

Management of Glyphosate-resistant Waterhemp

RFR-A1381

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Introduction

Waterhemp that is no longer effectively controlled by glyphosate is becoming more common in many fields in Iowa. It also is becoming more common for herbicides with other modes of action to be ineffective against this troublesome weed. Farmers need to be aware of management systems to prevent this resistance problem from occurring in their fields and to know how to deal with the problem.

Materials and Methods

The entire experimental area received an application of 22 oz/acre Roundup PowerMax (glyphosate) plus 16 oz/acre 2,4-D ester + 3 lb/acre ammonium sulfate (AMS) at the same time the preplant (PP) applications were made on May 13. No waterhemp had emerged at this date. Soybeans were planted no-till on May 24, with a blend of Roundup Ready and Liberty Link soybeans at a population of approximately 250,000 seeds/acre because of the inability to find an appropriate maturity soybean variety that contained both traits. Early post (EP) applications were sprayed on June 13 to VC soybeans when the waterhemp was 0.5-2 in. tall (1-6 leaves). Late postemergence (LP) treatments were sprayed on June 25 to V3 soybeans. Waterhemp was 0.5-8 in. tall (2-15 leaves) in plots that had not received an EP application and 0.5-3 in. tall (1-8 leaves) in previously sprayed plots.

All treatments were applied to 10 × 25 ft (4-row) plots arranged in a randomized complete

block design with three replications.

Applications were made with a CO₂ backpack sprayer using a carrier volume of 20 GPA.

Plots were evaluated for waterhemp control in late June, mid-July, and early August.

Results and Discussion

At the time the study was planned, it was not known that there was glyphosate resistant waterhemp on the research farm, but the results of the study indicate some waterhemp present in the experimental area could not be effectively controlled with the labeled rate of glyphosate. Neither the split application of 22 oz/acre Roundup PowerMax to 0.5-3 in. waterhemp, nor the single application of 32 oz/acre Roundup PowerMax to 0.5-8 in. waterhemp provided acceptable control of the weed. See Table 1 for details. It was apparent the glyphosate gave complete control of some of the waterhemp population, but had little effect on other waterhemp plants. Adding Warrant (acetochlor) or Warrant plus Flexstar (fomesafen) to the glyphosate provided better than 90 percent control of the weed (Treatments 4 and 5).

Most systems including soil-applied preplant herbicides followed by Roundup, Touchdown, or Flexstar provided good control of waterhemp. Systems that included products containing PPO-inhibitor herbicides (Authority MTZ, Valor XLT) provided good control of waterhemp. Most systems including Liberty (glufosinate) provided about 80-90 percent control of the weed. Raptor (imazamox) provided little control, showing this population of waterhemp also is resistant to the ALS-inhibitors.

Table 1. Glyphosate-resistant waterhemp control with various herbicides.

No.	Treatment ^a	Oz/A (fl or dry)	Timing ^b	Waterhemp control (%)		
				Jun 25	Jul 10	Aug 6
1	WEEDY CHECK			0	0	0
2	Roundup PowerMax	22	EP	93	87	72
	Roundup PowerMax	22	LP			
3	Roundup PowerMax	32	LP	0	75	68
4	Roundup PowerMax	22	EP	99	91	93
	Warrant	48	EP			
5	Roundup PowerMax	22	EP	99	99	99
	Warrant	48	EP			
	Flexstar	20	EP			
6	Valor XLT	4	PP	99	99	99
	Roundup PowerMax	22	LP			
	Flexstar	24	LP			
7	Authority MTZ	18	PP	86	99	98
	Roundup PowerMax	22	LP			
	Flexstar	24	LP			
8	Liberty	28	EP	80	86	83
	Liberty	28	LP			
9	Boundary	40	PP	70	87	80
	Liberty	32	LP			
10	Prowl 3.3EC	48	PP	87	93	87
	Sencor	16	PP			
	Liberty	32	LP			
11	Optill	2	PP	56	85	68
	Liberty	32	LP			
12	Zidua	2.5	PP	91	90	78
	Liberty	32	LP			
13	Prefix	32	EP	99	99	96
	Touchdown	32	LP			
14	Raptor	5	LP	0	35	37
	Select	8	LP			
15	Authority MTZ	18	PP	83	99	99
	Flexstar	20	LP			
	Select	8	LP			
LSD (0.05)				--	13	14

^aThree lb/acre of ammonium sulfate AMS was included with all Roundup, Liberty, and Touchdown applications and other additives called for on the pesticides labels were also included (crop oil concentrate, methylated seed oil, non-ionic surfactant).

^bPP=preplant, EP=early postemergence, LP=late postemergence.