

Effect of Row-width and Plant Population on Roundup Ready Sugar Beet

Trial ID: SB01-08 Study Dir.: Armstrong, Sprague, Powell
 Conducted: Bean & Beet Investigator: Christy Sprague

Date Planted: 4/24/08 Row Spacing: 15 IN
 Variety: Hillshog 9028 RR No. of Reps: 4
 Population: See comments % OM: 3.0
 Soil Type: Clay pH: 7.8
 Plot Size: 15 X 30 FT Design: RANDOMIZED COMPLETE BLOCK

Tillage: Fall chisel dry beans
 Early spring field cultivator
 Shallow field cultivate on 4/23/08
 Fertilizer: 125# nitrogen (urea) applied and incorporated in early spring.

Crop and Weed Description

Weed	Code	Common Name	Scientific Name
1.	CHEAL	LAMBSQUARTERS, COMMON	CHENOPODIUM ALBUM L.
2.	ABUTH	VELVETLEAF	ABUTILON THEOPHRASTI MEDIK.
3.	AMASS	REDROOT PIGWEED, POWELL AMARANTH	AMARANTHUS SP.
Crop	Code	Common Name	
1.	BETVU	BEET, SUGAR	

Application Description

	A	B
Application Timing:	"A" wdfree	"B" 4" WF
Date Treated:	5/23/08	6/11/08
Time Treated:	12:45 PM	3:30 PM
% Cloud Cover:	80	25
Air Temp., Unit:	60 F	84 F
% Relative Humidity:	47	50
Wind Speed/Unit/Dir:	4 mph NE	3 mph NE
Soil Temp., Unit:	56 F	78 F
Soil/Leaf Surface M:	5 5	5 5
Soil Moist (1=w 5=d):	5	4

Crop Stage at Each Application

	A	B
Crop Name:	BETVU	BETVU
Height (In.):	.25-1	6-7
Stage (L):	2-4	8

Weed Stage at Each Application

	A	B
Weed 1 Name:	CHEAL	CHEAL
Height (In.):	.5-1	2-8
Stage (L):	4-6	6-many
Weed 2 Name:	ABUTH	ABUTH
Height (In.):	1	1-2
Stage (L):	3	1-4
Weed 3 Name:	AMASS	AMASS
Height (In.):	--	2-4
Stage (L):	--	4-8

Application Equipment

Appl	Sprayer Type	Speed MPH	Nozzle Type	Nozzle Size	Nozzle Height	Nozzle Spacing	Boom Width	GPA	Carrier	PSI
A	Cub	3.8	AirMix	11003	21	20	180	19	water	28
B	Cub	3.8	AirMix	11003	26	20	180	19	water	28

Comments: Populations:
 15" row = 6" seed spacing
 20" row = 4.5" seed spacing
 30" row = 3" seed spacing

Previous Crop- Dry Bean

Fungicides were broadcast applied the following dates-

May 11- 40 oz/acre Quadris
 July 6- 13 oz/acre Emmiment
 July 24- 9.2 oz/acre Headline
 August 12- 2.0 lb/acre Pencozeb + 0.5 lb/acre Topsin
 September 2- 9.2 oz/acre Headline

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COMPARING YIELD AND WEED MANAGEMENT IN WIDE- AND NARROW-ROW ROUNDUP READY SUGARBEET
Joe Armstrong, Christy Sprague and Gary Powell
MSU Crop and Soil Sciences

With the support of the Michigan Sugar Company and Project GREEN, we conducted multiple field trials to evaluate Roundup Ready (glyphosate-resistant) sugarbeet planted in 15-, 20-, and 30-inch rows to determine if there were any advantages for yield, quality, and weed management by planting in narrow rows. Trials were conducted at the MSU Saginaw Valley Bean and Beet Research Farm and on growers' fields in 2007 and 2008.

Row width and plant population effects on yield and quality

The first study evaluated sugar beet yield and quality in 15-, 20-, and 30-inch rows and stands of 22,000; 31,000; 41,000; or 50,000 beets/acre. All plots were thinned to the desired stands when beets were in four-leaf growth stages and were maintained weed-free during the growing season. Populations were held constant across the three row widths to evaluate the effect of row width.

Root yields were similar among all plant populations, regardless of row width. However, recoverable white sugar per ton (RWST) increased from 231 pounds per ton at stands of 22,000 beets per acre to 240 pounds per ton at stands of 50,000 beets per acre. Though the differences were not statistically significant, there was also a slight trend toward increased RWST as row width narrowed from 30-inches to 15-inches at all locations. When averaged over all populations, sugarbeet planted in 20-inch rows provided a 6% increase in root yield (38.9 tons per acre) over 15-inch (36.5 tons) and 30-inch rows (36.4 tons). As a result of the increased root yield with 20-inch rows, the highest recoverable white sugar per acre (RWSA) was also observed in 20-inch rows.

We also collected measurements throughout the growing season to compare crop canopy development among the various row width and plant population combinations. Sugarbeet planted in 15- and 20-inch rows provided earlier and denser canopy cover than beets planted in 30-inch rows at all populations. Earlier canopy cover is advantageous because it allows for maximum sunlight interception and can aid in weed control by shading out late-season weed emergence.

Glyphosate timing and weed control in narrow rows

The second question we addressed is the effect of row width on weed control in Roundup Ready sugarbeet. Three row widths, 15-, 20-, and 30-inches, were investigated at a uniform stand of 31,000 plants/acre. Treatments included Roundup WeatherMax (22 fl oz) + ammonium sulfate (17 lbs/100 gal) when weeds averaged 2- and 4-inches in height, with follow-up treatments when weeds were 4-inches in height; single glyphosate applications when weeds averaged 4- and 6-inches; conventional sugar beet herbicide programs (Betamix + Stinger + UpBeet) of either a standard-split program applied twice (non-ionic surfactant included in the second application) or micro-rate program applied four times (methylated seed oil included in all applications); and weed-free and untreated control plots. When averaged over all herbicide treatments, sugar beet root yields were highest in 15- and 20-inch rows. When averaged over row widths, yields were lowest when glyphosate applications were delayed until weeds were 6-inches in height. In treatments which received only a single glyphosate application when weeds were 4-inches tall, subsequent weed biomass accumulation was reduced by at least 70% in 15-in rows and 65% in 20-in rows, compared with 30-in rows. Results from this study indicate that planting glyphosate-resistant sugar beet in narrow rows may result in higher yields and provide some suppression of late-season weed growth.

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Weed Code						BETVU	BETVU	BETVU	BETVU	
Crop Code						% Sugar	yield	RWST	RWSA	
Rating Data Type							ton/A	#/ton	#/acre	
Rating Unit										
Rating Date						9/25/08	9/25/08	9/25/08	9/25/08	
Trt-Eval Interval						125 DA-A	125 DA-A	125 DA-A	125 DA-A	
Trt No.	Treatment Name	Form Conc	Form Type	Rate Rate Unit	Grow Stg	Appl Code				
1	20" rows, 84 beets/100'					A	15.9	33.9	239.1	8054
1	Weed free					A				
2	20" rows, 84 beets/100'						15.9	34.4	227.5	7786
2	Roundup WeatherMax	4.5	SL	22 fl oz/a	4" weeds	B				
2	AMS		WG	17 lb/100 gal	4" weeds	B				
3	20" rows, 120 beets/ 100'					A	16.1	36.9	241.4	8867
3	Weed free					A				
4	20" rows, 120 beets/100'						16.1	36.5	237.3	8660
4	Roundup WeatherMax	4.5	SL	22 fl oz/a	4" weeds	B				
4	AMS		WG	17 lb/100 gal	4" weeds	B				
5	30" rows, 126 beets/100'					A	15.7	34.5	225.3	7801
5	Weed free					A				
6	30" rows, 126 beets/100'						15.8	36.4	231.0	8380
6	Roundup WeatherMax	4.5	SL	22 fl oz/a	4" weeds	B				
6	AMS		WG	17 lb/100 gal	4" weeds	B				
7	30" rows, 180 beets/100'					A	15.9	36.9	229.3	8400
7	Weed free					A				
8	30" rows, 180 beets/100'						16.1	35.5	235.7	8341
8	Roundup WeatherMax	4.5	SL	22 fl oz/a	4" weeds	B				
8	AMS		WG	17 lb/100 gal	4" weeds	B				
9	15" rows, 63 beets/100'					A	15.6	33.6	225.6	7573
9	Weed free					A				
10	15" rows, 63 beets/100'						16.1	35.4	235.8	8351
10	Roundup WeatherMax	4.5	SL	22 fl oz/a	4" weeds	B				
10	AMS		WG	17 lb/100 gal	4" weeds	B				
11	15" rows, 90 beets/100'					A	16.4	30.9	243.7	7546
11	Weed free					A				
12	15" rows, 90 beets/100'						16.3	30.3	242.4	7337
12	Roundup WeatherMax	4.5	SL	22 fl oz/a	4" weeds	B				
12	AMS		WG	17 lb/100 gal	4" weeds	B				
12										
13	15" rows, 117 beets/100'					A	15.9	34.1	229.5	7447
13	Weed free					A				
14	15" beets, 117 beets/100'						16.3	32.3	239.6	7729
14	Roundup WeatherMax	4.5	SL	22 fl oz/a	4" weeds	B				
14	AMS		WG	17 lb/100 gal	4" weeds	B				

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Rating Unit							9/25/08	9/25/08	9/25/08	9/25/08	
Rating Date							125 DA-A	125 DA-A	125 DA-A	125 DA-A	
Trt-Eval Interval											
Trt No.	Treatment Name	Form Conc	Form Type	Rate Rate	Unit	Grow Stg	Appl Code				
15	15" rows, 144 beets/100'						A	16.4	33.5	243.2	8086
15	Weed free						A				
16	15" rows, 144 beets/100'							16.3	30.4	244.4	7430
16	Roundup WeatherMax	4.5	SL	22	fl oz/a	4" weeds	B				
16	AMS		WG	17	lb/100 gal	4" weeds	B				
17	30" rows, 234 beets/100'						A	16.0	36.6	231.2	8465
17	Weed free						A				
18	30" rows, 234 beets/100'							16.3	37.3	239.5	8911
18	Roundup WeatherMax	4.5	SL	22	fl oz/a	4" weeds	B				
18	AMS		WG	17	lb/100 gal	4" weeds	B				
19	30" rows, 288 beets/100'						A	16.0	34.0	238.6	8085
19	Weed free						A				
20	30" rows, 288 beets/100'							15.7	34.3	234.2	8013
20	Roundup WeatherMax	4.5	SL	22	fl oz/a	4" weeds	B				
20	AMS		WG	17	lb/100 gal	4" weeds	B				
21	20" rows, 156 beets/100'						A	16.0	41.2	230.5	9488
21	Weed free						A				
22	20" rows, 156 beets/100'							16.3	38.0	239.7	9079
22	Roundup WeatherMax	4.5	SL	22	fl oz/a	4" weeds	B				
22	AMS		WG	17	lb/100 gal	4" weeds	B				
23	20" rows, 192 beets/100'						A	16.2	38.6	242.3	9348
23	Weed free						A				
24	20" rows, 192 beets/100'							15.9	37.4	236.5	8812
24	Roundup WeatherMax	4.5	SL	22	fl oz/a	4" weeds	B				
24	AMS		WG	17	lb/100 gal	4" weeds	B				
LSD (P=.10)								0.54	5.10	10.50	1164.9
Standard Deviation								0.45	4.32	8.89	985.9
CV								2.82	12.3	3.77	11.95