

Adjuvant-fertilizer blend and spray water quality effects on glyphosate efficacy. Ramsdale, Brad K., Sam J. Lockhart, and Calvin G. Messersmith. The experiment was conducted to examine the effects of various commercial adjuvant-fertilizer blends and spray water quality on glyphosate efficacy. Bioassay species were planted as 6- to 10-ft-wide strips side-by-side. Plots 10 ft wide were laid out perpendicular to the strips so that each plot contained all three assay species. Treatments were applied with a CO₂-pressurized bicycle-wheel-type plot sprayer equipped with four 8001 flat-fan nozzles at 20-inch spacing. Experimental design was a randomized complete block with four replicates. Glyphosate was applied at a reduced rate of 0.06 lb ae/A to better detect treatment effects on glyphosate efficacy. Weed control was evaluated visually where 0 equaled no visible injury and 100 equaled complete death of assay species.

Experiment location	Fargo	Prosper
Planting date	May 22	May 24
Treatment date	June 25	June 21
Sprayer		
gpa	8.5	8.5
psi	35	35
Air temperature (F)	85	65
Relative humidity (%)	45	60
Wind (mph)	5	8-10
Sky (% clouds)	50	100
Oat		
variety	'Jerry'	'Jerry'
growth stage	tillering	tillering
height (inch)	8-12	8-10
Barley		
variety	'Robust'	'Robust'
growth stage	tillering	tillering
height (inch)	8-12	8-10
Proso millet		
variety	'Sunrise'	'Sunrise'
growth stage	tillering	4- to 6-leaf
height (inch)	4-8	2-6

Spray water quality did not affect glyphosate efficacy for these adjuvant-fertilizer blends, indicating that all contained a sufficient amount of ammonium sulfate (AMS) to overcome the antagonistic salts in the hard water source. The adjuvant-fertilizer blends were applied at a rate to provide 8.5 lb AMS per 100 gal water. Glyphosate (Roundup Custom), which does not include a surfactant, was most effective when applied with adjuvants that contained surfactant, which included L-283, Surfate, Class Act Next Generation, Bronc Plus, and One AP XL. Drift retardant-AMS blends, which do not contain a surfactant, were generally the least effective. However, glyphosate with Placement Pro-Pak or Array was generally more effective than with the other drift retardant-AMS blends, except with One AP XL which also contains surfactant. Thus, with glyphosate (Roundup Custom) that does not contain a surfactant, adjuvant-fertilizer blends that contained surfactant were the most effective adjuvants for glyphosate. (This material is based upon work supported by the Cooperative State Research, Education, and Extension Service, U.S. Department of Agriculture, under Agreement No. 00-34361-9038. Dept. of Plant Sciences, North Dakota State University, Fargo)

Table 1. Adjuvant-fertilizer blend and spray water quality effects on glyphosate efficacy, Fargo, ND. (Ramsdale, Lockhart, and Messersmith)

Treatment ^a	Rate (lb/A)	Spray water ^b	July 9			July 18		
			Barley (%)	Proso millet (%)	Oat (%)	Barley (%)	Proso millet (%)	Oat (%)
Glyt + L-283	0.06 + 1%	Soft	97	96	94	97	95	97
Glyt + L-283	0.06 + 2%	Soft	98	98	99	99	99	99
Glyt + Surfate	0.06 + 1%	Soft	98	97	98	99	98	99
Glyt + Class Act NG	0.06 + 2.5%	Soft	99	99	97	99	99	99
Glyt + Bronc Plus	0.06 + 3%	Soft	99	98	97	99	99	99
Glyt + Guardian Plus	0.06 + 2.5%	Soft	85	85	82	82	86	79
Glyt + Corral AMS	0.06 + 2.5%	Soft	69	74	69	65	70	63
Glyt + Surf Plus	0.06 + 2.5%	Soft	76	85	78	75	78	69
Glyt + Array	0.06 + 9	Soft	89	91	87	88	89	81
Glyt + Placement Pro-Pak	0.06 + 1%	Soft	94	94	94	95	95	97
Glyt + One AP XL	0.06 + 10	Soft	99	99	98	99	98	99
Glyt + L-283	0.06 + 1%	Hard	97	96	97	98	96	97
Glyt + L-283	0.06 + 2%	Hard	97	97	96	98	97	98
Glyt + Surfate	0.06 + 1%	Hard	95	94	94	94	93	96
Glyt + Class Act NG	0.06 + 2.5%	Hard	98	97	96	99	96	98
Glyt + Bronc Plus	0.06 + 3%	Hard	98	98	96	98	98	97
Glyt + Guardian Plus	0.06 + 2.5%	Hard	87	89	83	88	88	78
Glyt + Corral AMS	0.06 + 2.5%	Hard	78	83	80	78	78	75
Glyt + Surf Plus	0.06 + 2.5%	Hard	74	79	73	74	74	68
Glyt + Array	0.06 + 9	Hard	89	91	84	90	90	81
Glyt + Placement Pro-Pak	0.06 + 1%	Hard	91	88	91	92	88	92
Glyt + One AP XL	0.06 + 10	Hard	98	97	93	97	97	97
LSD (5%)			6	6	6	5	7	6

^a Glyt = glyphosate as Roundup Custom; L-283, Surfate, Class Act NG (Next Generation), and Bronc Plus = surfactant ammonium sulfate blends; Guardian Plus, Corral AMS, Surf Plus, Array, and Placement Pro-Pak = drift retardant-ammonium sulfate blends; One AP XL = surfactant, drift retardant, ammonium sulfate blend.

^b Spray water: Soft = Fargo city water, 100 ppm CaCO₃; Hard = well water, 1550 ppm CaCO₃.

Table 2. Adjuvant-fertilizer blend and spray water quality effects on glyphosate efficacy, Prosper, ND. (Ramsdale, Lockhart, and Messersmith)

Treatment ^a	Rate (lb/A)	Spray water ^b	July 5			July 16		
			Barley (%)	Proso millet (%)	Oat (%)	Barley (%)	Proso millet (%)	Oat (%)
Glyt + L-283	0.06 + 1%	Soft	91	88	89	89	68	81
Glyt + L-283	0.06 + 2%	Soft	93	94	96	93	80	91
Glyt + Surfate	0.06 + 1%	Soft	93	89	93	92	76	86
Glyt + Class Act NG	0.06 + 2.5%	Soft	99	96	97	99	88	94
Glyt + Bronc Plus	0.06 + 3%	Soft	91	89	90	86	76	80
Glyt + Guardian Plus	0.06 + 2.5%	Soft	95	90	88	92	75	71
Glyt + Corral AMS	0.06 + 2.5%	Soft	77	80	76	66	55	56
Glyt + Surf Plus	0.06 + 2.5%	Soft	83	86	78	78	64	58
Glyt + Array	0.06 + 9	Soft	80	81	81	70	59	63
Glyt + Placement Pro-Pak	0.06 + 1%	Soft	89	83	88	87	55	78
Glyt + One AP XL	0.06 + 10	Soft	97	98	96	98	91	92
Glyt + L-283	0.06 + 1%	Hard	94	93	94	94	81	89
Glyt + L-283	0.06 + 2%	Hard	92	91	92	89	76	84
Glyt + Surfate	0.06 + 1%	Hard	97	92	93	96	79	85
Glyt + Class Act NG	0.06 + 2.5%	Hard	96	97	98	96	88	94
Glyt + Bronc Plus	0.06 + 3%	Hard	97	94	95	96	86	90
Glyt + Guardian Plus	0.06 + 2.5%	Hard	85	81	77	80	58	59
Glyt + Corral AMS	0.06 + 2.5%	Hard	91	86	81	88	68	64
Glyt + Surf Plus	0.06 + 2.5%	Hard	80	75	71	73	50	53
Glyt + Array	0.06 + 9	Hard	93	89	90	91	72	76
Glyt + Placement Pro-Pak	0.06 + 1%	Hard	95	84	91	92	66	83
Glyt + One AP XL	0.06 + 10	Hard	94	94	94	93	83	89
LSD (5%)			7	6	6	9	14	12

^a Glyt = glyphosate as Roundup Custom; L-283, Surfate, Class Act NG (Next Generation), and Bronc Plus = surfactant ammonium sulfate blends; Guardian Plus, Corral AMS, Surf Plus, Array, and Placement Pro-Pak = drift retardant-ammonium sulfate blends; One AP XL = surfactant, drift retardant, ammonium sulfate blend.

^b Spray water: Soft = Fargo city water, 100 ppm CaCO₃; Hard = well water, 1550 ppm CaCO₃.