EVALUATION OF PREEMERGENCE AND POSTEMERGENCE HERBICIDE APPLICATIONS ON SUGAR BEETS, 1997

Marvin Butler

Abstract

Evaluation of preemergence and postemergence herbicide applications on sugar beets was conducted in two commercial fields near Prineville and Culver, Oregon. Herbicides applied preemergence included Nortron (ethofumesate) and Pyramin (pyrazon). Herbicides applied postemergence were Upbeet (triflusulfuron) and Betamix (phenmedipham plus desmedipham). The most effective control of was provided by preemergence application of Nortron, Pyramin, or a combination of the two, followed by Betamix plus Upbeet applied at the cotyledon stage and 2 to 4 leaf stages.

Introduction

This is the third year of both commercial sugar beet production and herbicide trials conducted in the Prineville and Culver areas of central Oregon. This project conducted to evaluate herbicides applied preemergence and postemergence to sugar beets, focused on comparing two rates of Nortron (ethofumesate) and Pyramin (pyrazon) applied preemergence, and a comparison of preemergence-only, pre- and postemergence, and postemergence-only applications.

Methods and Materials

Preemergence treatments included Nortron and Pyramin, and a combination of Nortron and Pyramin. Postemergence applications included Betamix (phenmedipham plus desmedipham) plus Upbeet (triflumesate), and Betamix at half the normal rate plus Upbeet with crop oil concentrate at 1.5 % v/v. Treatments applied preemergence were made April 18 at Culver and April 17 at Prineville. This was followed by Gramoxone (paraquat) treatments to appropriate plots on April 29 at Prineville, while the crop at Culver emerged unexpectedly early so no application was made. Treatments applied postemergence were made at the cotyledon stage May 8 at Culver and May 16 in Prineville. The second postemergence treatments were made at the two-leaf stage May 14 at Culver and at the four-leaf stage May 27 at Prineville.

The Prineville location received freeze damage as the plants were beginning to emerge. The field was replanted, and Gramoxone was applied to the field prior to emergence of the replanting. Most of the trial was treated with the field Gramoxone application, expect for a three and a half plot wide strip through the middle.

Treatments were applied with a CO_2-pressurized, hand-held boom sprayer at 40 psi and 20-gal/a water. Plots 10 ft X 22 ft were replicated four times in a randomized complete block design. Treatments at the Culver location were evaluated for crop injury and percent control of common groundsel, common lambsquarters, redstem filaree, redroot pigweed, and kochia May 23 and August 1. Evaluation of treatments at the Prineville location were made June 10 and August 1

for redroot pigweed, prostrate knotweed, hairy nightshade, and common lambsquarters. The center row of each plot at the Culver location was harvested October 7, while the Prineville location was harvested October 17. Samples were weighed and **10** beet sub-samples evaluated for percent sugar and parts per million nitrate by Spreckles Sugar, Woodland, California.

Results and Discussion

At the Culver location (Table 1) all treatments provided excellent weed control, except the preemergence only applications with 69% control. Crop stunting was the highest, with 16% when crop oil was added to the Betamix plus Upbeet treatments. Nortron at 3 pt/a and Pyramin at 4.6 lb/a produced 13% crop stunting, while other treatments with both preemergence and postemergence applications produced 9 to 11% stunting. Since yields in hand-weeded plots were no different that those where herbicides were applied, it would appear than there is not across-the-board reduction in yield associated with herbicide treatments. There does not appear to be any consistent effect on yield associated with stunting early in the season.

Overall results for the Prineville location are provided in Table 2. Preemergence application of Nortron at 2 pt/a or 3 pt/a, Pyramin at 3 lb/a or 4.6 lb/a, or the combination of Nortron at 1.5 pt/a plus Pyramin at 1.25 lb/a followed by Betamix plus Upbeet provided excellent weed control. Preemergence only application of Nortron plus Pyramin provided only 84 to 85% control.

When postemergence applications were made at Prineville, weeds in plots that did not receive the commercial Gramoxone application after replanting were larger than weeds in plots where Gramoxone was applied. This provided a comparison of weed control under timely application and late application scenarios (Table 3 and Table 4). However, it should be noted that not all treatments were represented in each situation and the number of replications in each was not consistent.

For the postemergence only application of Betamix plus Upbeet, weed control was 88% in plots receiving the field Gramoxone treatment, and only 60% in plots not field-treated with Gramoxone where the weeds were larger. Similar results occurred when the rate of Betamix was cut in half, and crop oil concentrate was added: weed control dropped from 98 to 80%. Gramoxone as a planned treatment was less effective when postemergence treatments were not timely, with a reduction in weed control from 97 to 82% when postemergence herbicide treatments were late.

Redroot pigweed appeared to be the most difficult weed to control for treatments not including Nortron or Pyramin applied preemergence. At the Culver location, the weed spectrum was 45% common lambsquarters, 37% common groundsel, 10% redroot pigweed, 4%, and 4% redstem filaree. At the Prineville location, the weed spectrum included 38% redroot pigweed, 22% prostrate knotweed, 20% common lambsquarters, and 20% hairy nightshade.

Table 1. Effect of herbicide applications on sugar beets near Culver, OR, evaluated May 23, 1997.

Treatments[2]	Application Timing (amount/a)			Percent Weed Control'										Yield	
	Preemergence	Cotyledon	Two-leaf	Groundsel		Lambsquarter		Filaree		Pigweed		Kochia		Average		Tons/ac	
1. Nortron	1.5 pt			95	B	72	b	33	b	80	b	92	a	74	b	36.9	a
Pyramin	1.25 lb																
2. Nortron	1.5 pt			100	a	100	a	100	a	100	a	100	a	100	a	46.0	a
Pyramin	1.25 lb																
Betamix		1.5 pt	2.0 pt														
Upbeet		0.5 oz	0.5 oz														
3. Nortron	2.0 pt			100	a	100	a	100	a	100	a	100	a	100	a	41.3	a
Betamix		1.5 pt	2.0 pt														
Upbeet		0.5 oz	0.5 oz														
4. Nortron	3.0 pt			100	a	100	a	100	a	100	a	100	a	100	a	39.9	a
Betamix		1.5 pt	2.0 pt														
Upbeet		0.5 oz	0.5 oz														
5. Pyramin	3.0 lb			100	a	100	a	100	a	100	a	100	a	100	a	37.1	a
Betamix		1.5 pt	2.0 pt														
Upbeet		0.5 oz	0.5 oz														
6. Pyramin	4.6 lb			100	a	100	a	100	a	100	a	100	a	100	a	39.8	a
Betamix		1.5 pt	2.0 pt														
Upbeet		0.5 oz	0.5 oz														
7. Betamix		1.5 pt	2.0 pt	100	a	100	a	100	a	100	a	100	a	100	a	40.6	a
Upbeet		0.5 oz	0.5 oz														
8. Betamix		1.5 pt	2.0 pt	100	a	100	a	99	a	100	a	100	a	100	a	39.5	a
Upbeet		0.5 oz	0.5 oz														
9. Betamix		0.75 pt	1.0 pt	100	a	99	a	100	a	99	a	98	a	99	a	37.7	a
Upbeet		0.5 oz	0.5 oz														
Crop Oil		1.5 %	1.5 %														
10. Untreated				0	c	0	c	0	b	0	c	0	b	0	c	19.0	b
11. Hand Weeded				100	a	100	a	100	a	100	a	100	a	100	a	39.1	a

'Visual evaluation was conducted May 23, 1997.
[2]Treatments were applied April 18, May 8, and May 14, 1997.

Table 2. Effect of herbicide application on sugar beets near Prineville, OR, evaluated June 9, 1997.

Treatments'	Application Timing (amount/a)			Percent Weed Control'									Yield	
	Preemergence	Cotyledon	Two-leaf	Pigweed		Prostrate Knotweed		Nightshade		Lambsquarter		Average	Tons/ac	
1. Nortron	1.5 pt			92	a	98	a	73	b	92	a	89	31.4	a
Pyramin	1.25 lb													
2. Nortron	1.5 pt			100	a	98	a	100	a	100	a	100	36.2	a
Pyramin	1.25 lb													
Betamix		1.5 pt	2.0 pt											
Upbeet		0.5 oz	0.5 oz											
3. Nortron	2.0 pt			100	a	99	a	100	a	100	a	100	36.2	a
Betamix		1.5 pt	2.0 pt											
Upbeet		0.5 oz	0.5 oz											
4. Nortron	3.0 pt			100	a	98	a	100	a	100	a	100	37.0	a
Betamix		1.5 pt	2.0 pt											
Upbeet		0.5 oz	0.5 oz											
5. Pyramin	3.0 lb			100	a	100	a	100	a	100	a	100	33.5	a
Betamix		1.5 pt	2.0 pt											
Upbeet		0.5 oz	0.5 oz											
6. Pyramin	4.6 lb			100	a	98	a	100	a	100	a	100	34.0	a
Betamix		1.5 pt	2.0 pt											
Upbeet		0.5 oz	0.5 oz											
7. Gramoxone	1.5 pt			100	a	88	a	100	a	98	a	97	34.5	a
Betamix		1.5 pt	2.0 pt											
Upbeet		0.5 oz	0.5 oz											
8. Betamix		1.5 pt	2.0 pt	93	a	43	b	94	a	93	a	81	35.1	a
Upbeet		0.5 oz	0.5 oz											
9. Betamix		0.75 pt	1.0 pt	93	a	88	a	93	a	92	a	92	33.5	a
Upbeet		0.5 oz	0.5 oz											
Crop Oil		1.5%	1.5%											
10. Untreated				0	b	0	c	0	c	0	b	0	11.6	b

'Visual evaluation was conducted May 23, 1997.
'Treatments were applied April 17, May 16, and May 27, 1997.

Table 3. Effect of herbicide application, without preemergence Gramoxone, on sugar beets near Prineville, OR, evaluated June 9, 1997.

Treatments'	Application Timing (amount/a) Preemergence	Cotyledon	Two-leaf	Percent Weed Control' Pigweed	Prostrate Knotweed	Nightshade	Lambsquarter	Average
1. Nortron	1.5 pt			85	85	85	85	85
Pyramin	1.25 lb							
2. Nortron	1.5 pt			100	100	100	95	99
Pyramin	1.25 lb							
Betamix		1.5 pt	2.0 pt					
Upbeet		0.5 oz	0.5 oz					
3. Nortron	2.0 pt							
Betamix		1.5 pt	2.0 pt					
Upbeet		0.5 oz	0.5 oz					
4. Nortron	3.0 pt			100	100	100	90	98
Betamix		1.5 pt	2.0 pt					
Upbeet		0.5 oz	0.5 oz					
5. Pyramin	3.0 lb			100	100	100	100	100
Betamix		1.5 pt	2.0 pt					
Upbeet		0.5 oz	0.5 oz					
6. Pyramin	4.6 lb			100	100	100	98	100
Betamix		1.5 pt	2.0 pt					
Upbeet		0.5 oz	0.5 oz					
7. Gramoxone	1.5 pt			95	93	93	45	82
Betamix		1.5 pt	2.0 pt					
Upbeet		0.5 oz	0.5 oz					
8. Betamix		1.5 pt	2.0 pt	80	80	80	0	60
Upbeet		0.5 oz	0.5 oz					
9. Betamix		0.75 pt	1.0 pt	80	80	80	80	80
Upbeet		0.5 oz	0.5 oz					
Crop Oil		1.5%	1.5%					
10. Untreated				0	0	0	0	0

'Visual evaluation was conducted May 23, 1997.

'Treatments were applied April 17, May 16, and May 27, 1997.

Table 4. Effect of herbicide application, with preemergence Gramoxone, on sugar beets near Prineville, OR, evaluated June 9, 1997.

Treatments'	Application Timing (amount/a)			Percent Weed Control'				
	Preemergence	Cotyledon	Two-leaf	Pigweed	Prostrate Knotweed	Nightshade	Lambsquarter	Average
1. Nortron	1.5 pt			93	93	50	100	84
Pyramin	1.25 lb							
2. Nortron	1.5 pt			100	100	100	99	100
Pyramin	1.25 lb							
Betamix		1.5 pt	2.0 pt					
Upbeet		0.5 oz	0.5 oz					
3. Nortron	2.0 pt			100	100	100	99	100
Betamix		1.5 pt	2.0 pt					
Upbeet		0.5 oz	0.5 oz					
4. Nortron	3.0 pt			100	100	100	100	100
Betamix		1.5 pt	2.0 pt					
Upbeet		0.5 oz	0.5 oz					
5. Pyramin	3.0 lb			100	100	100	100	100
Betamix		1.5 pt	2.0 pt					
Upbeet		0.5 oz	0.5 oz					
6. Pyramin	4.6 lb			100	100	100	98	100
Betamix		1.5 pt	2.0 pt					
Upbeet		0.5 oz	0.5 oz					
7. Gramoxone	1.5 pt			100	98	100	88	97
Betamix		1.5 pt	2.0 pt					
Upbeet		0.5 oz	0.5 oz					
8. Betamix		1.5 pt	2.0 pt	100	97	99	57	88
Upbeet		0.5 oz	0.5 oz					
9. Betamix		0.75 pt	1.0 pt	100	98	100	93	98
Upbeet		0.5 oz	0.5 oz					
Crop Oil		1.5%	1.5%					
10. Untreated				0	0	0	0	

'Visual evaluation was conducted May 23, 1997.
'Treatments were applied April 17, May 16, and May 27, 1997.