

Herbicide Options for Weed Burndown in Alfalfa

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INTRODUCTION

Paraquat has been used heavily for weed burndown in alfalfa (*Medicago sativa*) but new safety measures introduced by United States Environmental Protection Agency to reduce the risks associated with the use of paraquat has left most growers seeking safer alternatives.

Objective

Identify effective alternatives to paraquat for weed control in established alfalfa.

MATERIALS AND METHODS

- **Study Locations:** Kimberly, ID and Greenville, UT in 2023 and 2024.
- **Study Design:** Randomized complete block with 4 replications. Plot size was 3 x 9 m.
- **Treatments:** low and high use rates of carfentrazone, diuron + hexazinone, pyraflufen, saflufenacil, tiafenacil, glyphosate, paraquat and a nontreated included for comparison (Figure 2).
- **Herbicide Application:** CO₂-pressurised sprayer, 144L ha⁻¹ at 207 kPa with TeeJet DG11002 nozzles.
- Herbicide applied to 5-10 cm tall Alfalfa (in April).

Data Collection

- Weekly height measurement (3-5 plants plot⁻¹).
- Visible weed control efficacy (0 - 100%).
- Alfalfa forage yield.

Data Analysis

- Linear mixed effect ANOVA in R statistical language v 4.4.2.
- Means were separated using Tukey's HSD at alpha=0.05.

RESULTS AND DISCUSSION

- After 3 weeks of treatment, the increase in height was similar across all the treatments in both locations (Figure 1).
- Yield ranged from 1163 kg ha⁻¹ to 2431 kg ha⁻¹ with no significant difference in all the treatments in Idaho (Figure 2A)
- In Utah, yield ranged from 1848 kg ha⁻¹ to 4984 kg ha⁻¹ with significantly higher yield in pyraflufen compared to paraquat (Figure 2B).
- Carfentrazone, tiafenacil had similar effects as paraquat (Figures 2 A and 2B).

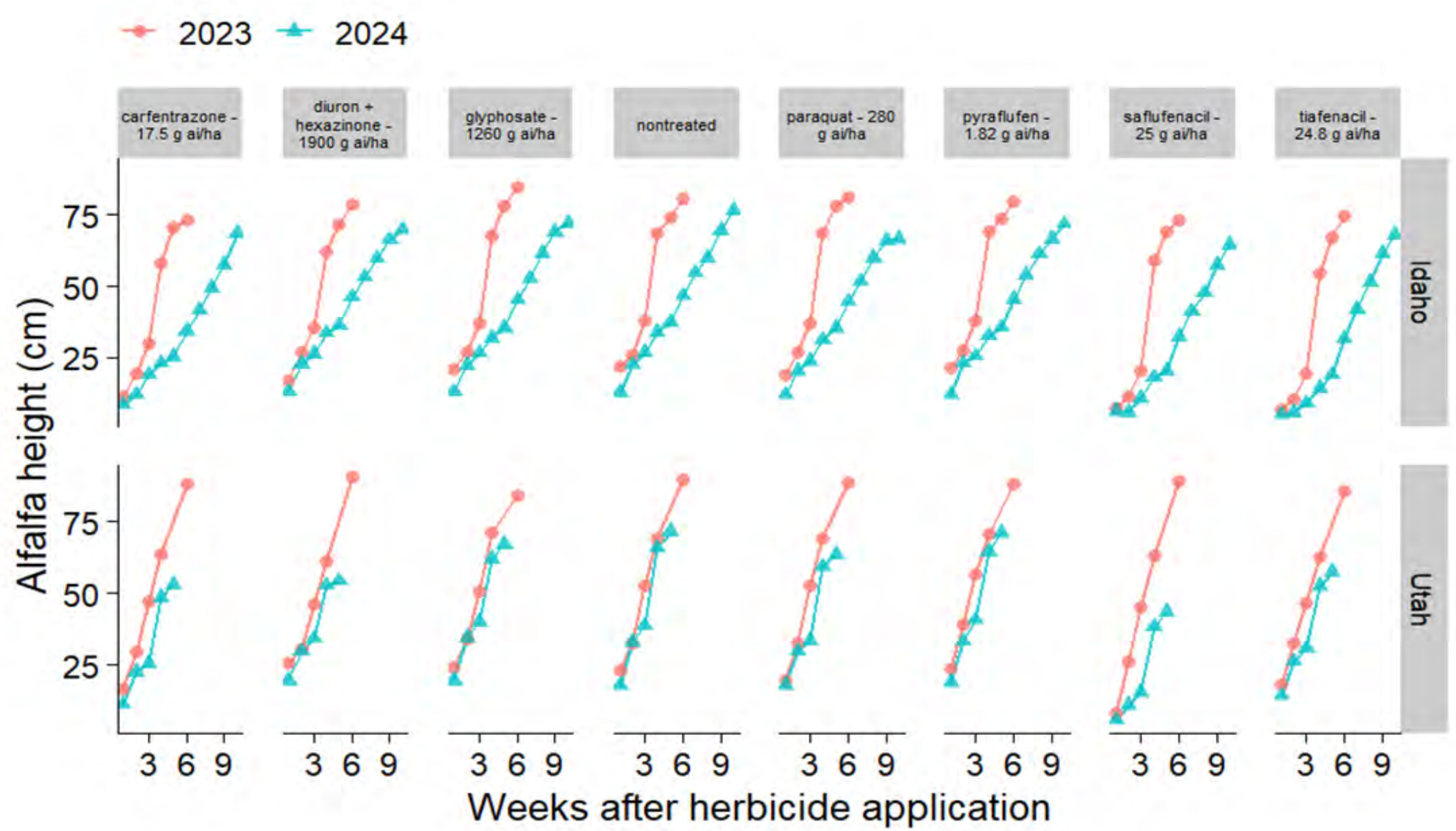


Figure 1: Height of Alfalfa in different herbicide treated field

Figure 2: Alfalfa forage yield as influenced by herbicide treatments in Idaho and Utah. Means followed by the same letters are not significantly different using Tukey's HSD at alpha=0.05

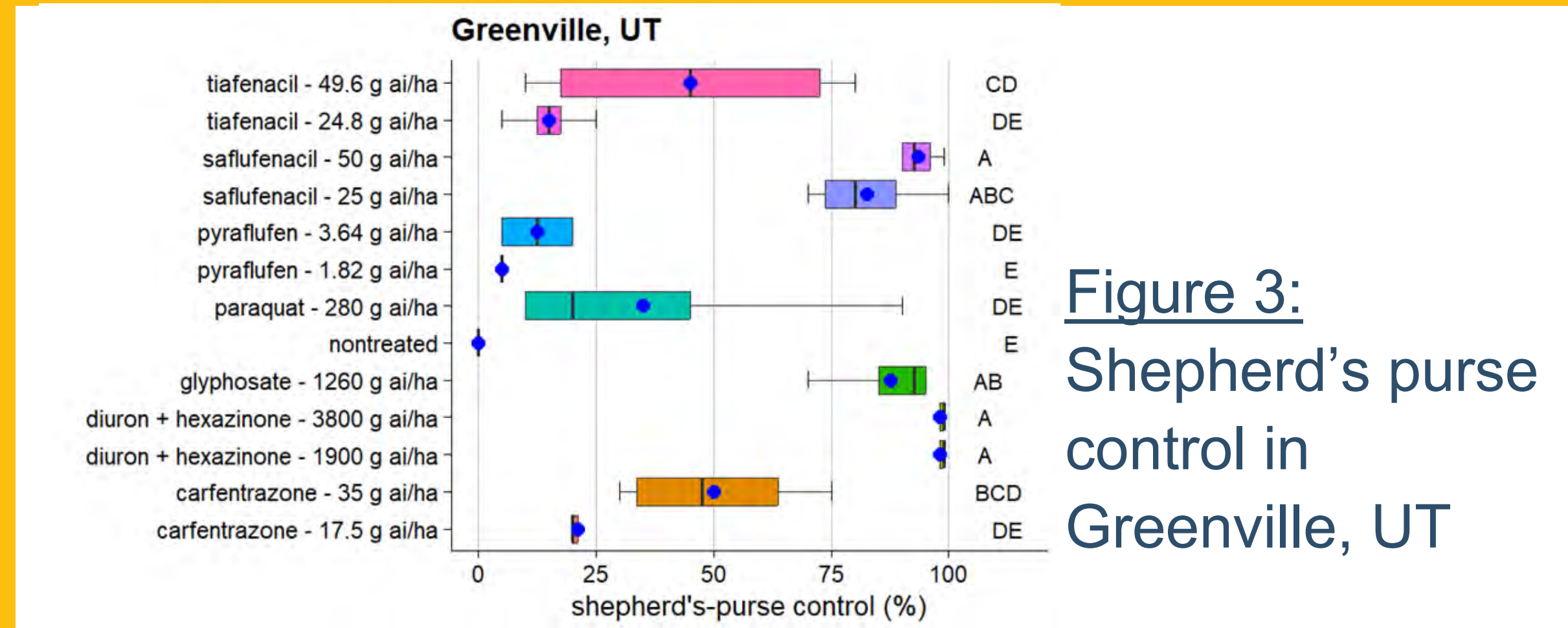
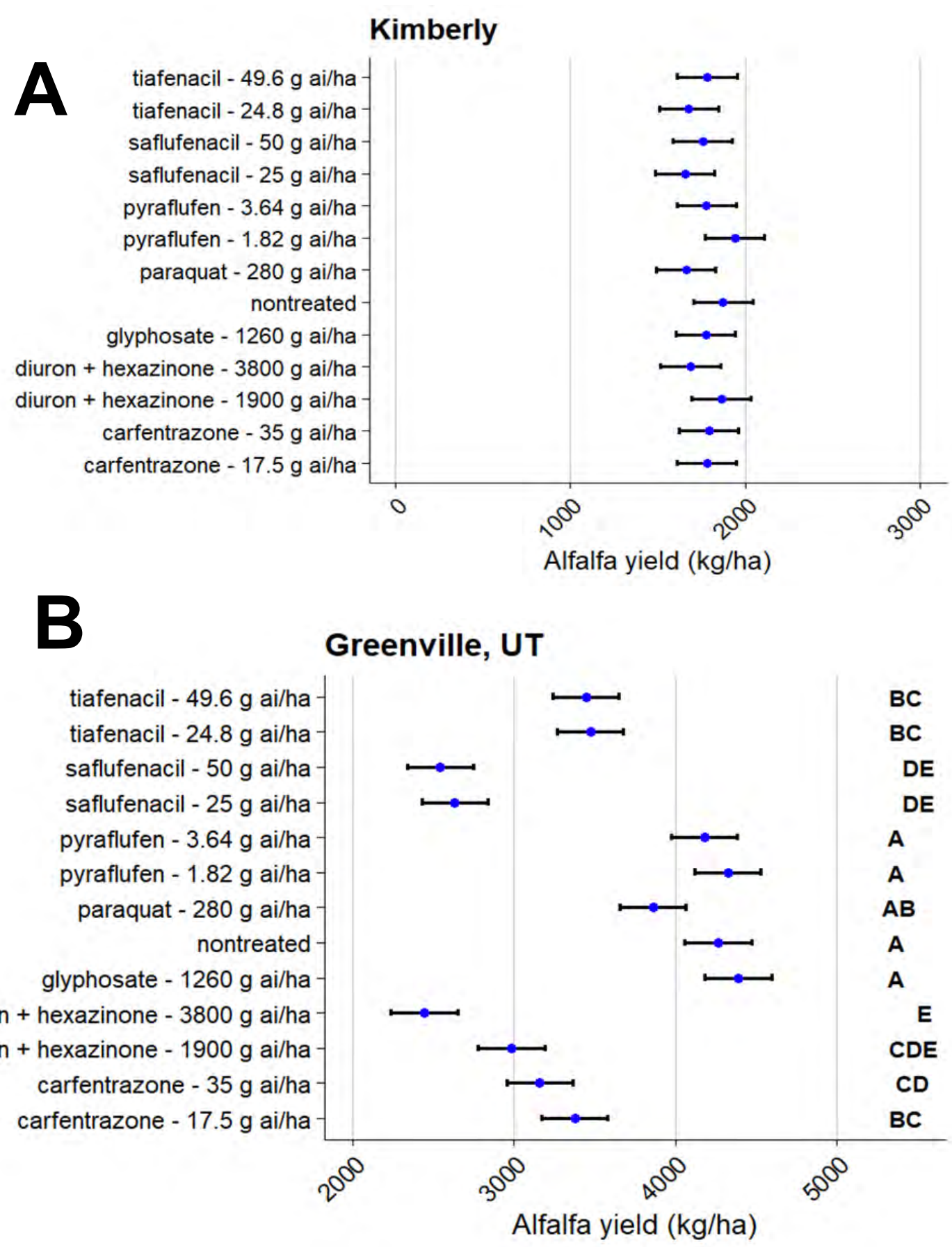


Figure 3: Shepherd's purse control in Greenville, UT

- In Utah, diuron + hexazinone, saflufenacil were significantly more effective in controlling shepherd's purse than paraquat (Figure 3).

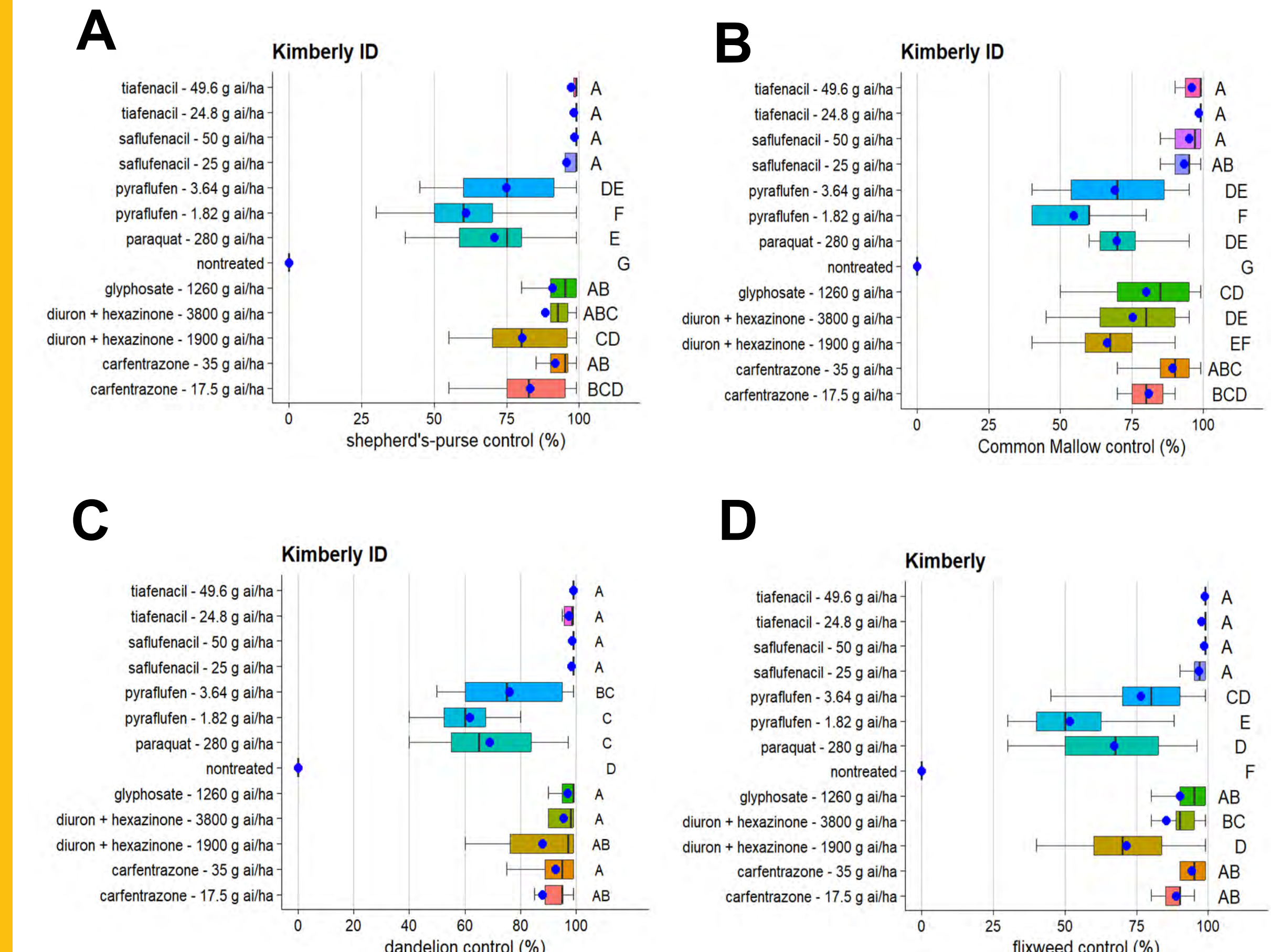


Figure 4: Weed control in different herbicides in Kimberly, Idaho. Shepherd's purse (A), common mallow (B), dandelion (C), flaxweed (D). Means followed by the same letters are not significantly different using Tukey's HSD at alpha=0.05.

- In Idaho, tiafenacil, saflufenacil, diuron + hexazinone and carfentrazone, significantly reduced the population of shepherd's purse, flaxweed and dandelion compared to paraquat (Figure 4).
- Pyraflufen weed control efficacy was similar to paraquat in both locations (Figures 3 & 4).

Table 1. Approximate cost of the herbicide treatments

Herbicide (g ai/ha)	Cost (\$/ha)
paraquat (280)	8.5
glyphosate (1260)	19.3
carfentrazone (17.5))	16.0
carfentrazone (35)	32.0
saflufenacil (25)	15.5
saflufenacil (50)	31.0
pyraflufen (1.82)	11.3
pyraflufen (3.64)	22.5
tiafenacil (24.8)	14.0
tiafenacil (49.6)	28.0
diuron + hexazinone (1900)	123.8
diuron + hexazinone (3800)	247.3

Paraquat remained the cheapest option for spring weed burndown in established alfalfa, but pyraflufen, tiafenacil, saflufenacil, and carfentrazone may be good alternatives for controlling emerged broadleaf weeds if new regulatory safety measures limit the availability and use feasibility of paraquat.

