

# Timing of Volunteer Corn Control Affects Sugarbeet Yield

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## Introduction

- Volunteer glyphosate-resistant corn is a frequent weed problem in glyphosate-resistant sugarbeet grown in Michigan.
- Without appropriate management volunteer corn can cause reductions in sugarbeet yield and quality.

## Objectives

- Identify the optimal time for control of volunteer glyphosate-resistant corn in glyphosate-resistant sugarbeet.
- Evaluate two herbicide options for management of volunteer corn in glyphosate-resistant sugarbeet.

## Materials and Methods

- Field research conducted at two locations in 2012 & 2013
  - MSU Agronomy Farm, East Lansing, MI
  - SVREC, Richville, MI
- RCB design with factorial arrangement, 4 replications
- Sugarbeet seed: 'HM 173 RR' planted in 76 cm rows at 124,000 seeds ha<sup>-1</sup>
- Planting dates:
  - East Lansing: April 12, 2012 & May 3, 2013
  - Richville: April 4, 2012 & May 2, 2013
- 'F<sub>2</sub>' glyphosate-resistant volunteer corn planted at 17,220 plants ha<sup>-1</sup> (1.7 plants m<sup>-2</sup>), 13 cm off sugarbeet row
- Herbicide treatments are listed in Table 1

**Table 1.** Herbicide rates and application timings

Removal timing	clethodim <sup>a</sup>	quizalofop <sup>ab</sup>
V2 corn	105 g ha <sup>-1</sup>	28 g ha <sup>-1</sup>
V4 corn	105 g ha <sup>-1</sup>	28 g ha <sup>-1</sup>
V6 corn	158 g ha <sup>-1</sup>	35 g ha <sup>-1</sup>
V8 corn	158 g ha <sup>-1</sup>	35 g ha <sup>-1</sup>
V10 corn	210 g ha <sup>-1</sup>	56 g ha <sup>-1</sup>

<sup>a</sup> Glyphosate 0.84 kg ha<sup>-1</sup> + AMS 2% w/w

<sup>b</sup> Non-ionic surfactant 0.125% v/v

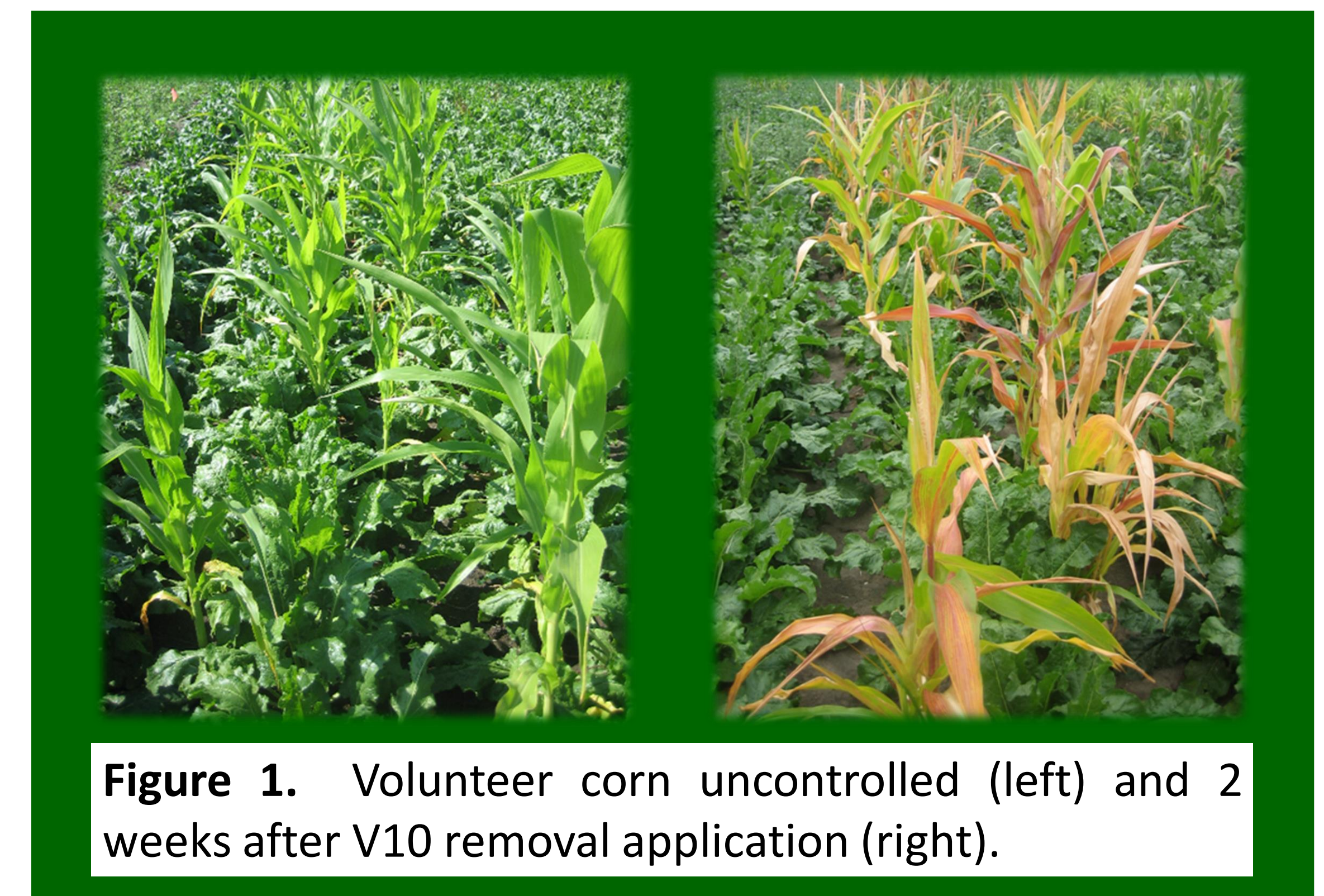
- Plots kept weed free with glyphosate (0.84 kg a.e. ha<sup>-1</sup>)
- Measurements:
  - Volunteer corn control
  - Volunteer corn biomass (prior to harvest)
  - Sugarbeet yield
  - Recoverable white sucrose per hectare (RWSHa)
- Analyzed with PROC MIXED in SAS
- Interactions tested
- Means separated with Fisher's Protected LSD at p ≤ 0.05
  - Volunteer corn control
  - Volunteer corn biomass (prior to harvest)
  - Sugarbeet yield
  - Recoverable white sucrose per hectare (RWSHa)

## Results and Discussion

- Clethodim and quizalofop were equally effective for volunteer corn control, so results were combined over herbicides (Table 2).
- Volunteer corn was most effectively controlled when it was treated at the V2, V4, or V6 growth stages. Volunteer corn control of applications made to V8 corn ranged from 71 to 91%, and volunteer corn was not effectively controlled with applications to V10 corn (Table 2, Fig. 1).
- Data are presented separately by year and location due to interactions.
- Sugarbeet yield and RWSHa were not impacted by volunteer corn at Richville in 2012. This may be due to minimal early-season precipitation that resulted in limited corn growth (data not shown).
- At East Lansing in 2012, if volunteer corn was controlled at any time (V2-V10) sugarbeet yield and RWSHa was equivalent or higher than the no volunteer corn control. Only volunteer corn that was not controlled caused reductions (Table 3).
- At East Lansing in 2013, yield was reduced 13% when volunteer corn was not controlled and reductions in RWSHa started at the V8 application timing compared with the no corn control (Table 3).
- The greatest reduction in sugarbeet yield and RWSHa due to volunteer corn time of control occurred at Richville in 2013 (Table 3). Yield and RWSHa was reduced starting at the V4 application timing compared with the no volunteer corn control with reductions of 10 and 11%, respectively. Yields and RWSHa were even further reduced if herbicide applications did not occur until V10 corn.

**Table 2.** Volunteer corn control (2 WAT).

Removal time	East Lansing		Richville	
	2012	2013	2012	2013
V2	99 A	99 A	99 A	99 A
V4	98 A	99 A	98 A	99 A
V6	98 A	97 A	95 B	99 A
V8	91 B	71 B	82 C	91 B
V10	73 C	43 C	76 D	39 C



**Figure 1.** Volunteer corn uncontrolled (left) and 2 weeks after V10 removal application (right).

**Table 3.** Effect of herbicide application timings on sugarbeet yield and RWSHa at East Lansing and Richville.

Removal time	East Lansing				Richville	
	2012		2013		2013	
	Yield (Mg ha <sup>-1</sup> )	RWSHa (kg ha <sup>-1</sup> )	Yield (Mg ha <sup>-1</sup> )	RWSHa (kg ha <sup>-1</sup> )	Yield (Mg ha <sup>-1</sup> )	RWSHa (kg ha <sup>-1</sup> )
No corn	48.0 B	6355 B	70.9 A	9493 A	49.0 A	7542 A
V2	49.1 B	6477 B	68.5 A	8656 ABC	45.4 AB	6796 AB
V4	50.7 AB	6841 AB	68.4 A	8853 AB	44.3 B	6738 B
V6	54.9 A	7496 A	68.2 A	8862 AB	43.5 B	6701 B
V8	46.6 B	6229 B	65.1 AB	8382 BC	43.2 B	6585 B
V10	48.4 AB	6724 B	64.3 AB	8266 BC	32.2 C	4927 C
Untreated	34.3 C	4665 C	61.4 B	7838 C	30.6 C	4599 C

## Conclusions

- Clethodim and quizalofop should be used for control of glyphosate-resistant volunteer corn in sugarbeet.
- While there was some variability in yield loss due to volunteer corn, applications prior to V4 corn were able to maximize sugarbeet yield and recoverable white sucrose.

## Acknowledgements

