

Glyphosate-Fungicide Interaction in Roundup Ready Sugarbeet

Gary Powell, Joe Armstrong, and Christy Sprague

MSU Crop and Soil Science

Eight fungicides were tank-mixed with glyphosate (Roundup OriginalMax) to evaluate potential interactions in sugar beet. The fungicides were Quadris, Gem, Headline, Champ II, Penncozeb, Eminent, SuperTin, and Topsin M.

When applied at the 2 leaf or 6 leaf sugar beet growth stage, all fungicide/glyphosate tank-mix applications resulted in sugarbeet injury less than 10%. Sugar beets recovered from this visual injury within 7 days. When Quadris was tank-mixed with Dual Magnum plus Roundup OriginalMax or Outlook plus Roundup OriginalMax at the 6 leaf stage, sugar beet visual injury was 31% and 13%, respectively, but sugar beets quickly outgrew this injury within 30 days.

Manganese deficiency was visible in sugar beets throughout all treatments, but in treatments #11 and #16, when Penncozeb was applied at DSV1 and DSV2, this deficiency was corrected within 14 days.

Three fungicide treatments, Champ II (#10), Headline (#14), and Topsin M plus Penncozeb (#16) resulted in higher sugarbeet yield and RWSA than the comparison of Roundup applied without a fungicide (#1).

Glyphosate-Fungicide Interaction Study in Roundup Ready Sugarbeet

Trial ID: SB05-07 Study Dir.: Sprague, Powell
 Conducted: Bean & Beet Farm Investigator: Christy Sprague

Date Planted: 4/20/07 Row Spacing: 30" IN
 Variety: Beta RZ02RR07 No. of Reps: 4
 Population: 4 3/8" spacing % OM: 3.9
 Soil Type: Silty Clay pH: 7.4
 Plot Size: 10 X 30 FT Design: RANDOMIZED COMPLETE BLOCK

Tillage: Fall Chisel Plow, Spring Soil Finish X2, Previous Crop Wheat
 Fertilizer: 120 lb of Nitrogen as Urea

Crop and Weed Description

Weed	Code	Common Name	Scientific Name
1.	CHEAL	LAMBSQUARTERS, COMMON	CHENOPODIUM ALBUM L.
2.	AMAPO	AMARANTH, POWELL	AMARANTHUS POWELLII S.WATS.
Crop	Code	Common Name	
1.	BETVU	BEET, SUGAR	

Application Description

	A	B	C	D
Application Timing:	2-leaf	6-leaf	55 DSV1	55 DSV2
Date Treated:	5/18/07	5/30/07	7/2/07	7/11/07
Time Treated:	1:30 pm	11:30 am	11:30 am	1:30 pm
% Cloud Cover:	10	60	15	30
Air Temp., Unit:	68 F	85 F	71 F	73 F
% Relative Humidity:	20	45	35	52
Wind Speed/Unit/Dir:	5 mph SW	5 mph S	3 mph E	8 mph W
Soil Temp., Unit:	58 F	74 F	68 F	74 F
Soil/Leaf Surface M:	5 5	5 5	5 5	5 5
Soil Moist (1=w 5=d):	5	5	5	5

Crop Stage at Each Application

	A	B	C	D
Crop Name:	BETVU	BETVU	BETVU	BETVU
Height (In.):	1-2.5"	3-6"	12"	14"
Stage (L):	4	6-8	16	20

Weed Stage at Each Application

	A	B	C	D
Weed 1 Name:	CHEAL	CHEAL	CHEAL	CHEAL
Height (In.):	1-2.5"	1/2-1"	-	-
Stage (L):	2-10	2-4	-	-
Weed 2 Name:	AMAPO	AMAPO	AMAPO	AMAPO
Height (In.):	1/4-1/2"	1/2	-	-
Stage (L):	2-4	2	-	-

Application Equipment

Appl	Sprayer	Speed	Nozzle	Nozzle	Nozzle	Nozzle	Boom	GPA	Carrier	PSI
	Type	MPH	Type	Size	Height	Spacing	Width			
A	Cub	3.8	AirMix	11003	22"	20	100	19	water	27
B	Cub	3.8	AirMix	11003	25"	20	100	19	water	27
C	Cub	3.8	AirMix	11003	26"	20	100	19	water	27
D	Cub	3.8	AirMix	11003	26"	20	100	19	water	27

Comments: Plots were kept weed-free with Roundup OriginalMax applications at the various timings. Negative numbers are greener plants from Mn (Manganese) deficiency corrected in these treatments.

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Weed Code								BETVU	BETVU	BETVU	BETVU	BETVU	BETVU
Crop Code								injury	injury	count	% sugar	yield	RWSA
Rating Data Type								percent	percent	#/100'		ton/acre	# / acre
Rating Unit								6/6/07	7/18/07	9/25/07	9/25/07	9/25/07	9/25/07
Rating Date								19 DA-A	61 DA-A	130 DA-A	130 DA-A	130 DA-A	130 DA-A
Trt-Eval Interval													
Trt No.	Treatment Name	Form Conc	Form Type	Rate Rate	Rate Unit	Grow Stg	Appl Code						
1	Roundup OriginalMax	4.5	SL	22	fl oz/a	2-LF	A	0	0	214	17.7	27.6	7052.9
1	AMS		WG	17	lb/100 gal	2-LF	A						
1	Roundup OriginalMax	4.5	SL	22	fl oz/a	6-LF	B						
1	AMS		WG	17	lb/100 gal	6-LF	B						
1	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV1	C						
1	AMS		WG	17	lb/100 gal	55 DSV1	C						
1	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV2	D						
1	AMS		WG	17	lb/100 gal	55 DSV2	D						
2	Roundup OriginalMax	4.5	SL	22	fl oz/a	2-LF	A	6	0	212	17.6	27.5	6986.7
2	Quadris	2.08	FL	9.2	fl oz/a	2-LF	A						
2	AMS		WG	17	lb/100 gal	2-LF	A						
2	Roundup OriginalMax	4.5	SL	22	fl oz/a	6-LF	B						
2	AMS		WG	17	lb/100 gal	6-LF	B						
2	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV1	C						
2	AMS		WG	17	lb/100 gal	55 DSV1	C						
2	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV2	D						
2	AMS		WG	17	lb/100 gal	55 DSV2	D						
3	Roundup OriginalMax	4.5	SL	22	fl oz/a	2-LF	A	8	0	206	17.8	25.8	6644.5
3	GEM	500	SC	3.5	fl oz/a	2-LF	A						
3	AMS		WG	17	lb/100 gal	2-LF	A						
3	Roundup OriginalMax	4.5	SL	22	fl oz/a	6-LF	B						
3	AMS		WG	17	lb/100 gal	6-LF	B						
3	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV1	C						
3	AMS		WG	17	lb/100 gal	55 DSV1	C						
3	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV2	D						
3	AMS		WG	17	lb/100 gal	55 DSV2	D						
4	Roundup OriginalMax	4.5	SL	22	fl oz/a	2-LF	A	4	0	212	17.8	27.4	7122.7
4	Headline	2.09	L	9.2	fl oz/a	2-LF	A						
4	AMS		WG	17	lb/100 gal	2-LF	A						
4	Roundup OriginalMax	4.5	SL	22	fl oz/a	6-LF	B						
4	AMS		WG	17	lb/100 gal	6-LF	B						
4	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV1	C						
4	AMS		WG	17	lb/100 gal	55 DSV1	C						
4	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV2	D						
4	AMS		WG	17	lb/100 gal	55 DSV2	D						
5	Roundup OriginalMax	4.5	SL	22	fl oz/a	2-LF	A	4	0	220	18.2	28.2	7273.7
5	AMS		WG	17	lb/100 gal	2-LF	A						
5	Roundup OriginalMax	4.5	SL	22	fl oz/a	6-LF	B						
5	Quadris	2.08	FL	9.2	fl oz/a	6-LF	B						
5	AMS		WG	17	lb/100 gal	6-LF	B						
5	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV1	C						
5	AMS		WG	17	lb/100 gal	55 DSV1	C						
5	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV2	D						
5	AMS		WG	17	lb/100 gal	55 DSV2	D						
6	Roundup OriginalMax	4.5	SL	22	fl oz/a	2-LF	A	3	0	223	18.2	29.4	7853.0
6	AMS		WG	17	lb/100 gal	2-LF	A						
6	Roundup OriginalMax	4.5	SL	22	fl oz/a	6-LF	B						
6	GEM	500	SC	3.5	fl oz/a	6-LF	B						
6	AMS		WG	17	lb/100 gal	6-LF	B						
6	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV1	C						
6	AMS		WG	17	lb/100 gal	55 DSV1	C						
6	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV2	D						
6	AMS		WG	17	lb/100 gal	55 DSV2	D						

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Crop Code								injury	injury	count	% sugar	yield	RWSA
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Rating Unit								6/6/07	7/18/07	9/25/07	9/25/07	9/25/07	9/25/07
Rating Date								19 DA-A	61 DA-A	130 DA-A	130 DA-A	130 DA-A	130 DA-A
Trt-Eval Interval													
Trt No.	Treatment Name	Form Conc	Form Type	Rate Rate	Rate Unit	Grow Stg	Appl Code						
7	Roundup OriginalMax	4.5	SL	22	fl oz/a	2-LF	A	1	0	206	18.1	25.9	6911.7
7	AMS		WG	17	lb/100 gal	2-LF	A						
7	Roundup OriginalMax	4.5	SL	22	fl oz/a	6-LF	B						
7	Headline	2.09	L	9.2	fl oz/a	6-LF	B						
7	AMS		WG	17	lb/100 gal	6-LF	B						
7	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV1	C						
7	AMS		WG	17	lb/100 gal	55 DSV1	C						
7	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV2	D						
7	AMS		WG	17	lb/100 gal	55 DSV2	D						
8	Roundup OriginalMax	4.5	SL	22	fl oz/a	2-LF	A	31	0	213	17.6	27.2	6857.6
8	AMS		WG	17	lb/100 gal	2-LF	A						
8	Roundup OriginalMax	4.5	SL	22	fl oz/a	6-LF	B						
8	Quadris	2.08	FL	9.2	fl oz/a	6-LF	B						
8	Dual Magnum	7.64	SL	1.33	pt/a	6-LF	B						
8	AMS		WG	17	lb/100 gal	6-LF	B						
8	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV1	C						
8	AMS		WG	17	lb/100 gal	55 DSV1	C						
8	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV2	D						
8	AMS		WG	17	lb/100 gal	55 DSV2	D						
9	Roundup OriginalMax	4.5	SL	22	fl oz/a	2-LF	A	13	0	218	18.0	27.6	7207.6
9	AMS		WG	17	lb/100 gal	2-LF	A						
9	Roundup OriginalMax	4.5	SL	22	fl oz/a	6-LF	B						
9	Quadris	2.08	FL	9.2	fl oz/a	6-LF	B						
9	Outlook	6	EC	16	fl oz/a	6-LF	B						
9	AMS		WG	17	lb/100 gal	6-LF	B						
9	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV1	C						
9	AMS		WG	17	lb/100 gal	55 DSV1	C						
9	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV2	D						
9	AMS		WG	17	lb/100 gal	55 DSV2	D						
10	Roundup OriginalMax	4.5	SL	22	fl oz/a	2-LF	A	0	0	206	17.9	30.8	8098.2
10	AMS		WG	17	lb/100 gal	2-LF	A						
10	Roundup OriginalMax	4.5	SL	22	fl oz/a	6-LF	B						
10	AMS		WG	17	lb/100 gal	6-LF	B						
10	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV1	C						
10	Champ II (Copper)		FL	2	pt/a	55 DSV1	C						
10	AMS		WG	17	lb/100 gal	55 DSV1	C						
10	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV2	D						
10	Champ II (Copper)		FL	2	pt/a	55 DSV2	D						
10	AMS		WG	17	lb/100 gal	55 DSV2	D						
11	Roundup OriginalMax	4.5	SL	22	fl oz/a	2-LF	A	0	-20	207	16.9	27.9	6613.5
11	AMS		WG	17	lb/100 gal	2-LF	A						
11	Roundup OriginalMax	4.5	SL	22	fl oz/a	6-LF	B						
11	AMS		WG	17	lb/100 gal	6-LF	B						
11	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV1	C						
11	Penncozeb	75	DF	2	lb/a	55 DSV1	C						
11	AMS		WG	17	lb/100 gal	55 DSV1	C						
11	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV2	D						
11	Penncozeb	75	DF	2	lb/a	55 DSV2	D						
11	AMS		WG	17	lb/100 gal	55 DSV2	D						

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Rating Data Type								percent	percent	#/100'		ton/acre	# / acre
Rating Unit								6/6/07	7/18/07	9/25/07	9/25/07	9/25/07	9/25/07
Rating Date								19 DA-A	61 DA-A	130 DA-A	130 DA-A	130 DA-A	130 DA-A
Trt-Eval Interval													
Trt No.	Treatment Name	Form Conc	Form Type	Rate Rate	Rate Unit	Grow Stg	Appl Code						
12	Roundup OriginalMax	4.5	SL	22	fl oz/a	2-LF	A	1	0	227	17.5	29.6	7414.5
12	AMS		WG	17	lb/100 gal	2-LF	A						
12	Roundup OriginalMax	4.5	SL	22	fl oz/a	6-LF	B						
12	AMS		WG	17	lb/100 gal	6-LF	B						
12	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV1	C						
12	Eminent	1	SL	13	fl oz/a	55 DSV1	C						
12	AMS		WG	17	lb/100 gal	55 DSV1	C						
12	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV2	D						
12	Eminent	1	SL	13	fl oz/a	55 DSV2	D						
12	AMS		WG	17	lb/100 gal	55 DSV2	D						
13	Roundup OriginalMax	4.5	SL	22	fl oz/a	2-LF	A	0	0	205	18.3	27.1	7329.3
13	AMS		WG	17	lb/100 gal	2-LF	A						
13	Roundup OriginalMax	4.5	SL	22	fl oz/a	6-LF	B						
13	AMS		WG	17	lb/100 gal	6-LF	B						
13	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV1	C						
13	GEM	500	SC	3.5	fl oz/a	55 DSV1	C						
13	AMS		WG	17	lb/100 gal	55 DSV1	C						
13	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV2	D						
13	GEM	500	SC	3.5	fl oz/a	55 DSV2	D						
13	AMS		WG	17	lb/100 gal	55 DSV2	D						
14	Roundup OriginalMax	4.5	SL	22	fl oz/a	2-LF	A	0	0	211	17.9	30.8	8176.8
14	AMS		WG	17	lb/100 gal	2-LF	A						
14	Roundup OriginalMax	4.5	SL	22	fl oz/a	6-LF	B						
14	AMS		WG	17	lb/100 gal	6-LF	B						
14	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV1	C						
14	Headline	2.09	L	9.2	fl oz/a	55 DSV1	C						
14	AMS		WG	17	lb/100 gal	55 DSV1	C						
14	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV2	D						
14	Headline	2.09	L	9.2	fl oz/a	55 DSV2	D						
14	AMS		WG	17	lb/100 gal	55 DSV2	D						
15	Roundup OriginalMax	4.5	SL	22	fl oz/a	2-LF	A	0	0	185	18.0	26.3	6910.8
15	AMS		WG	17	lb/100 gal	2-LF	A						
15	Roundup OriginalMax	4.5	SL	22	fl oz/a	6-LF	B						
15	AMS		WG	17	lb/100 gal	6-LF	B						
15	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV1	C						
15	SuperTin	80	WP	5	oz/a	55 DSV1	C						
15	AMS		WG	17	lb/100 gal	55 DSV1	C						
15	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV2	D						
15	SuperTin	80	WP	5	oz/a	55 DSV2	D						
15	AMS		WG	17	lb/100 gal	55 DSV2	D						
16	Roundup OriginalMax	4.5	SL	22	fl oz/a	2-LF	A	0	-24	219	18.0	31.6	8341.9
16	AMS		WG	17	lb/100 gal	2-LF	A						
16	Roundup OriginalMax	4.5	SL	22	fl oz/a	6-LF	B						
16	AMS		WG	17	lb/100 gal	6-LF	B						
16	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV1	C						
16	Topsin M	70	WG	0.5	lb/a	55 DSV1	C						
16	Penncozeb	75	DF	2	lb/a	55 DSV1	C						
16	AMS		WG	17	lb/100 gal	55 DSV1	C						
16	Roundup OriginalMax	4.5	SL	22	fl oz/a	55 DSV2	D						
16	Topsin M	70	WG	0.5	lb/a	55 DSV2	D						
16	Penncozeb	75	DF	2	lb/a	55 DSV2	D						
16	AMS		WG	17	lb/100 gal	55 DSV2	D						
LSD (P=.05)								4.5	2.6	29.1	0.86	3.68	1035.50
Standard Deviation								3.2	1.8	20.4	0.60	2.58	724.60
CV								72.56	0.0	9.64	3.39	9.15	9.93