

EFFECT OF ROW SPACING AND PLANT POPULATION IN ROUNDUP READY SUGAR BEETS

Trial ID: SB06-06 **Study Dir.:** Joe Armstrong, Christy Sprague, Gary Powell
Conducted: Bean and Beet **Investigator:** Christy Sprague

Date Planted: 4/20/2006 **Row Spacing:** 30 IN
Variety: Beta Seed RR **No. of Reps:** 4
Population: 3"-30"rows 6"-15"row **% OM:** 3.3
Soil Type: Silty Clay **pH:** 7.8
Plot Size: 10 X 30 FT **Design:** RANDOMIZED COMPLETE BLOCK

Tillage: Fall Chisel Plow, Field Cultivate 4/18/2006
Fertilizer: Broadcast application of 125#/acre N on March 15, 2006

Crop and Weed Description

Weed	Code	Common Name	Scientific Name
1.	CHEAL	LAMBSQUARTERS, COMMON	CHENOPODIUM ALBUM L.
2.	POLPY	SMARTWEED, PENNSYLVANIA	POLYGONUM PENNSYLVANICUM
3.	AMARE	PIGWEEED, REDROOT	AMARANTHUS RETROFLEXUS L.
4.	ANGR	Annual grass	mainly foxtail, panicum
5.	POLCO	BUCKWHEAT, WILD	POLYGONUM CONVULVULUS L.
Crop	Code	Common Name	
1.	BETVU	BEET, SUGAR	

Application Description

	A	B	C
Application Timing:	2" weeds	4" weeds	8" weeds
Date Treated:	5/25/2006	6/1/2006	6/8/2006
Time Treated:	2:00 pm	2:30 pm	12:30 pm
% Cloud Cover:	50	90	25
Air Temp., Unit:	82 F	76 F	87 F
% Relative Humidity:	61	39	34
Wind Speed/Unit/Dir:	6 mph S	2 mph W	2 mph SW
Soil Temp., Unit:	66 F	80 F	93 F
Soil/Leaf Surface M:	3 5	3 5	4 5
Soil Moist (1=w 5=d):	3	3	4

Crop Stage at Each Application

	A	B	C
Crop Name:	BETVU	BETVU	BETVU
Height (In.):	1/2"-2"	1"-4 1/2"	
Stage (L):	coty-4	2-6	8-10

Weed Stage at Each Application

	A	B	C
Weed 1 Name:	CHEAL	CHEAL	CHEAL
Height (In.):	1/4"-3"	3/4"-6"	1"-12"
Stage (L):	2-20	4-many	many
Weed 2 Name:	POLPY	POLPY	POLPY
Height (In.):	1 1/2"	1 1/2"-4"	2"-5"
Stage (L):	3	8-12	many

Weed Density (plants/sq. ft.)

	1	2
Date:	7/21/2006	7/21/2006
Weed Name:	CHEAL	POLPY
Density:	<1	<1

Appl	Sprayer Type	Application Equipment					Boom Width	GPA	Carrier	PSI
		Speed MPH	Nozzle Type	Nozzle Size	Nozzle Height	Nozzle Spacing				
A	Cub	3.8	AirMix	11003	20"	20"	100"	19	H20	27
B	Cub	3.8	AirMix	11003	22"	20"	100"	19	H20	27
C	Cub	3.8	AirMix	11003	22"	20"	100"	19	H20	27

Comments: Previous Crop: Soybeans. Previous Herbicide: Roundup.

June 12- 3.5 oz/acre Amistar applied
 July 7- 0.5 oz/acre Topsin applied
 July 19- 9.2 oz/acre Headline applied
 July 31- 13 oz/acre Emminent applied
 August 15- 9.2 oz/acre Headline applied

Plant populations- # beets/acre
 Low 21954
 Med 31363
 High 40772

SUMMARY: Weed management in Michigan sugar beet production, which relies heavily on a limited number of herbicides, continues to be a challenge. Herbicide programs currently available are expensive, tend to cause significant crop injury, lack application flexibility, and are not always completely effective. The introduction of Roundup Ready (glyphosate-resistant) sugar beet varieties has the potential to reduce labor and herbicide inputs for sugar beet production while improving crop safety and weed control. However, one concern with the adoption of Roundup Ready sugar beets is the added seed cost associated with the resistance trait. Two options to help offset this added cost include reducing seeding rates and/or maximizing sugar beet yield and quality. Currently, there has not been any research conducted in Michigan to evaluate the potential benefits to weed management from planting sugar beets in narrow rows. The objective of this research was to evaluate the effects of row spacing, plant population, and weed removal timing on Roundup Ready sugar beet production in Michigan.

A field trial was established in 2006 at the Michigan State University Saginaw Valley Bean and Beet Research Farm in St. Charles. Sugar beets were planted on April 20 at two row widths, 15- and 30-in, and stands were thinned at the 4-leaf stage to low, medium, or high populations consisting of 21,954, 31,363, or 40,772 plants/A, respectively. In 15-in rows, the low, medium, and high populations resulted in plant spacings of 19.0-, 13.3-, and 10.3-in, respectively. Plant spacings in the 30-in rows for the low, medium, and high populations were 9.5-, 6.6-, and 5.1-in, respectively. For each row width and plant population combination, Roundup WeatherMAX + ammonium sulfate (AMS) (22 fl oz/A + 17 lbs/100 gal) was applied when weeds were either 4- or 8-in tall. Plots were kept weed-free after they received a glyphosate application. Additionally, weed-free and untreated control plots were established. Sugar beets were mechanically harvested on September 20 and root weights were measured for the inner two rows

of each plot. Sub-samples of the sugar beets were also collected for each plot and analyzed for quality.

For both row widths, plant population did not have a significant effect on root yield. Comparing weed-free control plots, root yield was 29% greater for sugar beets planted in 15-in rows (34.1 tons/A) compared with those planted in 30-in rows (26.4 tons/A). Though the recoverable white sugar per ton was nearly identical among 15- and 30-in rows, the increase in root yield for 15-in rows resulted in an increase of 1,970 lbs/A of recoverable white sugar. Within each row width, weed removal timing did not affect root yield.

Canopy cover measurements were also taken throughout the growing season. Beets planted in 15-in rows exhibited significantly greater canopy closure than beets planted in 30-in rows at each sampling time and achieved 90% canopy closure 70 days after planting. Plant population did not have a significant effect on canopy closure.

Results from one year of data indicate there may be potential benefits from planting Roundup Ready sugar beets in narrow rows. However, additional trials are required to more fully examine the optimal row width and plant population to maximize weed control and sugar beet yield and quality. Future plans for this research includes investigating 20-in rows in addition to 15- and 30-in rows, as well as comparing glyphosate treatments to standard-split and/or micro-rate herbicide programs in varying plant populations.