

WEED CONTROL IN ROUNDUP®-RESISTANT SUGAR BEETS

Corey V. Ransom and Joey K. Ishida
Malheur Experiment Station
Oregon State University
Ontario, OR, 2000

Introduction

Rates and timings of Roundup Ultra were evaluated to determine the most effective weed control in Roundup-resistant sugar beets. Research also was conducted to determine how Roundup Ultra compared to the registered sequential herbicide treatments currently used in the Treasure Valley.

Methods

A trial was established at the Malheur Experiment Station. The field soil type was silt loam with pH 7.6 and 1.4 percent organic matter. Roundup-resistant sugar beets ('HM 127 RR') were planted on April 12 using a tool bar planter with 22-inch row spacing. Seeds were planted every 2 inches and subsequently thinned to an 8-inch spacing. Trials were designed as randomized complete blocks with four replications. Plots were four rows wide and 27-ft long. Counter 20 CR was applied in a 6-inch band over the row at 6 oz/1,000 ft after planting. On May 22, plots were sidedressed with 240 lb N/acre as urea. Herbicide applications were made with a CO₂-pressurized backpack sprayer delivering 20 gal/acre at 30 psi. Yields were determined by harvesting sugar beets from the center two rows of each plot on October 4. Sugar beet yields were adjusted for a 5 percent tare.

Treatments with single applications included Roundup Ultra at 0.375 and 0.75 lb ae/acre applied to two-leaf and four-leaf beets and Roundup Ultra (0.75 lb ae/acre) plus Nortron (1.0 lb ai/acre) applied to four-leaf beets. Roundup Ultra was applied at three different rates (0.25, 0.375, and 0.75 lb ae/acre) and at different stages of sugar beet growth. Initial applications were made to cotyledon, two-leaf, or four-leaf sugar beets. For treatments with sequential Roundup Ultra timings, second applications were made 10, 20, or 30 days after the first application. For treatments with three application dates, the third Roundup Ultra treatment was applied 10 days after the second treatment. Treatments including Roundup Ultra were compared to a standard sequential herbicide treatment of Progress (0.33 lb ai/acre) plus Upbeet (0.0156 lb ai/acre) at the cotyledon stage followed by Progress, Upbeet, and Stinger (0.094 lb ai/acre) applied 10 and 20 days after the initial treatment.

Results

On June 12 redroot pigweed and hairy nightshade control was excellent for all herbicide treatments (91-100 percent) (Table 1). Roundup Ultra (0.375 lb ae/acre) applied once to four-leaf beets provided significantly lower common lambsquarter control than all other treatments. Roundup Ultra (0.375 lb ae/acre) applied at the two-leaf stage and 10 days after the initial treatment appeared to be weak on barnyardgrass (75 percent). On June 26, redroot pigweed, common lambsquarter, and barnyardgrass control with Roundup Ultra (0.375 lb ae/acre) applied once to four-leaf beets was significantly lower than all other treatments (data not shown). By July 18 all Roundup Ultra treatments with multiple applications and the Progress, Upbeet, and Stinger treatment provided excellent weed control for all weed species. Roundup Ultra at the low rate applied once to four-leaf beets continued to be among the poorest treatment for all weeds.

On June 12, Roundup Ultra (0.75 lb ae/acre) plus Nortron (1.0 lb ai/acre) applied once to four-leaf beets and the standard treatment of Progress, Upbeet, and Stinger applied 3 times were among the treatments with the highest sugar beet injury (16 percent). Roundup Ultra (0.375 lb ae/acre) applied to two-leaf beets and again 10 days after the initial treatment and Roundup Ultra (0.75 lb ae/acre) applied once at the four-leaf beet stage also had crop injury greater than the untreated check.

Roundup Ultra (0.375 lb ae/acre) applied once at the four-leaf stage had sugar beet root yields significantly lower than all other herbicide treatments. This can be attributed to weed competition relating to what appeared to be lower weed control than all other herbicide treatments on July 18. All herbicide treatments provided yields that were significantly higher than the untreated check.

Table 1. Weed control, sugar beet injury, and sugar beet root yields in response to Roundup Ultra rates and timings, Malheur Experiment Station, Oregon State University, Ontario, OR, 2000.

Treatment	Rate lb ai/acre	Timing* Leaf DAIT	Beet injury† %	Weed control								Sugar beet root yield‡ ton/ acre
				Redroot pigweed		Lambs- quarters		Hairy nightshade		Barnyard- grass		
				6-12	7-18	6-12	7-18	6-12	7-18	6-12	7-18	
Roundup Ultra	0.75	2-lf 20 DAIT	4	100	99	100	98	99	100	100	99	39.2
Roundup Ultra	0.75	2-lf 30 DAIT	3	100	100	100	99	100	100	100	100	39.9
Roundup Ultra	0.75	4-lf 20 DAIT	3	100	100	100	100	100	100	100	100	39.6
Roundup Ultra	0.75	4-lf 30 DAIT	4	100	100	100	100	100	100	98	100	38.4
Roundup Ultra	0.375	2-lf 20 DAIT	4	96	100	98	99	100	100	95	100	37.5
Roundup Ultra	0.375	4-lf 30 DAIT	8	100	95	94	85	100	100	100	96	39.2
Roundup Ultra	0.375	2-lf 10, 20 DAIT	10	100	100	97	99	100	100	75	98	40.0
Roundup Ultra	0.375 0.75	2-lf 30 DAIT	5	93	100	100	99	100	100	95	100	38.5
Roundup Ultra	0.25	cotyledon 10, 20 DAIT	3	98	96	96	91	100	100	100	99	38.1
Roundup Ultra	0.75	2-lf	5	100	90	96	89	100	91	100	84	33.8
Roundup Ultra	0.75	4-lf	10	98	87	96	87	100	97	98	91	37.1
Roundup Ultra	0.375	4-lf	8	95	74	75	65	95	89	90	74	27.5
Roundup Ultra + Nortron	0.75 + 1.0	4-lf	16	91	84	94	87	95	95	93	86	35.8
Progress + Upbeet	0.33 + 0.0156	cotyledon	16	94	90	91	91	98	100	98	100	36.9
Progress + Upbeet + Stinger	0.33 + 0.0156 + 0.094	10, 20 DAIT										
Untreated			0	0	0	0	0	0	0	0	0	4.6
LSD (0.05)			8	9	8	9	10	6	8	20	12	3.5

*Treatments were initially applied to cotyledon, two-leaf (2-lf), or four-leaf (4-lf) sugar beets and followed by one or two subsequent applications 10, 20, or 30 days after the initial application (DAIT).

†Crop injury was rated on June 12.

‡Sugar beets were harvested on October 4.