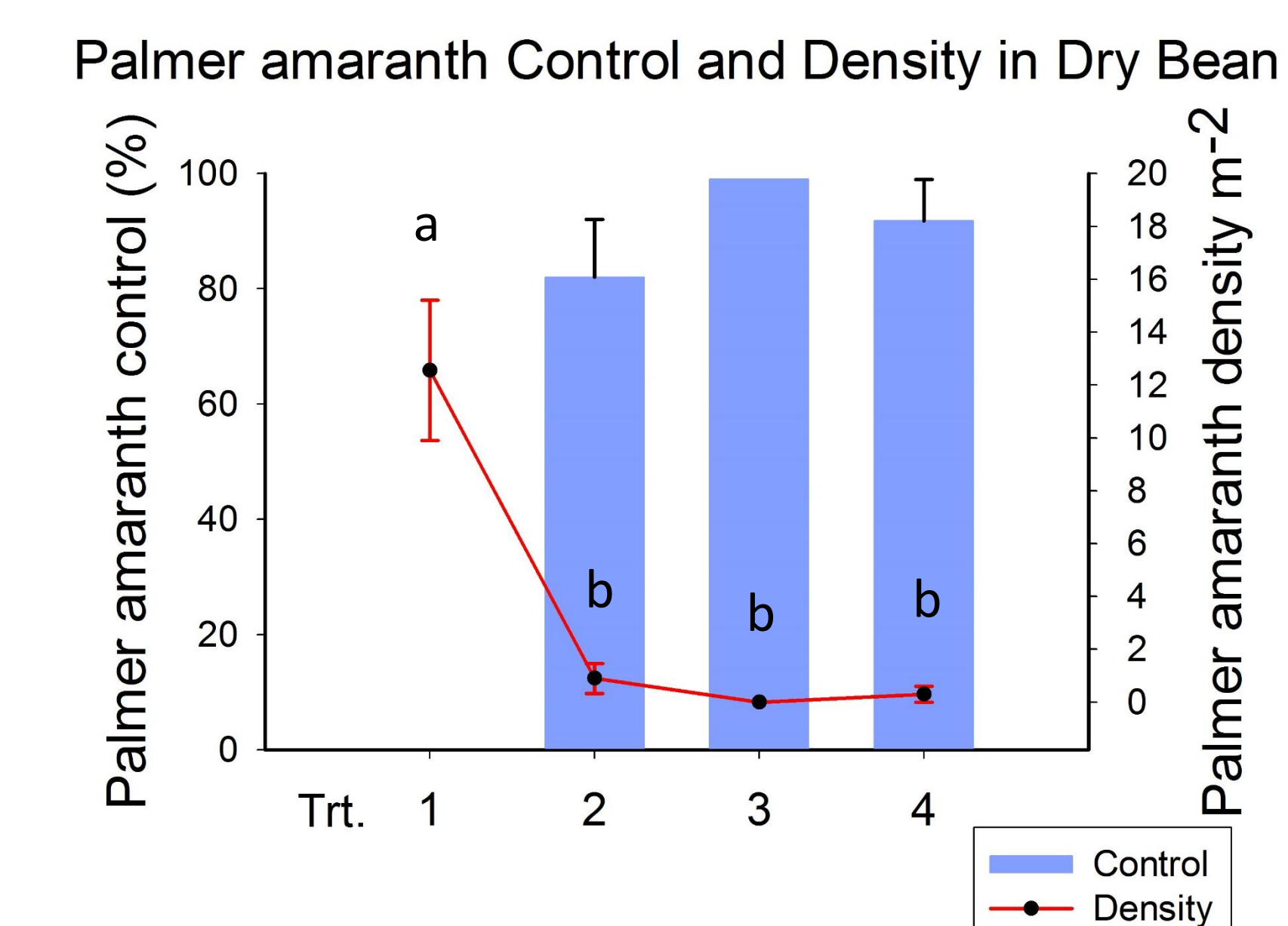
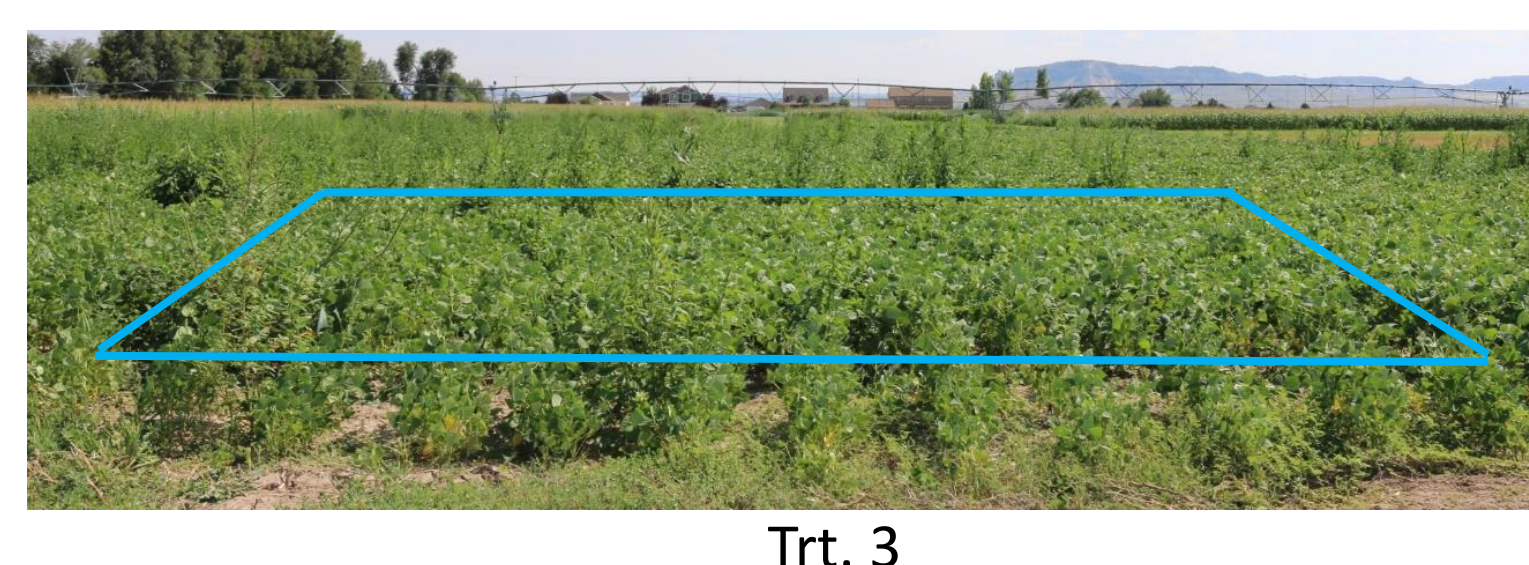
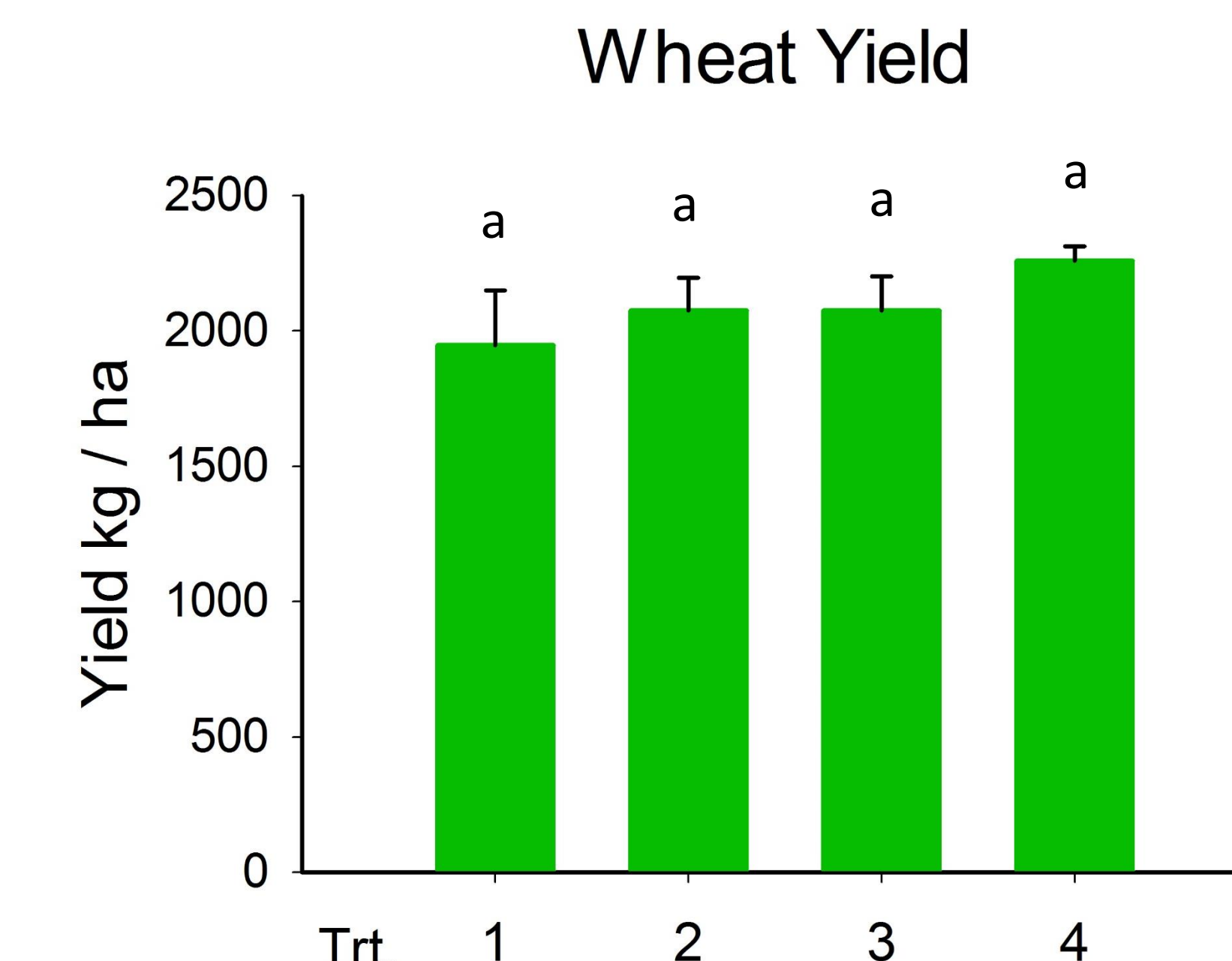
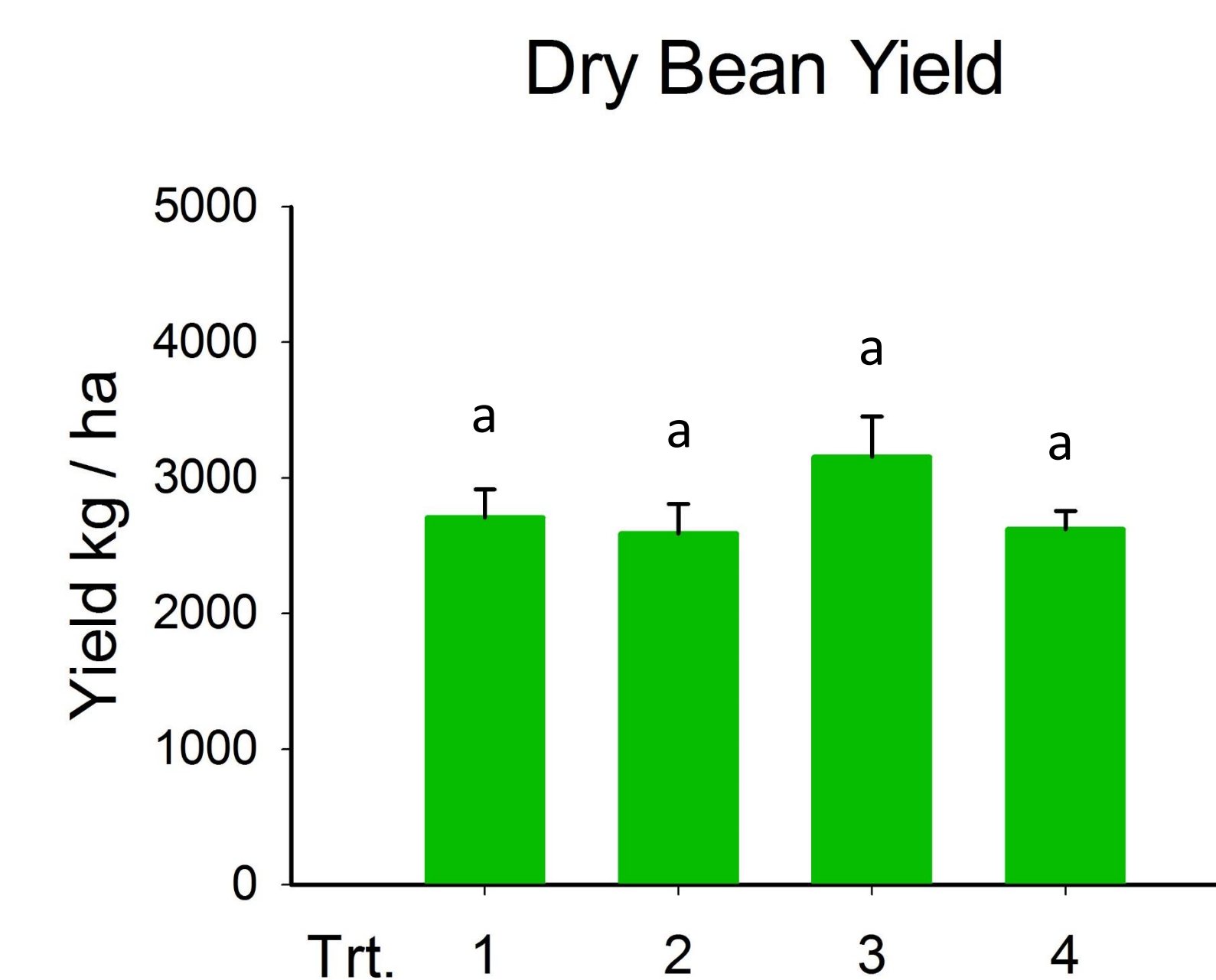
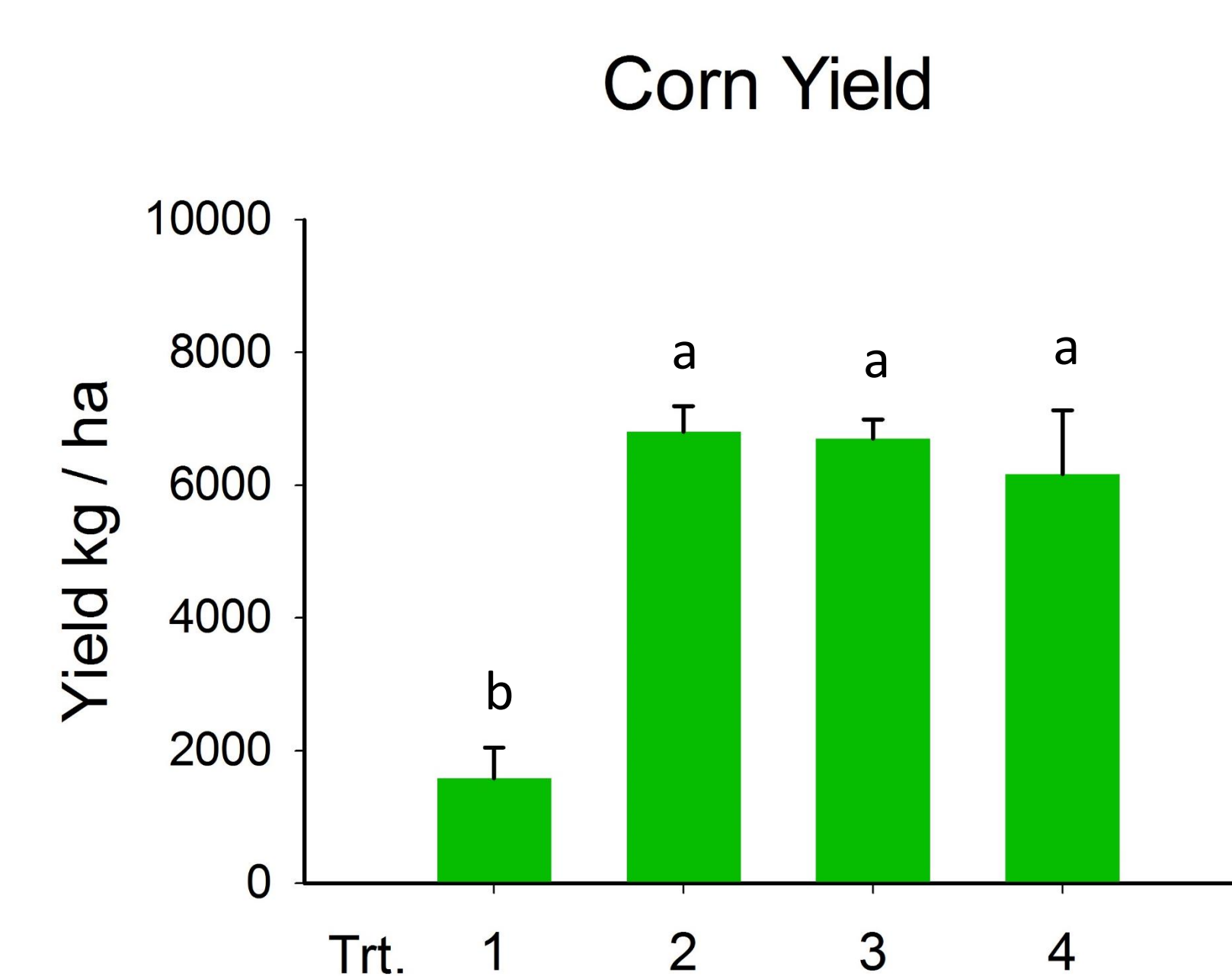
1	Non-treated Check		
2	Glyphosate + Dicamba Glyphosate	POST 1 POST 2	1261 + 280 1261
3	Glyphosate + Saflufenacil + Dimethenamid-P Glyphosate + Dicamba	PRE POST 2	1261 + 60 + 525 1261 + 280
4	2,4-D + Flumioxazin Rimsulfuron + Thifensulfuron-methyl	7 DBP POST 2	532 + 89 16 + 4

^aAll rates are in g ai or ae hectare⁻¹

^bAbbreviations: fb, followed by; PPI, Pre-plant incorporated; PRE, pre-emergence; DBP, days before planting.

Results

- There were no kochia observed in the spring wheat or dry bean treatments.
- Palmer amaranth, another weed of concern in sugarbeets, was present at high densities in dry bean.
- Corn treatments containing glyphosate and dicamba provided superior control relative to other corn treatments.



Discussion

- Spring wheat is an effective competitor with kochia because it starts growth early in the season and is at canopy during the main time of kochia emergence.
- Dry bean was an effective rotational crop at controlling kochia because it is planted after most kochia emergence has taken place. However, the higher abundance of Palmer amaranth in dry bean may limit the benefit of dry bean as a desirable rotational crop.
- While glyphosate plus dicamba provided superior weed control, the increase of both glyphosate and dicamba-resistant kochia may limit this treatment combination in the future.
- Sugarbeet will be planted across the entire study to evaluate multiple year herbicide interactions.

Citations