

APPLICATION TIMING AND SUGAR BEET TOLERANCE WITH BAS 656 07 H AND DUAL MAGNUM IN ROUNDUP RESISTANT SUGAR BEETS

Corey V. Ransom, Joey K. Ishida, and Corey J. Guza
Malheur Experiment Station
Oregon State University
Ontario, Oregon, 1999

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. BAS 656 07 H and Dual II Magnum have been evaluated for use in conventional sugar beets, but not in Roundup resistant sugar beets. Trials were conducted to evaluate Roundup resistant sugar beet tolerance to BAS 656 07 H and Dual Magnum, and to determine if the addition of either soil-active herbicide would improve weed control.

Procedures

Roundup resistant sugar beets (HM Pillar RR) were planted on April 12 using a tool bar planter with a 22-inch row spacing. Seeds were planted to a 2-in spacing and subsequently thinned to an 8-in spacing. Trials were designed as randomized complete blocks with three or four replications. Plots were four rows wide and 27 ft long. Counter 20 CR was applied over the row at a rate of 6 oz/1,000 ft 1 day after planting. On June 15, plots were sidedressed with 210 lb N/acre as urea. Herbicide applications were made with a CO₂-pressurized backpack sprayer calibrated to deliver 20 gpa at 30 psi. Yield was determined by harvesting sugar beets from the center two rows of each plot on October 7. Sugar beet yields were adjusted for a 5 percent tare.

Application Timing of BAS 656 07 H and Dual Magnum

Dual Magnum and BAS 656 07 H 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 combined with Roundup Ultra (0.75 lb ae/acre). Dual Magnum or BAS 656 07 H were 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. The combinations with Dual Magnum and BAS 656 07 H were compared to the standard applied three times or to Roundup applied either two or three times. The EP, MP, and LP applications were made on May 10, 18, and 26, respectively. Sugar beet injury and weed control were evaluated throughout the season.

Sugar Beet Tolerance to BAS 656 07 H and Dual II Magnum

For the tolerance trial, all plots were maintained weed free. Sugar beet injury and yield were evaluated in response to postemergence applications of BAS 656 07 H at a typical use rate (0.64 lb ai/acre) and at 2 times (1.28 lb ai/acre) the typical use rate. Dual II Magnum also was evaluated at a typical use rate (1.3 lb ai/acre) and at 2 times (2.6 lb ai/acre) the standard use rate. All plots also were treated with Roundup at 0.75 lb ae/acre. Treatments were applied to 4-leaf sugar beets on May 18. Sugar beet injury was evaluated on May 25, June 2, June 15, and July 12.

Results and Discussion

Application Timing of BAS 656 07 H and Dual Magnum

Early sugar beet injury was increased by the addition of Dual magnum to the EP application and the addition of BAS 656 07 H to either the EP or MP applications of Progress plus Upbeet (Table 1). On June 2, sugar beet injury was greatest in the plot treated with three applications of Progress plus Upbeet. By June 21, only the EP application of Dual Magnum with Progress plus Upbeet and the LP applications of BAS 656 07 H and Dual Magnum with Roundup still were exhibiting slight sugar beet injury.

Roundup alone applied three times provided greater redroot pigweed, hairy nightshade, and annual sowthistle control than any of the Progress plus Upbeet combinations. Two applications of Roundup alone provided similar control to three applications. Because of the high level of control achieved with Roundup alone, it was not possible to identify improved weed control with the addition of BAS 656 07 H or Dual Magnum.

Roundup combinations with BAS 656 07 H or Dual Magnum applied at the MP or LP timing provided greater yields than treatments containing Progress plus Upbeet either with or without BAS 656 07 H or Dual Magnum. Sugar beet root yields were lower in plots treated with Progress plus Upbeet with the addition of BAS 656 07 H compared to plots treated with three applications of Progress plus Upbeet. This yield difference is likely attributable to the poorer redroot pigweed and annual sowthistle control with the BAS 656 07 H combinations. Sugar beet sugar content and extraction were not different among treatments, so differences in recoverable sugar (data not shown) were similar to differences in root yield.

Sugar Beet Tolerance to BAS 656 07 H and Dual II Magnum

Sugar beets treated with Dual II Magnum exhibited stunting on May 25. One week later, only the high rate of Dual II Magnum still was causing injury. On June 15, the high rates of BAS 656 07 H and Dual II Magnum exhibited slightly higher injury than the low rates of both products. By July 12, no significant injury was apparent for any of the treatments. Sugar beet yield was not reduced by BAS 656 07 H or Dual II Magnum, even when they were applied at twice the typical use rate. Beet sugar content and extraction, and recoverable sugar per acre or per ton of beets also were not different among treatments.

Table 1. Sugar beet injury, weed control, and sugar beet root yield in response to applications of Frontier and BAS 656 07 H, Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1999.

Treatment	Rate	Timing†	Crop injury			Weed control‡					Sugar beet root yield§	
			5-20	6-2	6-21	Redroot pigweed	Lambs-quarters	Hairy nightshade	Annual Sowthistle	Barnyardgrass		
	lb ai/acre		%									ton/acre
Progress + Upbeet	0.25 + 0.0156	EP, MP, LP	15	40	7	87	98	90	99	78	33.4	
Progress + Upbeet Dual Magnum	0.25 + 0.0156 1.6	EP, MP EP	42	18	12	75	88	85	93	88	31.2	
Progress + Upbeet Dual Magnum	0.25 + 0.0156 1.6	EP, MP MP	20	5	3	78	89	83	90	88	31.2	
Progress + Upbeet BAS 656 07 H	0.25 + 0.0156 0.64	EP, MP EP	42	10	3	75	80	83	90	83	29.1	
Progress + Upbeet BAS 656 07 H	0.25 + 0.0156 0.64	EP, MP MP	27	12	3	72	91	85	87	87	26.4	
Roundup	0.75	EP, MP, LP	0	0	5	99	100	100	100	99	35.9	
Roundup Dual Magnum	0.75 1.6	EP, MP EP	0	3	5	96	100	97	100	100	36.4	
Roundup Dual Magnum	0.75 1.6	EP, MP MP	2	2	3	97	98	97	100	100	38.5	
Roundup Dual Magnum	0.75 1.6	EP, MP, LP LP	0	15	12	100	100	100	100	97	37	
Roundup BAS 656 07 H	0.75 0.64	EP, MP EP	3	0	3	92	93	93	100	100	36.5	
Roundup BAS 656 07 H	0.75 0.64	EP, MP MP	0	2	5	97	100	99	100	100	37.9	
Roundup BAS 656 07 H	0.75 0.64	EP, MP, LP LP	0	17	13	100	100	100	100	100	37.8	
Roundup	0.75	EP, MP	0	2	3	98	97	88	98	95	35.9	
Untreated			0	0	0	0	0	0	0	0	10.9	
LSD (0.05)			8	6	8	7	11	9	8	11	3.2	

†Treatments were applied early postemergence (EP), Mid postemergence (MP), or Late postemergence (LP). The EP, MP, and LP applications were on May 10, May 18, and May 26, respectively.

‡Weed control was evaluated on June 21, except barnyardgrass, which was evaluated on July 27.

§Sugar beets were harvested on October 7.

Table 2. Tolerance of Roundup resistant sugar beets to BAS 656 07 H and Dual II Magnum under weed free conditions, Malheur Experiment Station, Oregon State University, Ontario, Oregon, 1999.

Treatment [†]	Rate lb ai/acre	Crop injury				Root yield [‡] ton/acre	Sugar %	Extraction %	Estimated recoverable sugar lb/acre
		5-25	6-2	6-15	7-12				
Handweeded		0	0	6	0	37.8	17.5	92.9	12,282
BAS 656 07 H	0.64	0	0	6	0	38.8	18.3	93.2	13,248
BAS 656 07 H	1.28	0	3	13	1	37.0	18.0	93.0	12,390
Dual II Magnum	1.3	5	0	3	6	38.3	18.0	93.0	12,855
Dual II Magnum	2.6	16	11	10	3	37.4	17.7	92.7	12,269
LSD (0.05)		2	7	6	NS	NS	NS	NS	NS

[†]All plots received Betamix (0.25 lb ai/acre) on April 24 and May 1. Treatments were applied to 6-leaf sugar beets on May 18.

[‡]Sugar beets were harvested on October 7.