Control of Volunteer Corn in Sugarbeet

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INTRODUCTION

Volunteer glyphosate-resistant corn is one of the most common weed problems found in glyphosate-resistant sugarbeet grown in Michigan. While there are several options available for control of volunteer corn, there has been little research examining what effect the time of volunteer corn removal has on sugarbeet yield and quality.

OBJECTIVES

1. Compare two different herbicide programs for control of volunteer glyphosate-resistant corn.
2. Evaluate the effect of application timing on volunteer corn control and sugarbeet yield and quality.

MATERIALS & METHODS

- Field study – 2 locations:
  - MSU Agronomy Farm, East Lansing, MI
  - SVREC, Richville, MI
- Sugarbeet seed: 'HM 173 RR'
- Planted in 76 cm rows at 124,000 seeds ha^{-1}
- Planting dates:
  - East Lansing: April 12, 2012
  - Richville: April 4, 2012
- 'F_2' glyphosate-resistant volunteer corn planted at 5,740-8,610 plants ha^{-1}, 13 cm off sugarbeet row
- Randomized complete block design with factorial arrangement, 4 replications
  - Herbicide treatment (Table 1)
  - 5 application times

Table 1. Herbicide rates at the 5 application timings

Treatment Time	Clethodim[a]	Quizalofop[a,b]
	g ha^{-1}	g ha^{-1}
1	105	28
2	105	28
3	158	35
4	158	35
5	210	56

[a] Glyphosate 0.84 kg ha^{-1} + AMS 2% w/w
[b] Non-ionic surfactant 0.125% v/v

- Plots kept weed free with glyphosate (0.84 kg a.e. ha^{-1})
- Measurements:
  - Volunteer corn control
  - Volunteer corn biomass (prior to harvest)
  - Sugarbeet yield
  - Recoverable white sucrose per hectare (RWSha)
- Analyzed with PROC MIXED in SAS
  - Interactions tested
  - Means separated with Fisher's Protected LSD at $p \leq 0.05$

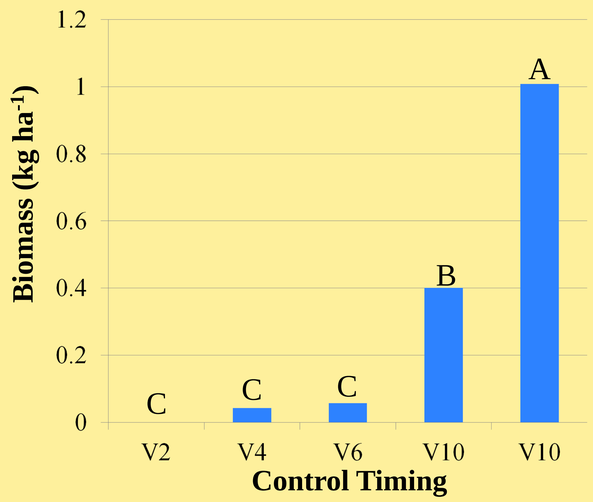
RESULTS & DISCUSSION

Volunteer Corn Biomass

East Lansing

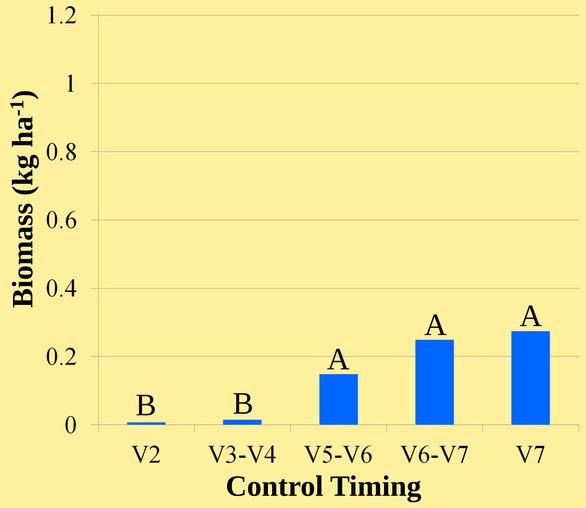
Figure 1. Volunteer corn biomass at harvest at East Lansing

Untreated = 7.34 kg ha^{-1}



Richville

Figure 2. Volunteer corn biomass at harvest at Richville



Untreated = 3.18 kg ha^{-1}

Yield and Sucrose

East Lansing

Table 2. Sugarbeet yield and quality at East Lansing

Removal Timing			Yield	RWSha
	Corn stage	DAP[a]	Mg ha^{-1}	kg ha^{-1}
No corn			48.0 B	6355 B
1	V2	49	49.1 B	6477 B
2	V4	63	50.7 AB	6841 AB
3	V6	68	54.9 A	7496 A
4	V10	79	46.6 B	6229 B
5	V10	86	48.4 AB	6724 B
Untreated			34.3 C	4665 C

[a] Days after planting

Richville

Table 3. Sugarbeet yield and quality at Richville

Removal Timing			Yield	RWSha
	Corn stage	DAP[a]	Mg ha^{-1}	kg ha^{-1}
No corn			64.6 A	8293 A
1	V2	42	71.3 A	8901 A
2	V3-V4	53	65.0 A	7753 A
3	V5-V6	62	65.9 A	8076 A
4	V6-V7	69	64.8 A	7689 A
5	V7	77	69.9 A	8439 A
Untreated			64.8 A	7767 A

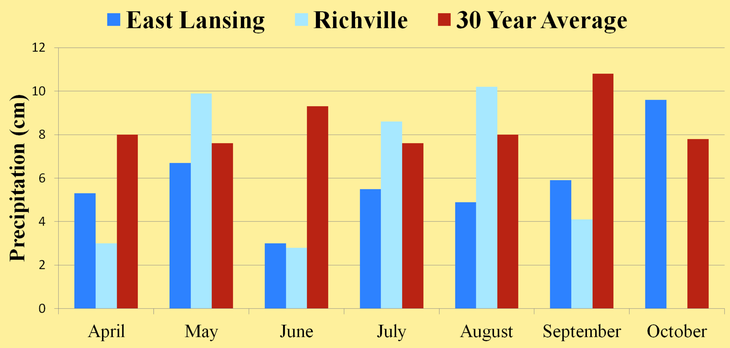
[a] Days after planting

Discussion

- Clethodim and quizalofop were equally effective at controlling volunteer corn, so data were combined over the two herbicide programs for all parameters measured.
- Volunteer corn control was lower (data not shown) and final corn biomass was higher (Figures 1 & 2) at the later application timings.
- Volunteer corn growth between the two locations was greatly affected by early season precipitation (Figure 3). At Richville, volunteer corn did not reduce sugarbeet yield or sucrose (Table 3). Final corn biomass was 57% higher in the untreated plots at East Lansing (Figures 1 & 2).
- At East Lansing, volunteer corn reduced sugarbeet yield 28.5% and sucrose 26.6% when it was not controlled (Table 2).

Precipitation

Figure 3. Monthly precipitation at the two field locations



CONCLUSIONS

There are several options available for control of glyphosate-resistant volunteer corn in glyphosate-resistant sugarbeet including clethodim and quizalofop. Initial results show control was beneficial at all times in the growing season at one of two locations. Low early-season precipitation contributed to a poor volunteer corn growth at Richville. This research will be repeated in 2013.

ACKNOWLEDGEMENTS

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