# Urea Ammonium Nitrate as the Carrier for Preplant Herbicides

University of Idaho

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# Introduction

Most small grain farmers in the Pacific Northwest apply burndown herbicides in the spring to control existing weeds before planting their crops. The timing of this spring burndown herbicide application often coincides with starter nitrogen (N) application. Thus, mixing burndown herbicides with starter N fertilizer could reduce the number of trips across the farm and reduce the cost of N and herbicide applications.

**Objective:** Evaluate the effect of urea ammonium

### Results

Table 1. Visible weed control within three weeks after herbicide treatment (WAT)

Factor	common lambsquarters			kochia			r	redroot pigweed			barnyardgrass		
	1 WAT	2 WAT	3 WAT	1 WAT	2 WAT	3 WAT	1 WAT	2 WAT	3 WAT	1 WAT	2 WAT	3 WAT	
	% visible control%												
Herbicide	<i>P</i> = 0.003	P < 0.001	P < 0.001	P = 0.08	P < 0.001	P < 0.001	<i>P</i> = 0.07	P < 0.001	P < 0.001	P < 0.001	P < 0.001	P < 0.001	
Glyphosate	95a	95a	92a	93	96a	92a	96	93a	85a	99a	98a	96a	
Paraquat	83b	75b	67b	96	79b	63b	88	67b	60b	95a	90b	84b	
Tiafenacil	86b	74b	63b	92	68c	52c	85	63b	51c	82b	71c	56c	
UAN (%V/V)	P = 0.94	P = 0.34	<i>P</i> = 0.54	P = 0.15	<i>P</i> = 0.02	<i>P</i> = 0.41	P = 0.09	P = 0.14	<i>P</i> = 0.04	<i>P</i> = 0.02	P = 0.93	P = 0.66	
0	86	76	71	88	81	69	92	74	68	88	89	78	
25	90	85	80	96	86	72	90	79	69	92	86	80	
50	90	84	77	96	81	68	90	74	65	93	84	79	
75	86	79	69	95	80	69	88	74	63	93	85	79	

nitrate (UAN) carrier volume on the efficacy of three non-selective herbicides.

#### Methods

- Field experiment was conducted in June 2021 at the University of Idaho Kimberly Research and Extension Center, Kimberly, ID.
- Experimental design: 3 by 5 factorial randomized complete block design with 4 replications. Individual plot size was 3 x 9 m.
- Treatments: Three non-selective herbicides [glyphosate (1260 g ae ha<sup>-1</sup>), paraquat (560 g ai ha<sup>-1</sup>), and tiafenacil (74 g ai ha<sup>-1</sup>)];
  Five rates of UAN (32-0-0): 0, 25, 50, 75, and 100% of carrier volume (%V/V).
- Treatments applied with a CO<sub>2</sub>-pressurized bicycle sprayer delivering 117 L ha<sup>-1</sup> at 207 kPa





#### with TeeJet 11002DG nozzles.

- This provided 12.3, 24.6, 36.9, and 49.2 kg N ha<sup>-1</sup> for the 25, 50, 75, and 100 %V/V UAN, respectively.
- Visible control of common lambsquarters (*Chenopodium album*), kochia (*Bassia scoparia*), redroot pigweed (*Amaranthus retroflexus*), and barnyardgrass (*Echinochloa crus-galli*), were evaluated on a scale of 0 to 100%, where 0% = no control and 100% = complete control.
- Data analyzed as linear mixed effect model in R, using the using the *ImerTest* package in R<sup>1,2</sup>.
- Means separated using Tukey's HSD at the 0.05 significance level.

**Figure 1**. The main effect of UAN rate on herbicide efficacy for kochia control at 2 weeks (A) and redroot pigweed control at 3 weeks (B)

**Figure 2.** The interaction effect of UAN rate and herbicide on common lambsquarters (A) control at 2 weeks and barnyardgrass control at 1 week (B) and 2 weeks (C)

#### References

<sup>1</sup>Kuznetsova A, Brockhoff PB, Christensen RHB (2017). "ImerTest Package: Tests in Linear Mixed Effects Models." Journal of Statistical Software. doi:

# **Discussion and Conclusions**

UAN at ≥50% v/v slightly reduced herbicide efficacy on kochia and redroot pigweed (Table 1 & Fig. 1)
 UAN improved tiafenacil efficacy on barnyardgrass but slightly reduced paraquat efficacy (Fig. 2B & 2C).

10.18637/jss.v082.i13

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