

When and What Herbicides to Apply for Layby Weed Control in Sugarbeets.

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Objective: Determine the most effective herbicides, rates, and application timing for late season weed control in sugarbeets.

Background: Most of the herbicides applied postemergence to sugarbeets have a short life span once they reach the soil and therefore provide very little residual weed control. Weeds that germinate shortly after postemergence herbicides are applied escape treatment and go on to compete with the crop later in the growing season. To overcome this problem, growers have applied herbicides such as Eptam, Dual Magnum, or Outlook at early stages of crop growth in hopes that the herbicide will provide soil residual to control weeds that germinate later in the season. The effectiveness of layby herbicides is often affected by timing, rate, method of incorporation, uniform soil coverage, and selecting the right herbicide to control the weed problem. Experiments conducted by researchers in Europe suggest that one method of improving the performance of layby herbicides is to apply small amounts of the layby herbicide with each application of the postemergence herbicide program. This program has been called the FAR technique. The postemergence herbicide program has three components: F = foundation herbicide, Betamix; A = activator herbicide, Nortron; and R = residual herbicide, Goltix or Pyramin.

Procedure: The study was designed to measure sugarbeet injury and mid to late season weed control. Sugarbeet 'BTS-RZ03RR07' were planted on April 26. Nortron was applied preemergence to selected plots on April 27. The study area was irrigated with an overhead sprinkler on May 1, May 2, May 9, and May 22 to enhance sugarbeet seed germination and seedling establishment. Postemergence herbicide application was initiated on May 15 when sugarbeets were in the cotyledon growth stage (Table 1). Herbicides were applied with a tractor-mounted sprayer calibrated to deliver 20 gallons per acre at 32-psi pressure with Spraying Systems 11002 VS nozzles. Environmental conditions and weed growth stages at each of the herbicide application timings are given in Table 1. When sugarbeets were in the 4 true-leaf growth stage, they were

cultivated. The entire plot was treated with Roundup WeatherMax plus Select at 0.75 plus 0.125 lb/acre on May 30 and again on June 11 to kill any weeds that had emerged with the crop. Therefore, weed control measured in July would measure the residual benefit from the herbicides applied from April 27 to June 11. The sugarbeet stand in the plot area averaged 26,500 plants per acre which could be considered 82% of an optimum stand of approximately 32,000 plants/acre. The reduced stand allowed more sunlight to reach the soil surface and stimulate weed growth. Weed density in each plot was recorded on July 9. Weed counts were followed with a postemergence treatment of Roundup WeatherMax at 1.12 lb/acre on August 1 to kill emerged weeds. This allowed for a second evaluation of late season weed density on September 6.

Results: Nortron applied preemergence followed by Outlook postemergence at the 2, 4 or 6 true-leaf growth stage and Nortron preemergence followed by Dual magnum at the 2 or 4 true-leaf growth stage caused early season sugarbeet injury. The Micro-Rate in combination with Outlook or Dual Magnum also caused sugarbeet injury.

Common lambsquarters, redroot pigweed, hairy nightshade, common purslane, stinkgrass, green foxtail and longspine sandbur emerged in the plot area following the Roundup application on June 11. Several broad comparisons can be derived from the data collected on July 9. The average total weed density for the four Outlook treatments (110 plants/138 sq ft) was the same as the average of the four Dual Magnum treatments (110 plants/138 sq ft). There was a benefit from applying Nortron at planting followed by Dual Magnum postemergence compared to just applying Dual Magnum postemergence. Nortron applied at planting followed postemergence by Dual Magnum applied when sugarbeets were in the 8 true-leaf growth stage reduced the total late season weed density to the lowest level of 28 plants/138 sq ft which when compared to the nontreated equates to 91% control.

Dual Magnum was applied at a rate of 0.99 lb/acre as a single treatment. Combining Dual Magnum with the Micro-Rate resulted in a Dual Magnum rate of 0.33 lb/acre applied with Betamix plus Upbeet plus Stinger plus methylated seed oil at the 2, 4, and 6 true-leaf growth stages and represented the European FAR program. Weed density was again lower when Nortron was applied at planting and followed postemergence by the

FAR program compared to no Nortron at planting. If Nortron was applied at planting and followed postemergence with a single application of Dual Magnum at the 6 true-leaf growth stage weed density was similar to Dual Magnum applied three times in the FAR program.

The second flush of late-season weeds was measured on September 6 (Table 2) and was much lower than the first flush. The weed control trends observed with the second flush of weeds were similar to those observed on July 9.

The results from the first and second years of this study suggest that applying Nortron broadcast at planting provides both early and late season weed control. If sugarbeet stands are poor and late season weed growth is expected a postemergence application of Dual Magnum or Outlook at the 6 or 8 true-leaf growth stage would provide the best late-season weed control program.

Table 1. Environmental Conditions at the Time of Herbicide Application.

Date	Air temperature (F)	Humidity (%)	Wind speed & direction (mph)	Time of day	Crop growth stage	No weeds present
April 27	47	72	10 W	9:00 am	Preemergence	
May 15	51	70	7 NW	9:00 am	Cotyledon	
May 21	67	52	5 SE	9:00 am	2 true-leaves	
May 30	54	86	2 NW	8:30 am	4 true-leaves	
June 5	58	75	4 SE	9:00 am	6 true-leaves	
June 11	72	58	3 SE	8:30 am	8 true-leaves	

Rainfall before and after herbicide application:

Date	Amount - (inches) -	Date	Amount - (inches) -	Date	Amount - (inches) -
April 24	0.30	May 5	0.29	June 6	0.75
April 26	0.04	May 9	0.50	June 7	0.08
May 1	0.75	May 21	0.23	June 12	0.08
May 2	0.40	May 22	0.75	June 16	0.05
May 3	0.26	May 29	0.23	June 18	0.85

Table 2. When and What Herbicides to Apply for Layby Weed Control in Sugarbeets at Scottsbluff, NE during the 2006 Growing Season.

Herbicide treatment	Sugarbeet																			
	Rate	Time of application	Visual injury			Stand 6/27	Yield 10/5	Sucrose	SLM	Weed Density 7/9 ¹							Weed density 9/6			
			6/3	6/12	6/20					Colq	Rrpw	Hans	Stgr	Copu	Grft	Lssb	Total	Colq	Copu	Total
(lb/acre)		---- (%) ----			(plants/acre)	(tons/acre)	(%)	----- (plants/137 sq ft) -----												
Nontreated	—	—	0	0	0	24900	39.3	13.1	1.8	36	6	36	27	97	106	5	317	11	8	19
Outlook	0.66	2 TL	7	3	2	19300	35.4	12.9	1.9	34	4	47	9	19	12	20	146	2	14	17
Outlook	0.66	4 TL	4	6	1	27200	39.8	13.3	1.8	12	2	12	0	12	2	37	93	1	3	5
Outlook	0.66	6 TL	1	4	3	27300	36.7	13.0	1.9	7	1	6	0	14	5	65	99	1	6	11
Outlook	0.66	8 TL	0	1	5	25100	33.7	13.5	1.8	21	7	5	0	12	26	0	102	7	2	11
Nortron	1.00	Pre																		
Outlook	0.66	2 TL	17	13	12	26300	34.5	13.2	2.0	11	1	46	1	18	86	6	169	4	1	6
Nortron	1.00	Pre																		
Outlook	0.66	4 TL	12	13	5	33300	39.3	13.5	1.8	16	2	102	1	49	21	3	194	1	0	2
Nortron	1.00	Pre																		
Outlook	0.66	6 TL	12	16	5	32900	38.1	13.5	1.7	28	1	42	0	31	6	0	108	6	3	11
Nortron	1.00	Pre																		
Outlook	0.66	8 TL	5	3	6	25400	42.7	13.1	1.9	17	4	41	0	9	14	2	96	3	6	9
Betamix + Upbeet + Stinger + MSO (<i>Micro-Rate</i>)	0.08 + 0.004 + 0.02	Cot																		
Betamix + Upbeet + Stinger + Outlook + MSO	0.08 + 0.004 + 0.02 + 0.22	2 TL																		
Betamix + Upbeet + Stinger + Outlook + MSO	0.08 + 0.004 + 0.02 + 0.22	4 TL																		
Betamix + Upbeet + Stinger + Outlook + MSO	0.08 + 0.004 + 0.02 + 0.22	6 TL	24	29	25	28000	31.2	13.0	1.9	17	7	47	0	51	109	12	244	3	5	8
Nortron	1.0	Pre																		
Micro-Rate	0.08 + 0.004 + 0.02	Cot																		
Micro-Rate + Outlook	0.08 + 0.004 + 0.02 + 0.22	2 TL																		
Micro-Rate + Outlook	0.08 + 0.004 + 0.02 + 0.22	4 TL																		
Micro-Rate + Outlook	0.08 + 0.004 + 0.02 + 0.22	6 TL	25	31	26	21700	31.2	13.4	1.9	14	2	6	4	15	85	26	155	2	2	4
Dual Magnum	0.99	2 TL	8	1	5	34900	39.3	13.9	1.7	39	3	16	0	56	4	1	126	2	2	4
Dual Magnum	0.99	4 TL	3	3	3	24200	33.9	13.0	1.9	14	0	36	0	29	4	10	99	1	3	9
Dual Magnum	0.99	6 TL	4	5	1	25700	41.8	13.5	1.9	15	0	11	0	6	15	5	60	1	1	4
Dual Magnum	0.99	8 TL	2	4	5	27500	35.2	12.8	2.0	26	6	12	0	34	3	1	82	20	3	26
Nortron	1.0	Pre																		
Dual Magnum	0.99	2 TL	17	5	6	24900	40.6	13.1	1.9	3	0	39	17	4	4	15	86	1	1	4

Sugarbeet																				
Herbicide treatment	Rate	Time of application	Visual injury			Stand 6/27	Yield 10/5	Sucrose	SLM	Weed Density 7/9 ¹							Weed density 9/6			
			6/3	6/12	6/20					Colq	Rrpw	Hans	Stgr	Copu	Grft	Lssb	Total	Colq	Copu	Total
		(lb/acre)	---- (%) ----			(plants/acre)	(tons/acre)	(%)	----- (plants/137 sq ft) -----											
Nortron	1.0	Pre																		
Dual Magnum	0.99	4 TL	9	10	5	28700	37.9	13.9	1.7	10	2	32	0	11	6	40	113	1	0	2
Nortron	1.0	Pre																		
Dual Magnum	0.99	6 TL	8	5	6	23000	34.5	13.0	1.9	6	4	8	0	5	2	37	62	1	1	3
Nortron	1.0	Pre																		
Dual Magnum	0.99	8 TL	5	3	2	30300	44.8	13.2	1.9	7	1	13	0	4	0	3	28	1	1	2
Micro-Rate	0.08 + 0.004 + 0.02	Cot																		
Micro-Rate + Dual Magnum	0.08 + 0.004 + 0.02 + 0.33	2 TL																		
Micro-Rate + Dual Magnum	0.08 + 0.004 + 0.02 + 0.33	4 TL																		
Micro-Rate + Dual Magnum	0.08 + 0.004 + 0.02 + 0.33	6 TL	23	24	18	22400	38.0	13.2	1.9	51	1	5	0	71	1	22	152	1	2	3
Nortron	1.0	Pre																		
Micro-Rate	0.08 + 0.004 + 0.02	Cot																		
Micro-Rate + Dual Magnum	0.08 + 0.004 + 0.02 + 0.33	2 TL																		
Micro-Rate + Dual Magnum	0.08 + 0.004 + 0.02 + 0.33	4 TL																		
Micro-Rate + Dual Magnum	0.08 + 0.004 + 0.02 + 0.33	6 TL	21	26	23	23900	31.4	13.2	1.9	36	2	7	3	3	3	10	62	2	1	3
LSD at 5%	—	—	8	8	9	NS	9.8	0.7	0.2	33	6	74	15	54	92	53	145	12	6	

¹ Weed density was measured on July 9 and then weeds were removed with Roundup, a second flush of weeds was measured on September 6. Weed abbreviations were as follows: common lambsquarters (Colq), redroot pigweed (Rrpw), hairy nightshade (Hans), stinkgrass (Stgr), common purslane (Copu), green foxtail (Grft) and longspine sandbur (Lssb).