

EFFECT OF VOLATILITY REDUCING ADJUVANTS ON WEED CONTROL AND SUGARBEET INJURY FROM RO-NEET SB IN 2016

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The objective of this study was to evaluate the effectiveness of volatility reducing adjuvants applied with Ro-Neet SB by evaluating control of weed indicator species in Roundup Ready (RR) sugarbeet.

MATERIALS AND METHODS

An experiment was conducted near Hickson, ND in 2016. The trial site was prepared using a Kongskilde 's-tine' field cultivator with rolling baskets on May 27, 2016. Preplant-incorporated (PPI) treatments were applied prior to seeding and immediately incorporated 4 inches deep with a 7' Frontier rototiller. All plots were rototilled to remove tillage variability among plots. Bioassay strips of redroot pigweed, foxtail millet, and oat were established by spreading seeds by hand perpendicular to herbicide treatments and then harrow incorporating the seeds. A rain event began as bioassay strips were being harrowed. Rainfall over the next 24 hours totaled 0.47 inches. 'SV36272RR' sugarbeet, treated with NipsIt Suite, Tachigaren at 45g per unit, and Kabina at 7g per unit, was seeded in 22-inch rows at 60,560 seeds per acre on June 8 with a John Deere 1700XP 6-row planter. Pre emergence (PRE) treatments were applied immediately after seeding. A rain event on May 31 totaled 0.39 inches. All herbicide treatments were applied with a bicycle sprayer in 17 gpa spray solution through 8002 XR flat fan nozzles pressurized with CO₂ at 40 psi to the center four rows of six row plots 35 feet in length. Sugarbeet injury and weed control were evaluated June 15, 22, 29 and July 5, 13.

All evaluations were a visual estimate of percent fresh weight reduction in the four treated rows compared to the adjacent untreated strip. Experimental design was randomized complete block with 4 replications for each trial. Data were analyzed with the ANOVA procedure of ARM, version 2016.4 software package.

Table 1. Application Information – Hickson, ND 2016

	PPI	PRE
Date	May 27	May 30
Time of Day	3:45 PM	12:00 PM
Air Temperature (F)	70	80
Relative Humidity (%)	65	37
Wind Velocity (mph)	5	8
Wind Direction	E	S
Soil Temp. (F at 6")	60	62
Soil Moisture	Good	Good
Cloud Cover (%)	100	5
Next Rainfal (amount)	May 27 (0.47")	May 31 (0.39")

SUMMARY

Sugarbeet injury from Ro-Neet SB at either 4.5 or 5.36 pt/a applied PPI was less than 5% at evaluations June 22, July 5, and July 13 (Table 2). Sugarbeet injury from Ro-Neet SB at either 4.5 or 5.36 pt/a alone or with an adjuvant was 5% or less when applied PRE. All adjuvants used in this study showed good crop safety when applied with Ro-Neet SB.

Table 2. Sugarbeet injury and weed control from Ro-Neet SB plus volatility reducing adjuvants at Hickson, ND in 2016.

Treatment	Rate	Appl ¹	June 22				July 5				July 13			
			sgbt ²	fxmi	oat	rrpw	sgbt	fxmi	oat	rrpw	sgbt	fxmi	oat	rrpw
			% inj	-- % control --			% inj	--% control --			% inj	--% control --		
Ro-Neet SB	4.5 pt/a	PPI	5	91	73	76	5	79	53	65	3	75	50	55
Ro-Neet SB	5.36 pt/a	PPI	3	94	83	85	5	84	73	71	5	83	58	65
Ro-Neet SB + Eptam	2.67 pt/a + 2.29 pt/a	PPI	33	100	100	99	35	93	93	89	20	94	91	91
Ro-Neet SB + Eptam	4.5 pt/a + 2.29 pt/a	PPI	36	98	99	100	35	96	95	93	20	95	95	95
Eptam	3.5 pt/a	PPI	48	100	99	100	40	95	93	94	25	94	94	91
Ro-Neet SB	4.5 pt/a	PRE	0	86	65	64	3	85	48	40	0	85	45	25
Ro-Neet SB	5.36 pt/a	PRE	0	94	74	64	0	88	54	33	0	89	55	25
Ro-Neet SB + AX-1618	4.5 pt/a + 0.5 % v/v	PRE	0	88	64	45	0	80	50	33	0	81	38	33
Ro-Neet SB + AX-1618	5.36 pt/a + 0.5 % v/v	PRE	0	93	80	71	3	88	63	55	0	90	65	40
Ro-Neet SB + AU-810D	4.5 pt/a + 0.5 % v/v	PRE	0	85	45	56	0	76	35	44	0	75	30	41
Ro-Neet SB + AU-810D	5.36 pt/a + 0.5 % v/v	PRE	0	94	63	73	5	89	41	50	0	89	43	33
Ro-Neet SB + AU-376	4.5 pt/a + 0.5 % v/v	PRE	0	90	34	46	0	76	38	33	0	87	35	30
Ro-Neet SB + AU-376	5.36 pt/a + 0.5 % v/v	PRE	0	93	55	45	3	83	46	30	0	84	39	28
Ro-Neet SB + Grounded	4.5 pt/a + 4 pt/a	PRE	0	85	51	69	5	73	44	41	0	71	45	33
Ro-Neet SB + Grounded	5.36 pt/a + 4 pt/a	PRE	5	89	43	70	4	81	30	51	0	81	23	40
Dual Magnum	12 fl oz/a	PRE	0	75	28	80	5	70	28	65	0	64	28	45
Dual Magnum + Grounded	12 fl oz/a + 4 pt/a	PRE	6	78	30	79	3	73	28	71	0	70	28	56
Nortron	6.5 pt/a	PRE	15	90	84	78	8	73	68	65	0	69	53	48
Untreated Check			0	0	0	0	0	0	0	0	0	0	0	0
LSD (0.05)			7.6	6.5	28.0	21.1	7.1	10.7	20.8	17.3	4.8	12.8	25.9	19.7

¹Appl = Application information indicated in Table 1.

²sgbt = sugarbeet, fxmi = foxtail millet, rrpw = redroot pigweed, inj = injury.

Sugarbeet injury from Eptam at 3.5 pt/a applied PPI was 48% on June 22, but declined to 40% and 25% on July 5 and 13 respectively. Ro-Neet SB at either 2.67 or 4.5 pt/a plus Eptam applied PPI showed a slight improvement in crop safety with 36% sugarbeet injury on June 22, 35% on July 5, and 20% on July 13. Sugarbeet injury with the use of Eptam decreased over time, but was statistically significant and biologically relevant throughout this experiment.

Sugarbeet injury from Nortron applied PRE was 15% on June 22, but declined to zero over time. Sugarbeet injury from Dual Magnum + Grounded was greater than from Dual Magnum alone on June 15 (data not shown), but injury was negligible throughout the remainder of this experiment from Dual Magnum applied alone or with Grounded.

Foxtail millet control from Ro-Neet SB applied PPI declined throughout the season. Ro-Neet SB at 5.36 pt/a PPI tended to give better millet control than Ro-Neet SB at 4.5 pt/a. Millet control from Ro-Neet SB applied PRE generally stayed the same throughout the duration of this trial with Ro-Neet SB at 4.5 pt/A giving 85% to 86% control and Ro-Neet SB at 5.36 pt/A giving 88% to 94% control. None of the tank mixed adjuvants enhanced foxtail millet control compared to

Ro-Neet SB applied PRE alone. Ro-Neet SB applied PRE, whether alone or in combination with an adjuvant gave greater control of foxtail millet than Dual Magnum or Nortron throughout this trial. Eptam, whether alone or tank mixed with Ro-Neet SB, gave the greatest and most consistent control of foxtail millet, ranging from 93% to 100% control over the duration of the trial.

Oat was seemingly more difficult to control than foxtail millet. Ro-Neet SB applied PPI at either 4.5 or 5.36 pt/A gave less than 60% oat control 45 days after application on July 13 and was similar to control from Ro-Neet SB applied PRE. None of the adjuvants applied with Ro-Neet SB statistically improved oat control. However, AX-1618 showed a trend towards enhancing oat control compared to PRE Ro-Neet SB alone or with other adjuvants. Dual Magnum alone or with Grounded gave 28% oat control, and Nortron gave 53% oat control on July 13. All three treatments containing Eptam gave 91% or greater oat control on July 13.

Redroot pigweed control was 55% to 65% from PPI Ro-Neet SB, depending on rate, compared to 25% from PRE Ro-Neet SB on July 13. The addition of a volatility reducing adjuvant to PRE Ro-Neet SB did not significantly improve redroot pigweed control compared to PRE Ro-Neet SB alone. Redroot pigweed control from Dual Magnum, Dual Magnum + Grounded, and Nortron was similar and ranged from 45% to 56% on July 13. All three treatments containing Eptam gave 91% or greater redroot pigweed control on July 13.

CONCLUSION

The PPI application of Eptam alone or Ro-Neet SB plus Eptam gave the most consistent and longest lasting weed control of all the treatments in this experiment. Ro-Neet SB plus Eptam showed slightly improved sugarbeet safety compared to Eptam alone.

Ro-Neet SB, when applied PPI, gave similar, to slightly improved, weed control and sugarbeet safety compared to PRE Nortron or Dual Magnum. Ro-Neet SB applied PRE showed significantly less redroot pigweed control throughout the season compared to PRE Nortron or Dual Magnum.

AX-1618 tended to be the most promising adjuvant for grass and broadleaf weed control when applied PRE with Ro-Neet SB in this experiment. However, neither AX-1618 nor any other adjuvant, significantly improved weed control compared to PRE Ro-Neet SB alone. Rainfall shortly after application may have masked some of the volatility reducing aspects of these adjuvants by quickly incorporating PRE Ro-Neet SB applied alone and not allowing significant volatility to occur. Additional research in an environment where Ro-Neet SB is more prone to volatility may allow significant weed control differences to be observed between Ro-Neet SB and Ro-Neet SB plus volatility reducing adjuvants.