

# APPLICATION TIMINGS WITH OUTLOOK® AND DUAL MAGNUM® IN ROUNDUP®-RESISTANT SUGAR BEETS

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## Introduction

Roundup effectively controls weeds in Roundup-resistant sugar beets. However, Roundup does not have soil-residual activity and does not control weeds that germinate after the herbicide is applied. Adding a soil-active herbicide to postemergence herbicide applications may provide suppression of germinating weeds and reduce problems with late emerging weeds. Outlook and Dual Magnum have been evaluated for use in conventional sugar beets. A trial was conducted to evaluate Roundup-resistant sugar beet tolerance to Outlook and Dual Magnum, and to determine if the addition of either soil-active herbicide would improve weed control.

## Methods

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 three 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 CO<sub>2</sub>-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.

Outlook and Dual Magnum were applied at various application timings combined with either a standard herbicide treatment of Progress (0.25 lb ai/acre) plus Upbeet (0.0156 lb ai/acre) or with Roundup Ultra (0.75 lb ae/acre). Outlook or Dual Magnum was applied at either the early postemergence (EP) or mid postemergence (MP) timing with the standard treatment, and at the EP, MP, and late postemergence (LP) timing with Roundup Ultra. The combinations with Outlook or Dual Magnum were compared to the standard applied three times or to Roundup Ultra applied either two or three times. EP applications were made on May 3 to two-leaf beets, MP treatments were made on May 18, and LP applications were made on May 31 to 6-inch-tall beets. Sugar beet injury and weed control were evaluated throughout the season.

## Results and Discussion

On June 12 all treatments provided excellent redroot pigweed control (93-100 percent) (Table 1). All treatments that included Roundup Ultra gave significantly better barnyardgrass control than any of the standard treatments of Progress plus Upbeet. On July 11 all Roundup Ultra treatments gave better redroot pigweed control than the standard treatments except for Progress plus Upbeet applied three times. All Roundup Ultra treatments provided better common lambsquarters control than the standard Progress plus Upbeet treatments. All treatments gave excellent hairy nightshade control (95-100 percent). Two applications of Roundup Ultra alone provided similar control to three applications. Because of the high level of control for all weed species achieved with Roundup Ultra alone, it was not possible to identify improved weed control by adding Outlook or Dual Magnum.

On June 12 all treatments had significantly greater injury than the untreated check except the Roundup Ultra applied alone two or three times and the Roundup Ultra applied early postemergence followed by Roundup Ultra plus Outlook (Table 2). The combinations of Progress plus Upbeet plus Outlook applied early postemergence followed by Progress plus Upbeet and Progress plus Upbeet applied three times were among the highest in crop injury (22 and 25 percent respectively).

Progress plus Upbeet applied three times and Progress plus Upbeet followed by Progress plus Upbeet plus Outlook resulted in significantly lower sugar beet root yields than any of the treatments that included Roundup Ultra. Progress plus Upbeet applied three times had among the lowest in root yield, which was likely attributed to the 25 percent injury recorded on May 12. There were no significant differences in root yield, gross sugar per acre, or estimated recoverable sugar per acre between Roundup Ultra treatments when applied alone or with the addition of Outlook or Dual Magnum.

Table 1. Weed control in response to application timings with Outlook and Dual Magnum in Roundup-resistant sugar beets, Malheur Experiment Station, Oregon State University, Ontario, OR, 2000.

Treatment	Rate	Timing*	Weed control							
			Redroot Pigweed		Lambs-quarters		Hairy nightshade		Barnyard-grass	
			6-12	7-11	6-12	7-11	6-12	7-11	6-12	7-11
	lb ai/acre		-----%							
Progress + Upbeet	0.25 + 0.0156	EP, MP, LP	93	97	94	84	95	100	63	80
Progress + Upbeet + Dual Magnum	0.25 + 0.0156 + 1.6	EP	93	90	87	87	92	98	79	99
Progress + Upbeet	0.25 + 0.0156	MP								
Progress + Upbeet	0.25 + 0.0156	EP	94	80	91	80	93	95	66	79
Progress + Upbeet + Dual Magnum	0.25 + 0.0156 + 1.6	MP								
Progress + Upbeet + Outlook	0.25 + 0.0156 + 0.64	EP	93	91	87	80	99	100	77	83
Progress + Upbeet	0.25 + 0.0156	MP								
Progress + Upbeet	0.25 + 0.0156	EP	96	90	90	85	93	100	77	72
Progress + Upbeet + Outlook	0.25 + 0.0156 + 0.64	MP								
Roundup Ultra	0.75	EP, MP, LP	100	100	100	100	100	100	100	100
Roundup Ultra + Dual Magnum	0.75 + 1.6	EP	100	100	100	100	100	100	100	100
Roundup Ultra	0.75	MP								
Roundup Ultra	0.75	EP	93	100	90	100	100	100	100	100
Roundup Ultra + Dual Magnum	0.75 + 1.6	MP								
Roundup Ultra	0.75	EP, MP, LP	100	100	100	100	100	100	100	100
Roundup Ultra + Dual Magnum	0.75 + 1.6	LP								
Roundup Ultra + Outlook	0.75 + 0.64	EP	100	100	100	100	100	100	100	100
Roundup Ultra	0.75	MP								
Roundup Ultra	0.75	EP	100	100	100	100	100	100	100	100
Roundup Ultra + Outlook	0.75 + 0.64	MP								
Roundup Ultra	0.75	EP, MP, LP	100	100	100	100	100	100	100	100
Roundup Ultra + Outlook	0.75 + 0.64	LP								
Roundup Ultra	0.75	EP, MP	93	100	95	100	100	100	100	98
Roundup Ultra + Dual Magnum	0.75 + 1.6	MP	100	100	100	99	100	100	100	100
Roundup Ultra + Outlook	0.75 + 0.64	MP	100	100	100	98	100	100	100	100
Untreated			0	0	0	0	0	0	0	0
LSD (0.05)			10	6	12	7	6	4	20	9

\*Treatments were applied early postemergence (EP), mid postemergence (MP), or late postemergence (LP). The EP, MP, and LP applications were on May 3, May 18, and May 31, respectively.

Table 2. Sugar beet yields in response to application timings with Outlook and Dual Magnum in Roundup resistant sugar beets, Malheur Experiment Station, Oregon State University, Ontario, OR, 2000.

Treatment	Rate	Timing*	Crop <sup>†</sup> injury	Sugar beet <sup>‡</sup>				
				Root yield	Sugar content	Gross sugar	Extraction	Est. Rec. sugar
				ton/acre	%	lb/acre	%	lb/acre
Progress + Upbeet	0.25 + 0.0156	EP, MP, LP	25	25.9	16.4	8,565	91.36	7,836
Progress + Upbeet + Dual Magnum	0.25 + 0.0156 + 1.6	EP	15	31.0	16.2	10,037	90.99	9,133
Progress + Upbeet	0.25 + 0.0156	MP						
Progress + Upbeet	0.25 + 0.0156	EP	10	30.5	16.5	10,080	91.29	9,203
Progress + Upbeet + Dual Magnum	0.25 + 0.0156 + 1.6	MP						
Progress + Upbeet + Outlook	0.25 + 0.0156 + 0.64	EP	22	29.6	16.5	9,823	90.92	8,938
Progress + Upbeet	0.25 + 0.0156	MP						
Progress + Upbeet	0.25 + 0.0156	EP	13	28.4	16.4	9,328	91.46	8,534
Progress + Upbeet + Outlook	0.25 + 0.0156 + 0.64	MP						
Roundup Ultra	0.75	EP, MP, LP	2	37.4	16.2	12,083	91.44	11,049
Roundup Ultra + Dual Magnum	0.75 + 1.6	EP	8	35.8	16.5	11,806	91.28	10,775
Roundup Ultra	0.75	MP						
Roundup Ultra	0.75	EP	16	36.8	16.3	11,960	91.61	10,950
Roundup Ultra + Dual Magnum	0.75 + 1.6	MP						
Roundup Ultra	0.75	EP, MP	8	37.0	16.5	12,251	91.41	11,198
Roundup Ultra + Dual Magnum	0.75 + 1.6	LP						
Roundup Ultra + Outlook	0.75 + 0.64	EP	16	36.9	16.4	12,064	91.37	11,023
Roundup Ultra	0.75	MP						
Roundup Ultra	0.75	EP	6	37.2	16.5	12,292	91.63	11,264
Roundup Ultra + Outlook	0.75 + 0.64	MP						
Roundup Ultra	0.75	EP, MP	13	35.3	16.5	11,642	90.80	10,571
Roundup Ultra + Outlook	0.75 + 0.64	LP						
Roundup Ultra	0.75	EP, MP	2	37.4	16.0	11,996	90.79	10,891
Roundup Ultra + Dual Magnum	0.75 + 1.6	MP	17	36.4	16.2	11,817	90.94	10,745
Roundup Ultra + Outlook	0.75 + 0.64	MP	8	36.2	16.6	12,003	90.37	10,848
Untreated			0	9.8	16.6	4,151	91.16	3,794
LSD (0.05)			8	6.4	NS	2,232	NS	2,058

\*Treatments were applied early postemergence (EP), mid postemergence (MP), or late postemergence (LP). The EP, MP, and LP applications were on May 3, May 18, and May 31, respectively.

<sup>†</sup>Crop injury was rated on June 12.

<sup>‡</sup>Sugar beets were harvested on October 4.