

Influence of Rainfall on the Timing and Efficacy of PRE/POST Soil Residual Herbicides for Control of Herbicide-Resistant Kochia and Palmer Amaranth

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PRE/POST Zidua Herbicide Combinations

Herbicide	Mode of Action	Timing
Express SG (tribenuron)	2	POST
Beyond (imazamox)	2	POST
Treflan (trifluralin)	3	PPI
Sonalan (ethalfuralin)	3	PPI
Prowl (pendimethalin)	3	PPI
Eptam (EPTC)	8	PPI
Dual Magnum (s-metolachlor)	15	PRE
Zidua (pyroxysulfone)	15	PRE
Spartan (sulfentrazone)	14	PRE
Aim (carfentrazone)	14	PRE
Spartan Charge (carfentrazone + sulfentrazone)	14	PRE
Authority Supreme (sulfentrazone + pyroxysulfone)	14 + 15	PRE
BroadAxe XC / Spartan Elite (sulfentrazone + s-metolachlor)	14 + 15	PRE



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With a focus on Palmer amaranth and kochia,

1. Can Zidua applied POST, extend PRE control?
2. What is the influence of rainfall on herbicide activity?



PRE/POST Zidua Herbicide Combinations

Treatment	Rate ¹	Application Timing
¹ Non treated check	—	—
Prowl H2O	2 pts	PRE
Prowl H2O fb* Zidua	2 pts fb 1.5 fl oz	PRE fb 2 Weeks after Emergence
Prowl H2O fb Zidua	2 pts fb 1.5 fl oz	PRE fb 4 Weeks after Emergence
Prowl H2O fb Zidua	2 pts fb 1.5 fl oz	PRE fb 6 Weeks after Emergence
Broadaxe	21 fl oz	PRE
Broadaxe fb Zidua	21 fl oz fb 1.5 fl oz	PRE fb 2 Weeks after Emergence
Broadaxe fb Zidua	21 fl oz fb 1.5 fl oz	PRE fb 4 Weeks after Emergence
Broadaxe fb Zidua	21 fl oz fb 1.5 fl oz	PRE fb 6 Weeks after Emergence
Spartan Charge	5 fl oz	PRE
Spartan Charge fb Zidua	5 fl oz fb 1.5 fl oz	PRE fb 2 Weeks after Emergence
Spartan Charge fb Zidua	5 fl oz fb 1.5 fl oz	PRE fb 4 Weeks after Emergence
Spartan Charge fb Zidua	5 fl oz fb 1.5 fl oz	PRE fb 6 Weeks after Emergence
Hand weeded check	—	—
*Abbreviations: fb, followed by; PRE, pre-crop emergence		
¹ Product applied per acre.		
¹ All treatments will include glyphosate as a PRE burndown.		



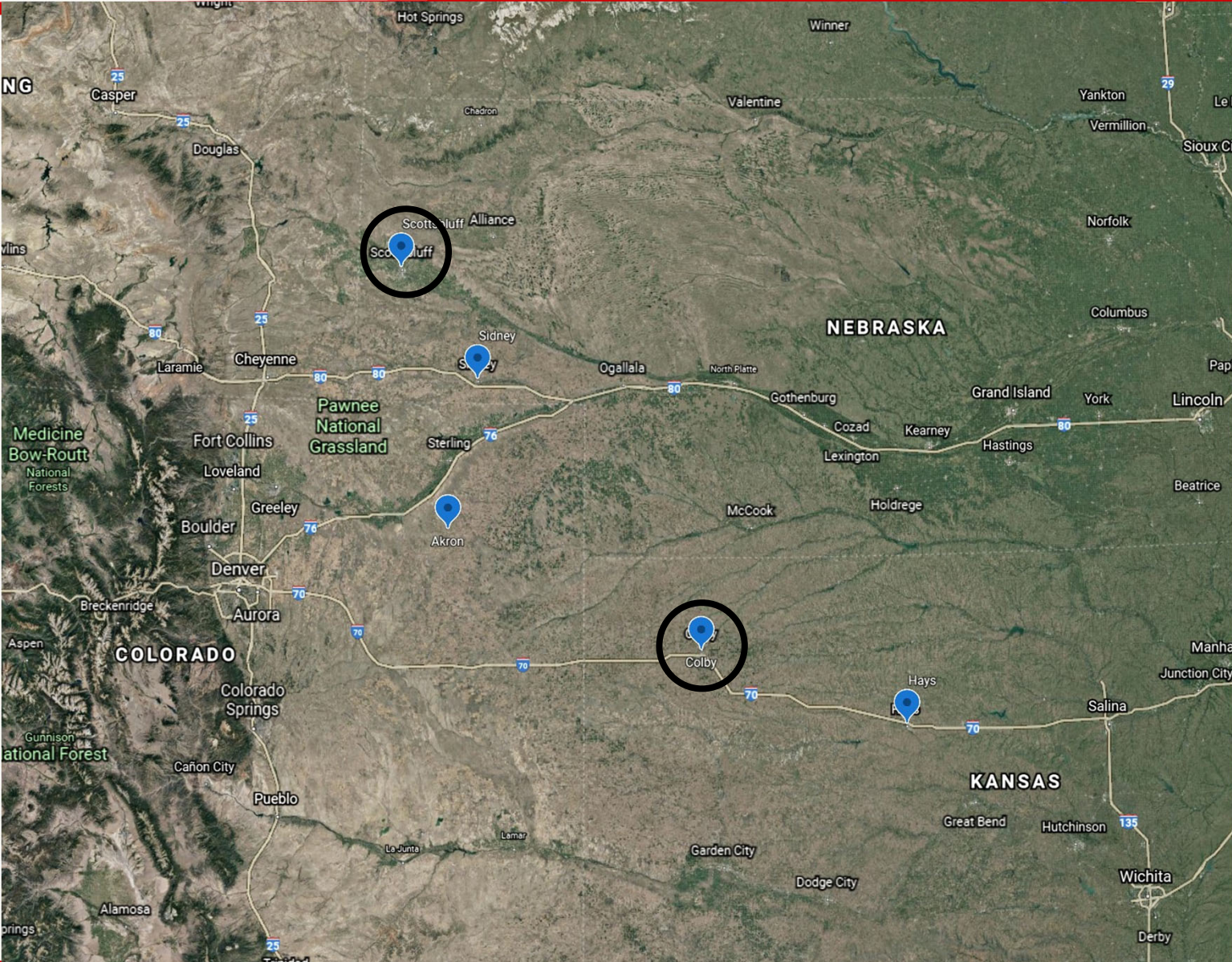
PRE/POST Zidua Herbicide Combinations

Treatment	Rate ¹	Application Timing
¹ Non treated check	—	—
Prowl H2O	2 pts	PRE
Prowl H2O fb* Zidua	2 pts fb 1.5 fl oz	PRE fb 2 TL
Prowl H2O fb Zidua	2 pts fb 1.5 fl oz	PRE fb 4 TL
Prowl H2O fb Zidua	2 pts fb 1.5 fl oz	PRE fb 6 TL
Broadaxe	21 fl oz	PRE
Broadaxe fb Zidua	21 fl oz fb 1.5 fl oz	PRE fb 2 TL
Broadaxe fb Zidua	21 fl oz fb 1.5 fl oz	PRE fb 4 TL
Broadaxe fb Zidua	21 fl oz fb 1.5 fl oz	PRE fb 6 TL
Spartan Charge	5 fl oz	PRE
Spartan Charge fb Zidua	5 fl oz fb 1.5 fl oz	PRE fb 2 TL
Spartan Charge fb Zidua	5 fl oz fb 1.5 fl oz	PRE fb 4 TL
Spartan Charge fb Zidua	5 fl oz fb 1.5 fl oz	PRE fb 6 TL
Hand weeded check	—	—
*Abbreviations: fb, followed by; PRE, pre-crop emergence		
¹ Product applied per acre.		
¹ All treatments will include glyphosate as a PRE burndown.		

Planting populations were reduced to 50% in some locations.



PRE/POST Zidua Herbicide Combinations

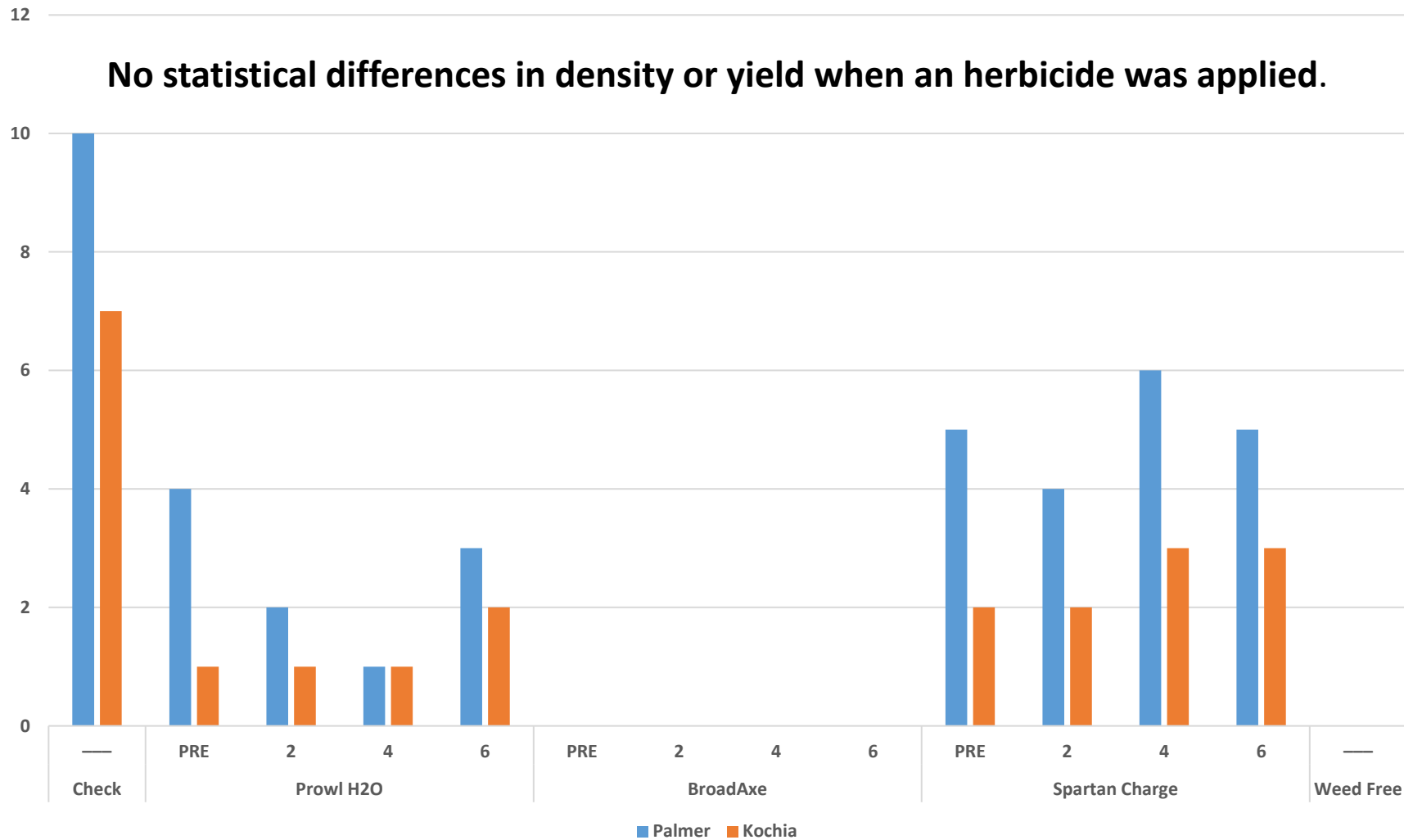


PRE/POST Zidua Herbicide Combinations

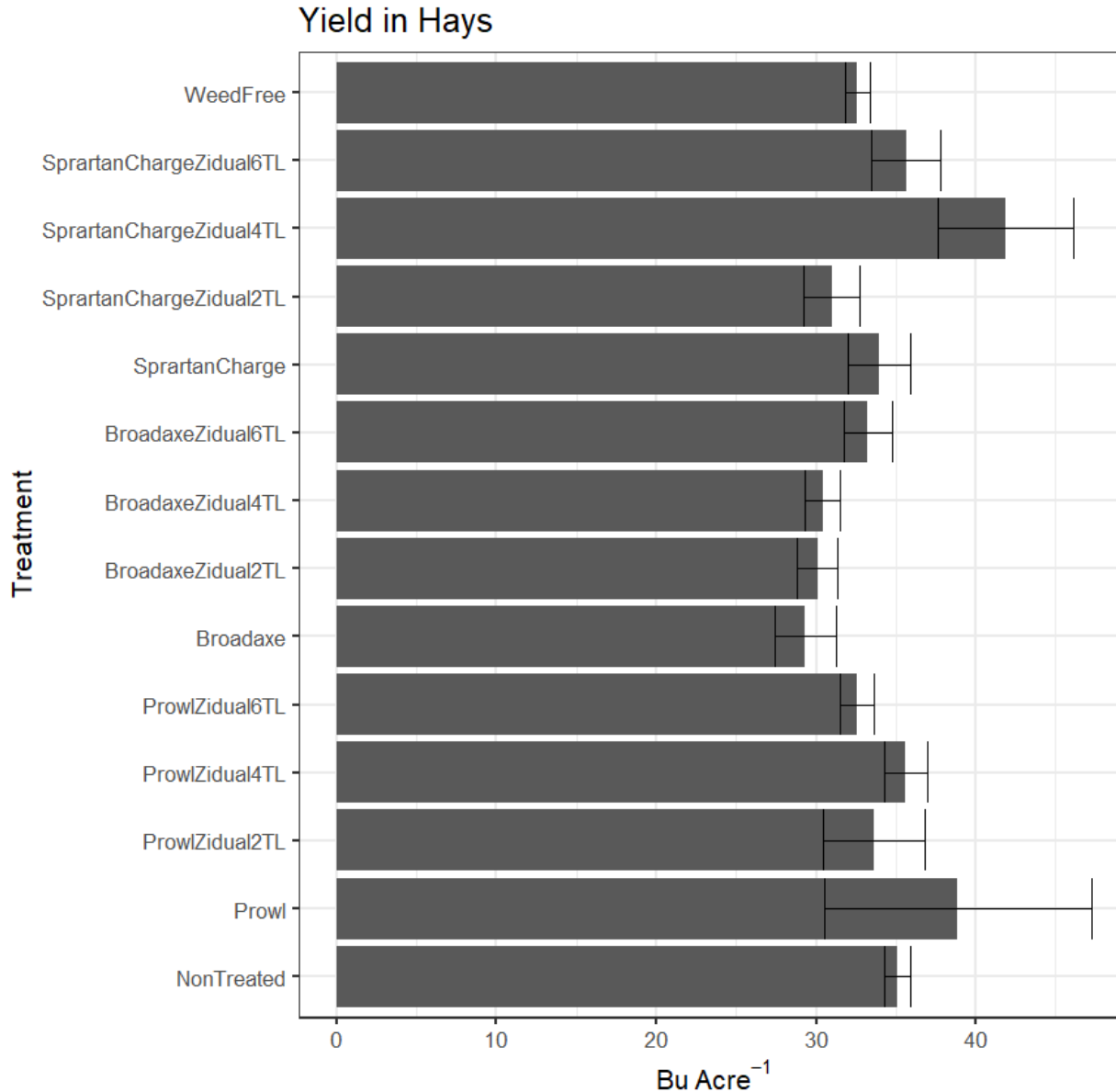


Zidua Herbicide Combinations – 2019 Hays

Weed Density row⁻¹



Zidua Herbicide Combinations – 2020 Hays

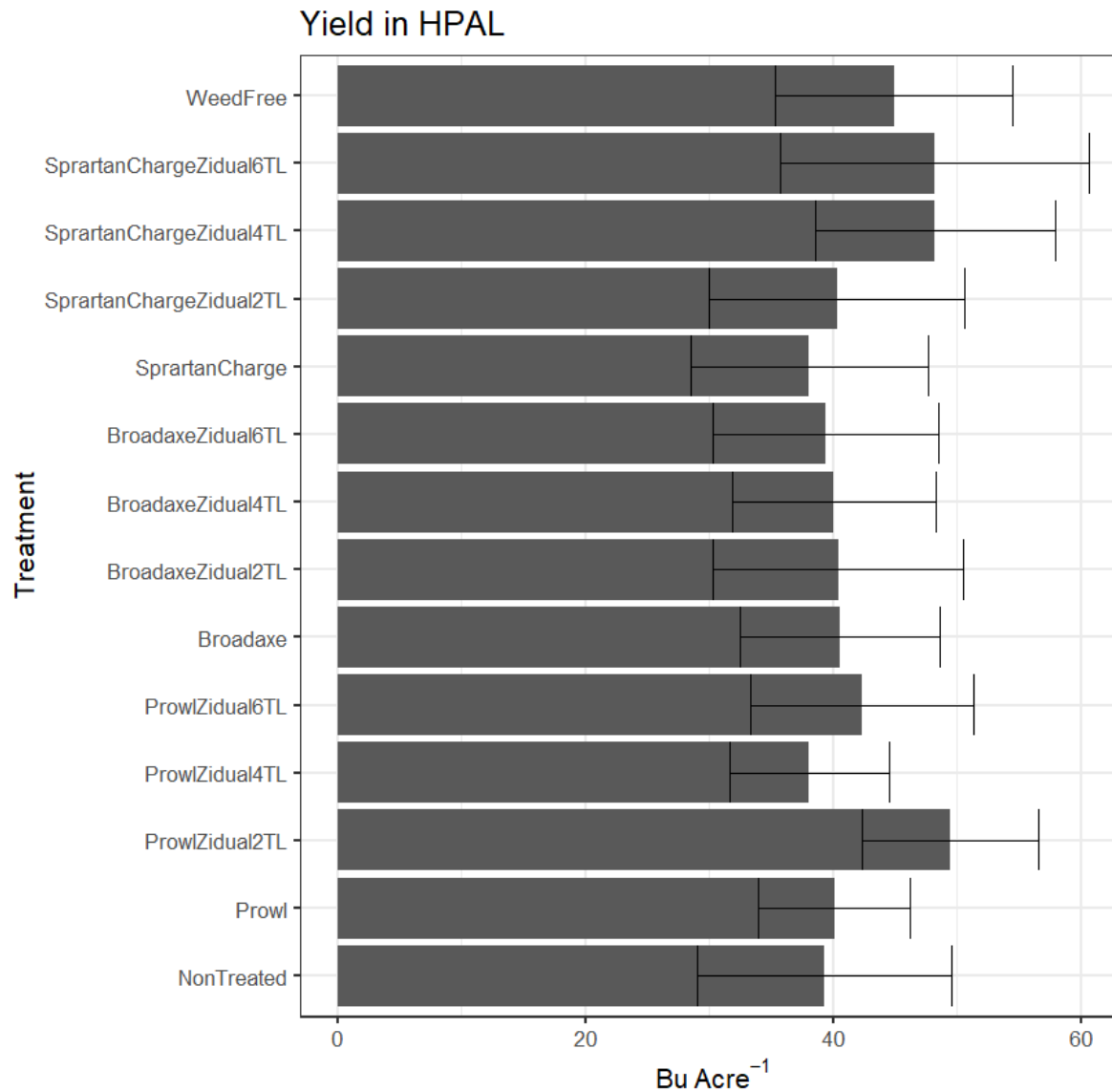


Kochia and Palmer control was improved with Broadaxe compared to Prowl.

No differences in biomass or yield.



Zidua Herbicide Combinations – 2020 Sidney



When an herbicide was used, weed density was reduced.

No differences in yield.



Zidua Herbicide Combinations – Conclusions

Dryland locations

Hays 2019

- No statistical differences, but Broadaxe seems to be doing better

Hays 2020

- No differences in weed biomass between treatments
- No differences in yield

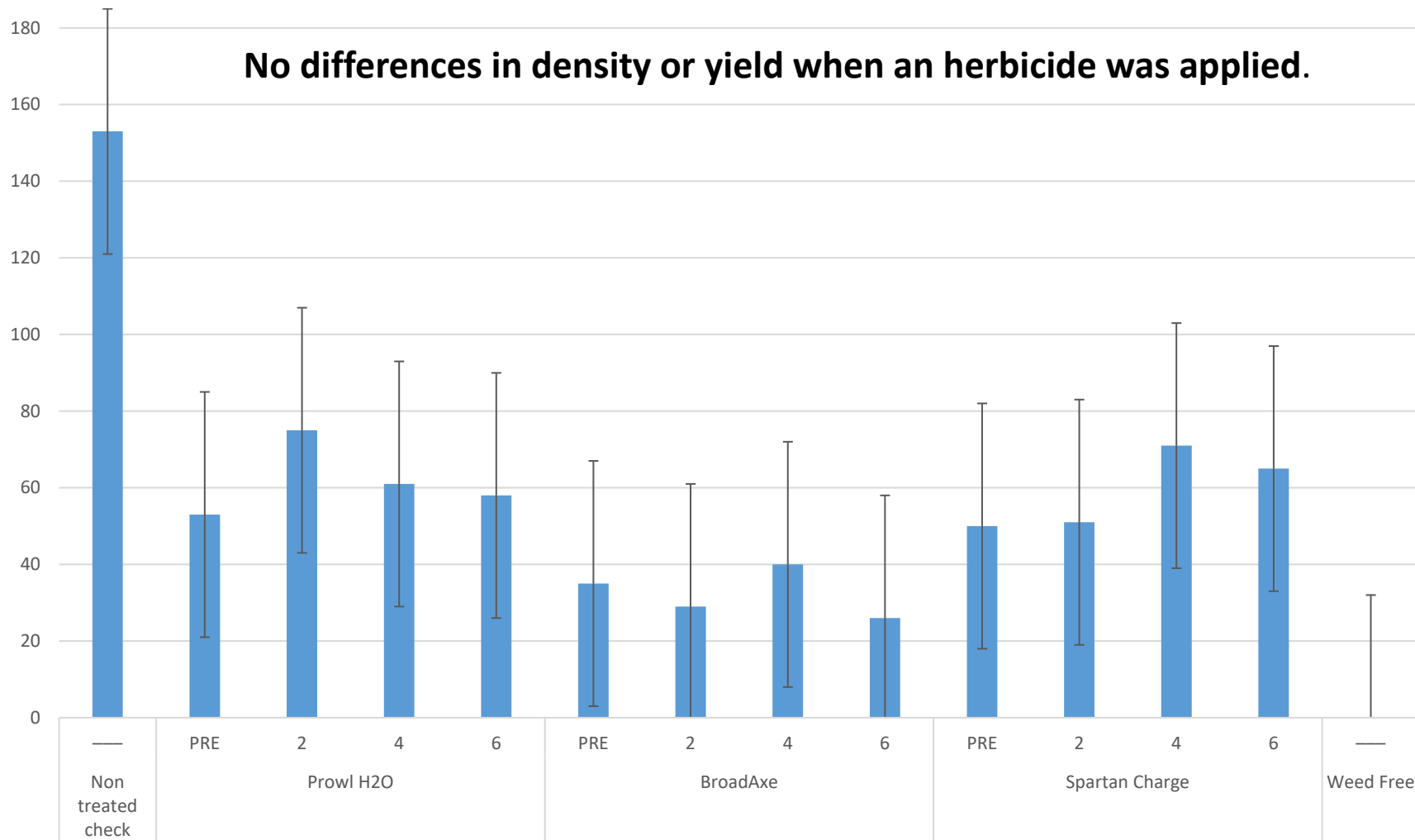
Sidney 2020

- Total weed density was decreased when an herbicide was applied
- No differences in yield



Zidua Herbicide Combinations – 2018 Colby

Palmer Density row⁻¹



Zidua Herbicide Combinations – 2018 Scottsbluff



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Prowl H2O fb Zidua	2 pts fb 1.5 fl oz	PRE fb 4 TL
Prowl H2O fb Zidua	2 pts fb 1.5 fl oz	PRE fb 6 TL
Broadaxe	21 fl oz	PRE
Broadaxe fb Zidua	21 fl oz fb 1.5 fl oz	PRE fb 2 TL
Broadaxe fb Zidua	21 fl oz fb 1.5 fl oz	PRE fb 4 TL
Broadaxe fb Zidua	21 fl oz fb 1.5 fl oz	PRE fb 6 TL
Spartan Charge	5 fl oz	PRE
Spartan Charge fb Zidua	5 fl oz fb 1.5 fl oz	PRE fb 2 TL
Spartan Charge fb Zidua	5 fl oz fb 1.5 fl oz	PRE fb 4 TL
Spartan Charge fb Zidua	5 fl oz fb 1.5 fl oz	PRE fb 6 TL
Hand weeded check	—	—
*Abbreviations: fb, followed by; PRE, pre-crop emergence		
¹ Product applied per acre.		
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Planting populations were reduced to 50% in some locations.



Zidua Herbicide Combinations – 2019 Scottsbluff



Zidua Herbicide Combinations – 2020 Scottsbluff

BroadAxe



Zidua Herbicide Combinations – Conclusions

Irrigated locations

Colby 2018

- No differences in Palmer density among herbicide treatments.
- No differences in yield

Scottsbluff 2018

- When an herbicide was applied, biomass was reduced
- No differences in yield

Scottsbluff 2019

- BroadAxe and Spartan Charge performed better than Prowl
- Zidua did reduce Palmer density when BroadAxe was applied and Kochia density when Prowl was applied.

Scottsbluff 2020

- BroadAxe and Spartan Charge performed better than Prowl
- Zidua did reduce Palmer density and biomass when Prowl was applied.



Zidua Herbicide Combinations – Conclusions

- **Only the Scottsbluff locations had consistently high populations of key weeds throughout the project.**
- **Spartan Charge and BroadAxe are superior to Prowl.**
- **Differences between Spartan Charge and BroadAxe were subtle.**
- **Zidua did reduce Palmer amaranth densities in Prowl treated plots.**
- **In non-irrigated sites, there were no substantial differences among herbicide treatments.**
- **Soil moisture did not appear to be a limiting factor of herbicide efficacy.**

