Grant Code: AP5457
Title: Pre-plant burndown herbicide efficacy and wheat crop safety
Personnel:

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Background: No-till dryland wheat growers in Idaho are becoming increasingly reliant on glyphosate for pre-plant and post-harvest weed control. The repeated use of glyphosate as the main weed management tool could result in widespread glyphosate-resistant weed populations. To protect the value of glyphosate in wheat production systems, it is important to identify effective alternative herbicides and mixtures for weed control.

Objectives: The objectives of this study were to

1. Assess the efficacy and safety of pre-plant burndown herbicides and mixtures on wheat
2. Economics of using alternative pre-plant burndown herbicides and mixtures on wheat

Accomplishments
2021 field trial:
Field studies were established in 2021 at three locations: the University of Idaho Kimberly Research and Extension Center, Aberdeen Research and Extension Center, and one on-farm site in Power County. There will be 20 treatments arranged in a randomized complete block with four replications (Figure 1). Each plot was 10 ft wide by 30 feet long. Herbicide applications were made within 14 to 28 days before winter wheat was planted. Winter wheat was planted September/October 2021 at all sites.

Weed control (by each weed species) was visually assessed within, 7 to 21 days after treatment on a scale of 0 to 100%, with 0% being no control, and 100% being plant death. Data will be analyzed following standard statistical procedures.

Objective #1: efficacy and safety of pre-plant burndown herbicides and mixtures

Nearly all herbicide treatments (except Impact applied alone) provided good control of common lambsquarters, kochia, redroot pigweed, and hairy nightshade (Figure 1). Grassy weed (barnyardgrass and green foxtail) varied among treatments, but the majority of the treatments provided good grassy weed control (Figure 1). Impact and Reviton applied alone provided less than 80% control of barnyardgrass and green foxtail. These herbicides may need to be tankmixed with other herbicides to provide good grassy weed control. At the on-farm site, most treatments (except Impact, Reviton, Everest, and Roundup PowerMax) provided more than 80% control of yellow sweetclover. No crop injury was observed after crop emergence at any of the study sites. Crop injury will be visually assessed in the spring of 2022.

Objective #2: Economics of using alternative pre-plant burndown herbicides and mixtures

Preliminary economic analyses showed that although glyphosate (Roundup PowerMax) remains one of the cheapest options for broad-spectrum weed control, glufosinate (Liberty) and combinations of paraquat (Gramoxone) and bromoxynil (Maestro), tiafenacil (Reviton), and pyraflufen (Vida) are promising alternatives for pre-plant weed control in wheat.

Projections: This study will be repeated in 2022 and results will be made available to the Idaho Wheat Commission and Idaho wheat growers. Results from this study will be presented at the 2022 Western Society of Weed Science Conference to be held from March 7-10th, 2022.

Publication/ Outreach: This study was showcased at the 2021 Kimberly Field Day and results were presented at the 2021 Idaho Association of Plant Protection meeting in Burley, Idaho.

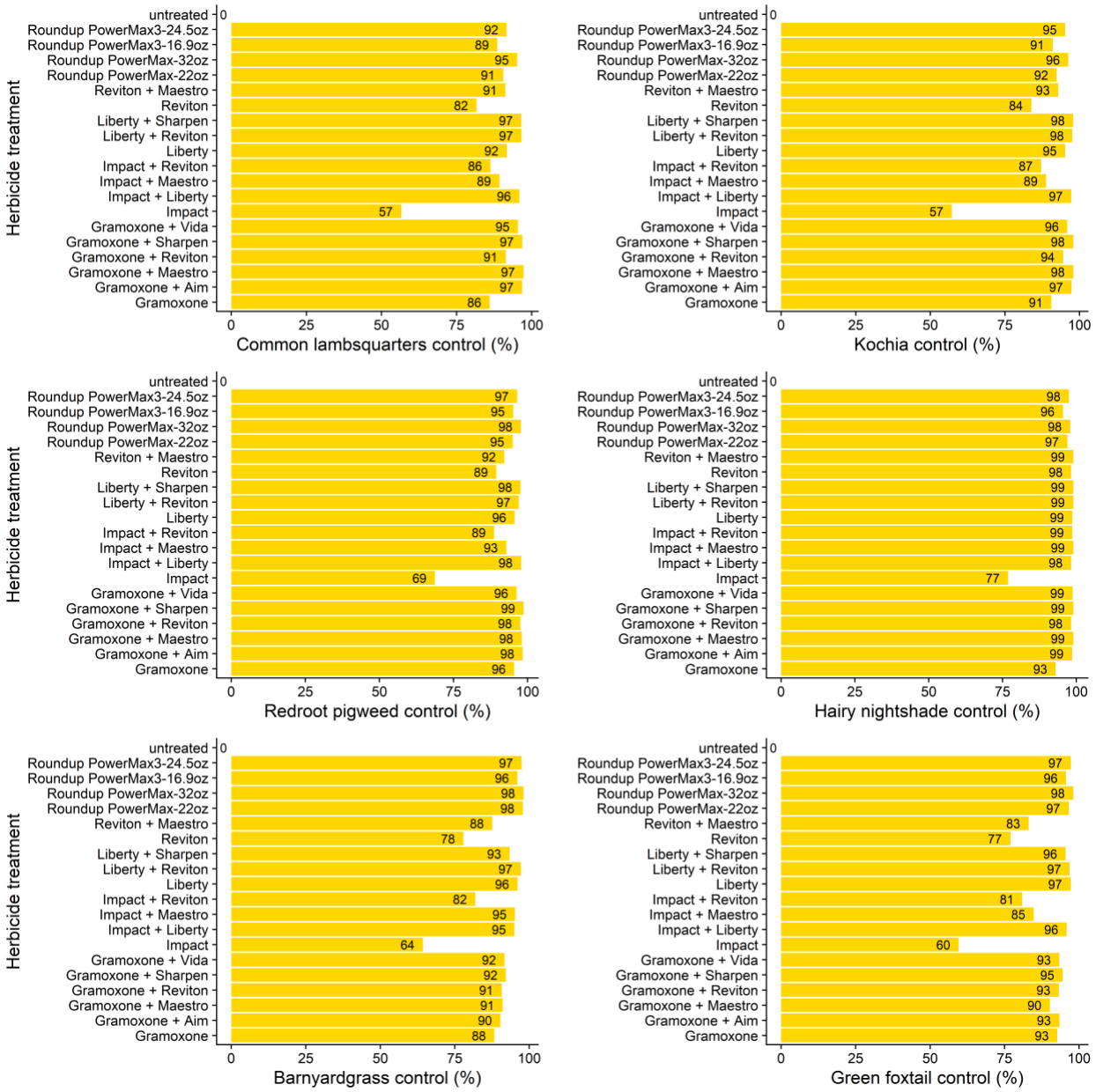

Figure 1*. The efficacy of herbicide programs on broadleaf and grassy weeds at Kimberly and Aberdeen study sites.*

Table 1. Preliminary analyses of the cost of herbicide programs

Treatment	Herbicide	Rate used (oz/acre)	Unit price ($)	Cost ($/acre)
1	Impact	1	15/oz	15
2	Impact	1	15/oz	26.1
	Reviton	2	5.55/oz	
3	Gramoxone	32	27/gal	6.8
4	Reviton	2	5.55/oz	11.1
5	Liberty 280	29	53/gal	12
6	Gramoxone	32	27/gal	19.5
	Aim	2	6.35/oz	
7	Gramoxone	32	27/gal	24.3
	Sharpen	2	6.15/oz	
8	Gramoxone	32	27/gal	15.8
	Vida	2	4.52/oz	
9	Gramoxone	32	27/gal	17.9
	Reviton	2	5.55/oz	
10	Gramoxone	32	27/gal	16.5
	Maestro 2EC	24	52/gal	
11	Reviton	2	5.55/oz	20.9
	Maestro 2EC	24	52/gal	
12	Liberty 280	29	53/gal	24.3
	Sharpen	2	6.15/oz	
13	Liberty 280	29	53/gal	23.1
	Reviton	2	5.55/oz	
14	Impact	1	15/oz	27
	Liberty 280	29	53/gal	
15	Impact	1	15/oz	24.8
	Maestro 2EC	24	52/gal	
16	Roundup PowerMax	22	65/gal	11.17
17	Roundup PowerMax	32	65/gal	16.25
18	Roundup PowerMax 3*	20.7	-	11.17
19	Roundup PowerMax 3	30	-	16.25

*Roundup PowerMax 3: No price data available yet. Equivalent price of regular PowerMax was used