Effect of Max-In Technology on Roundup Power Max Performance on Sugarbeet and Weeds at Mitchell, Nebraska during the 2009 Growing Season.

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A field study was initiated near Mitchell, Nebraska to examine the effect of Max-In Technology on Roundup Power Max performance on sugarbeet and weeds. The experimental design was a randomized complete block with four replications. Plots were 11 feet wide by 25 feet long. Sugarbeet 'BTS 66RR70' were planted on May 5 and irrigated on May 7 to enhance sugarbeet seed germination and emergence. Postemergence herbicide application began on May 27 when a majority of the sugarbeets reached the two true-leaf growth stage. Herbicides were applied with a tractor-mounted sprayer calibrated to deliver 20 gallons of water per acre at 32-psi pressure with Spraying Systems 11002 VS nozzles. Environmental conditions and weed and crop growth stages at the time of herbicide application are given in Table 1. Sugarbeet suffered hail damage on June 10 with approximately 75% of the leaf canopy destroyed. It took sugarbeets approximately 3 weeks to recover and by June 23 the crop had developed new leaves and herbicide application resumed. Sugarbeet leaf tissue samples were collected on July 8. The youngest fully developed leaf was collected 2 days after the July 6 herbicide application, 20 leaves were collected per plot, washed, air dried, placed in sample bags and shipped to Midwest Laboratories for analysis. Crop injury from herbicide treatments was minimal and only the conventional treatment of Betamix plus Upbeet plus Stinger in combination with Destiny HC and AGM 06018 caused significant sugarbeet injury (Table 2). Sugarbeet stand was not reduced by herbicide treatments but the absence of weed control in the nontreated resulted in a loss of sugarbeet stand and a dramatic reduction in root yield. Weed control was excellent when Roundup Power Max was applied three times at the four and six true-leaf stage and at canopy closure. Betamix plus Upbeet plus Stinger in combination with Destiny HC and AGM 06018 provided reduced control of common lambsquarters and redroot pigweed compared to Roundup Power Max. The use of two applications of Roundup Power Max at 66 oz/acre in combination with AGM 06018 and Class Act NG was not as effective for toothed spurge control compared to three applications of Roundup Power Max at 22 oz/acre in combination with AGM 06018 and Class Act NG.

Both AGM 06018 and AGM 07027 are nutrient mixtures designed to foliar feed plants. AGM 06018 consisted of 1.3% Ca, 1.3% B, 0.6% Mn, and 2% Zn while AGM 07027 contained 3% N, 0.1% B, 3% Mn, and 4% Zn and both fertilizers were applied at a rate of 1 quart of product/acre. Leaf tissue analysis taken 2 days after the second application of AGM 06018 and AGM 07027 showed a trend for an increase of Zn in leaves following an application of AGM 07027 in combination with Roundup Power Max compared to Roundup Power Max without AGM 07027. Sugarbeet root yields were similar among treatments containing Roundup Power Max with and without AGM 06018 or AGM 07027. Roundup Power Max at 22 oz/acre in combination with AGM 07027 increased sugar loss to molasses (SLM) compared to Roundup Power Max alone.

Table 1. Environmental Conditions at the Time of Herbicide Application.

Date	Air temperature	Humidity	Wind speed & direction	Time of day	Sugarbeet growth stage	Weed heights				
						Colq	Hans	Rrpw	Yeft	Tosp
	(F)	(%)	(mph)			---------- (inches) ----------				
May 27	61	54	1 SE	10:00 AM	2 true leaves	2	0.75	0.5	0.5	1
June 3	62	61	5 SE	2:00 PM	4 true leaves	4	2.5	1.5	1	2
June 23	70	65	1 SW	9:00 AM	6 true leaves	3	4	4	2	3
July 6	76	55	2 SE	10:00 AM	8 true leaves	15	10	15	6	7
July 14	66	63	4 W	8:30 AM	10 true leaves	25	16	24	16	14
July 20	79	48	7 NW	11:00 AM	canopy closure	30	20	26	15	21
July 27	77	44	3 NE	11:00 AM	1 wk after canopy closure	36	30	30	20	25

Soil analysis at the time of planting - soil type loam.

Organic matter 1.2
Phosphorus (P) weak bray 29 ppm strong bray 137 ppm
Potassium (K) 404 ppm
Magnesium (Mg) 327 ppm
Calcium (Ca) 2289 ppm
Sodium (Na) 65 ppm
pH 7.8
CEC 15.5 meg/100 g
Percent base saturation K 6.7, Mg 17.6, Ca 73.9, H 0, Na 1.8%

Nitrate 0-12 inch 14 ppm (50 lbs/A)
Sulfur 15 ppm
Zinc 1.6 ppm
Manganese 8 ppm
Iron 11 ppm
Copper 0.5 ppm
Boron 0.7 ppm
Soluble salts 0.4 mmhos/cm

Table 2. Effect of Max-In Technology on Roundup Power Max Performance on Sugarbeets and Weeds at Mitchell, Nebraska during the 2009 Growing Season.

			Sugarbeet				
Herbicide Treatment[1]	Rate	Sugarbeet growth stage[2]	Injury 7/8	Stand 7/21	Root yield[3]	Sucrose	SLM
	(product/acre)		(%)	(plants/acre)	(tons/acre)	(%)	
Nontreated			0	26610	13.8	15.9	1.21
Roundup Power Max (RPM)+Class Act Ng	22 oz	4 TL					
RPM + Class Act Ng (CANg)	22 oz	8 TL					
RPM + CANg	22 oz	Canopy closure	6	38490	31.0	16.5	1.25
RPM + CANg + AGM 06018	22 oz + 1 qt	4 TL					
RPM + CANg + AGM 06018	22 oz + 1 qt	8 TL					
RPM + CANg + AGM 06018	22 oz + 1 qt	Canopy closure	0	36950	33.5	15.7	1.51
RPM + CANg + AGM 07027	22 oz + 1 qt	4 TL					
RPM + CANg + AGM 07027	22 oz + 1 qt	8 TL					
RPM + CANg + AGM 07027	22 oz + 1 qt	Canopy closure	0	31010	32.6	15.2	1.64
RPM + CANg	22 oz	4 TL					
AGM 06018	1 qt	6 TL					
RPM + CANg	22 oz	8 TL					
AGM 06018	1 qt	10 TL					
RPM + CANg	22 oz	Canopy closure					
AGM 06018	1 qt	1 wk later	0	39320	32.2	15.7	1.32
RPM + CANg	22 oz	4 TL					
AGM 07027	1 qt	6 TL					
RPM + CANg	22 oz	8 TL					
AGM 07027	1 qt	10 TL					
RPM + CANg	22 oz	Canopy closure					
AGM 07027	1 qt	1 wk later	1	33150	30.2	16.5	1.27
Betamix + Upbeet + Stinger (B + U + S)	16oz + 0.25oz + 2.4oz						
+ Destiny HC (DH) + AGM 06018	+ 1qt	2 TL					
B + U + S + DH + AGM 06018	16+0.25+2.4 oz + 1qt	4 TL					
B + U + S + DH + AGM 06018	16+0.25+2.4 oz + 1qt	6 TL	9	33260	23.8	16.9	1.29
B + U + S + DH + AGM 07027	16+0.25+2.4 oz + 1qt	2 TL					
B + U + S + DH + AGM 07027	16+0.25+2.4 oz + 1qt	4 TL					
B + U + S + DH + AGM 07027	16+0.25+2.4 oz + 1qt	6 TL	5	31360	32.0	15.9	1.42

Table 2. Effect of Max-In Technology on Roundup Power Max Performance on Sugarbeets and Weeds at Mitchell, Nebraska during the 2009 Growing Season – Continued.

			Sugarbeet				
Herbicide Treatment[1]	Rate	Sugarbeet growth stage[2]	Injury 7/8	Stand 7/21	Root yield[3]	Sucrose	SLM
	(product/acre)		(%)	(plants/acre)	(tons/acre)	(%)	
RPM + CANg	66 oz	4 TL					
RPM + CANg	66 oz	8 TL	3	39320	31.9	17.0	1.20
RPM + CANg + AGM 06018	66 oz + 1 qt	4 TL					
RPM + CANg + AGM 06018	66 ox + 1 qt	8 TL	1	33150	30.0	16.2	1.37
RPM + CANg + AGM 07027	66 oz + 1 qt	4 TL					
RPM + CANg + AGM 07027	66 oz + 1 qt	8 TL	7	36000	29.6	17.4	1.17
RPM + CANg	66 oz	4 TL					
AGM 06018	1 qt	6 TL					
RPM + CANg	66 oz	8 TL					
AGM 06018	1 qt	10 TL	5	38490	30.7	17.3	1.22
RPM + CANg	66 oz	4 TL					
AGM 07027	1 qt	6 TL					
RPM + CANg	66 oz	8 TL					
AGM 07027	1 qt	10 TL	1	36230	30.7	16.9	1.26
LSD at 0.05	--	--	8	8250	6.0	1.5	0.28

[1]The adjuvant Class Act Ng (CANg) was applied at a rate of 2.5% per volume of carrier and Destiny HC (DH) was applied at a rate of 1% per volume of carrier.

[2]Sugarbeet growth stages were abbreviated as follows: 2 true-leaves (2 TL), 4 true-leaves (4 TL), 6 true-leaves (6 TL), 8 true-leaves (8 TL), 10 true leaves (10 TL), canopy closure, and 1 week following canopy closure (1 wk later).

[3]Sugarbeet were harvested on October 8 and root yield was adjusted for soil tare.

Table 2. Effect of Max-In Technology on Roundup Power Max Performance on Sugarbeets and Weeds at Mitchell, Nebraska during the 2009 Growing Season – Continued.

Herbicide Treatment[1]	Rate	Sugarbeet growth stage[2]	Sugarbeet tissue analysis[4]											
			N	P	K	Mg	Ca	S	Na	Fe	Mn	B	Cu	Zn
	(product/acre)		---------- (ppm) ----------											
Nontreated			5.82	0.68	3.94	0.45	0.48	0.37	1.99	521	58	33.8	17.5	66.8
Roundup Power Max (RPM)+Class Act Ng	22 oz	4 TL												
RPM + Class Act Ng (CANg)	22 oz	8 TL												
RPM + CANg	22 oz	Canopy closure	5.93	0.76	4.70	0.70	0.60	0.37	2.28	424	65	36.0	15.3	61.3
RPM + CANg + AGM 06018	22 oz + 1 qt	4 TL												
RPM + CANg + AGM 06018	22 oz + 1 qt	8 TL												
RPM + CANg + AGM 06018	22 oz + 1 qt	Canopy closure	5.60	0.83	4.14	0.56	0.50	0.39	2.23	505	58	36.8	15.3	64.0
RPM + CANg + AGM 07027	22 oz + 1 qt	4 TL												
RPM + CANg + AGM 07027	22 oz + 1 qt	8 TL												
RPM + CANg + AGM 07027	22 oz + 1 qt	Canopy closure	5.36	0.79	3.95	0.52	0.46	0.38	2.00	549	60	32.8	14.5	67.5
RPM + CANg	22 oz	4 TL												
AGM 06018	1 qt	6 TL												
RPM + CANg	22 oz	8 TL												
AGM 06018	1 qt	10 TL												
RPM + CANg	22 oz	Canopy closure												
AGM 06018	1 qt	1 wk later	5.32	0.81	4.26	0.52	0.53	0.39	1.99	546	58	34.0	16.3	72.3
RPM + CANg	22 oz	4 TL												
AGM 07027	1 qt	6 TL												
RPM + CANg	22 oz	8 TL												
AGM 07027	1 qt	10 TL												
RPM + CANg	22 oz	Canopy closure												
AGM 07027	1 qt	1 wk later	5.84	0.79	4.28	0.52	0.44	0.36	1.69	670	58	31.0	16.8	67.8
Betamix + Upbeet + Stinger (B + U + S) + Destiny HC (DH) + AGM 06018	16oz + 0.25oz + 2.4oz + 1qt	2 TL												
B + U + S + DH + AGM 06018	16+0.25+2.4 oz + 1qt	4 TL												
B + U + S + DH + AGM 06018	16+0.25+2.4 oz + 1qt	6 TL	5.32	0.79	4.36	0.68	0.65	0.37	2.00	734	67	33.0	17.3	64.3

Table 2. Effect of Max-In Technology on Roundup Power Max Performance on Sugarbeets and Weeds at Mitchell, Nebraska during the 2009 Growing Season – Continued.

Herbicide Treatment[1]	Rate	Sugarbeet growth stage[2]	Sugarbeet tissue analysis[4]											
			N	P	K	Mg	Ca	S	Na	Fe	Mn	B	Cu	Zn
	(product/acre)		---------- (ppm) ----------											
B + U + S + DH + AGM 07027	16+0.25+2.4 oz + 1qt	2 TL												
B + U + S + DH + AGM 07027	16+0.25+2.4 oz + 1qt	4 TL												
B + U + S + DH + AGM 07027	16+0.25+2.4 oz + 1qt	6 TL	5.19	0.72	3.66	0.44	0.40	0.33	1.47	780	57	29.3	15.5	65.3
RPM + CANg	66 oz	4 TL												
RPM + CANg	66 oz	8 TL	5.92	0.77	4.21	0.61	0.59	0.38	2.01	514	63	33.8	15.0	62.0
RPM + CANg + AGM 06018	66 oz + 1 qt	4 TL												
RPM + CANg + AGM 06018	66 ox + 1 qt	8 TL	4.93	0.83	5.91	0.55	0.50	0.38	1.86	604	60	33.3	16.0	66.8
RPM + CANg + AGM 07027	66 oz + 1 qt	4 TL												
RPM + CANg + AGM 07027	66 oz + 1 qt	8 TL	5.64	0.82	4.55	0.63	0.56	0.37	1.94	672	67	32.3	15.8	67.0
RPM + CANg	66 oz	4 TL												
AGM 06018	1 qt	6 TL												
RPM + CANg	66 oz	8 TL												
AGM 06018	1 qt	10 TL	5.66	0.74	4.16	0.49	0.44	0.36	1.78	711	60	32.0	17.0	62.8
RPM + CANg	66 oz	4 TL												
AGM 07027	1 qt	6 TL												
RPM + CANg	66 oz	8 TL												
AGM 07027	1 qt	10 TL	5.48	0.77	4.27	0.53	0.48	0.38	1.85	617	61	32.5	16.0	64.0
LSD at 0.05	--	--	0.86	0.08	1.26	0.14	0.15	0.03	0.35	234	8.7	4.18	1.76	8.40

[1]The adjuvant Class Act Ng (CANg) was applied at a rate of 2.5% per volume of carrier and Destiny HC (DH) was applied at a rate of 1% per volume of carrier.

[2]Sugarbeet growth stages were abbreviated as follows: 2 true-leaves (2 TL), 4 true-leaves (4 TL), 6 true-leaves (6 TL), 8 true-leaves (8 TL), 10 true leaves (10 TL), canopy closure, and 1 week following canopy closure (1 wk later).

[3]Sugarbeet were harvested on October 8 and root yield was adjusted for soil tare.

[4]Sugarbeet leaf tissue analysis occurred on July 8, 2 days following the 8 true-leaf application.

Table 2. Effect of Max-In Technology on Roundup Power Max Performance on Sugarbeets and Weeds at Mitchell, Nebraska during the 2009 Growing Season – Continued.

Herbicide Treatment[1]	Rate	Sugarbeet growth stage[2]	Percent weed control on July 31[5]						
			Colq	Hans	Rrpw	Yeft	Tosp	Prpw	Average
	(product/acre)		(%)						
Nontreated			0	0	0	0	0	0	0
Roundup Power Max (RPM)+Class Act Ng	22 oz	4 TL							
RPM + Class Act Ng (CANg)	22 oz	8 TL							
RPM + CANg	22 oz	Canopy closure	99	99	99	99	99	99	99
RPM + CANg + AGM 06018	22 oz + 1 qt	4 TL							
RPM + CANg + AGM 06018	22 oz + 1 qt	8 TL							
RPM + CANg + AGM 06018	22 oz + 1 qt	Canopy closure	99	99	99	99	99	99	99
RPM + CANg + AGM 07027	22 oz + 1 qt	4 TL							
RPM + CANg + AGM 07027	22 oz + 1 qt	8 TL							
RPM + CANg + AGM 07027	22 oz + 1 qt	Canopy closure	99	99	98	99	99	99	99
RPM + CANg	22 oz	4 TL							
AGM 06018	1 qt	6 TL							
RPM + CANg	22 oz	8 TL							
AGM 06018	1 qt	10 TL							
RPM + CANg	22 oz	Canopy closure							
AGM 06018	1 qt	1 wk later	99	99	99	96	99	99	98
RPM + CANg	22 oz	4 TL							
AGM 07027	1 qt	6 TL							
RPM + CANg	22 oz	8 TL							
AGM 07027	1 qt	10 TL							
RPM + CANg	22 oz	Canopy closure							
AGM 07027	1 qt	1 wk later	99	99	99	99	99	99	99
Betamix + Upbeet + Stinger (B + U + S)	16oz + 0.25oz + 2.4oz								
+ Destiny HC (DH) + AGM 06018	+ 1qt	2 TL							
B + U + S + DH + AGM 06018	16+0.25+2.4 oz + 1qt	4 TL							
B + U + S + DH + AGM 06018	16+0.25+2.4 oz + 1qt	6 TL	86	98	47	92	85	99	85

Table 2. Effect of Max-In Technology on Roundup Power Max Performance on Sugarbeets and Weeds at Mitchell, Nebraska during the 2009 Growing Season – Continued.

Herbicide Treatment[1]	Rate	Sugarbeet growth stage[2]	Percent weed control on July 31[5]						
			Colq	Hans	Rrpw	Yeft	Tosp	Prpw	Average
	(product/acre)		(%)						
B + U + S + DH + AGM 07027	16+0.25+2.4 oz + 1qt	2 TL							
B + U + S + DH + AGM 07027	16+0.25+2.4 oz + 1qt	4 TL							
B + U + S + DH + AGM 07027	16+0.25+2.4 oz + 1qt	6 TL	97	99	61	89	96	99	90
RPM + CANg	66 oz	4 TL							
RPM + CANg	66 oz	8 TL	99	99	99	99	92	99	98
RPM + CANg + AGM 06018	66 oz + 1 qt	4 TL							
RPM + CANg + AGM 06018	66 ox + 1 qt	8 TL	99	99	99	99	74	99	95
RPM + CANg + AGM 07027	66 oz + 1 qt	4 TL							
RPM + CANg + AGM 07027	66 oz + 1 qt	8 TL	99	99	99	99	99	99	99
RPM + CANg	66 oz	4 TL							
AGM 06018	1 qt	6 TL							
RPM + CANg	66 oz	8 TL							
AGM 06018	1 qt	10 TL	99	99	99	96	85	99	96
RPM + CANg	66 oz	4 TL							
AGM 07027	1 qt	6 TL							
RPM + CANg	66 oz	8 TL							
AGM 07027	1 qt	10 TL	99	95	97	99	99	99	98
LSD at 0.05	--	--	5	3	20	8	22	NS	5

[1]The adjuvant Class Act Ng (CANg) was applied at a rate of 2.5% per volume of carrier and Destiny HC (DH) was applied at a rate of 1% per volume of carrier.
[2]Sugarbeet growth stages were abbreviated as follows: 2 true-leaves (2 TL), 4 true-leaves (4 TL), 6 true-leaves (6 TL), 8 true-leaves (8 TL), 10 true leaves (10 TL), canopy closure, and 1 week following canopy closure (1 wk later).
[3]Sugarbeet were harvested on October 8 and root yield was adjusted for soil tare.
[4]Sugarbeet leaf tissue analysis occurred on July 8, 2 days following the 8 true-leaf application.
[5]Percent weed control calculated from weed counts taken on July 31. Weed abbreviations are as follows: common lambsquarters (Colq), hairy nightshade (Hans), redroot pigweed (Rrpw), yellow foxtail (Yeft), toothed spurge (Tosp), and prostrate pigweed (Prpw).