Research Report to the
Agricultural Research Foundation
and the
Oregon Processed Vegetable Commission
2004

Title: Weed Control in Table Beets

Project leader
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The main objective of this experiment was to determine the potential of using Dual Magnum herbicide for weed control in table beets. Secondary objectives were to evaluate the potential of using Upbeet, Betanex, and Betamix as sequential micro-rate applications.

Methods

Field experiments were placed at a site near Jefferson and at the OSU Vegetable Research Farm. Weed control was the main objective at the Jefferson site, while crop tolerance to Dual Magnum herbicide under wet soil conditions was the primary objective at the research farm.

At Jefferson, PPI herbicides were applied on April 27 and incorporated within 2 minutes with a 16 inch disk. Beets were planted on 18 inch rows on April 29 and PPS (post-plant surface) treatments applied the next day. Plots were 4 rows wide with 24 inches between beds and 30 ft long. Herbicides were incorporated with irrigation water shortly after planting. POST1-3 treatments were applied at the cotyledon, 2-leaf, or 4-leaf stage depending on treatment. Crop injury was evaluated at 4 and 5 WAP, and weed control at 5 WAP and at harvest. Beets were harvested on August 12 from one 2.5 m section of each row in the middle of the plot, graded, and weighed. A field day was held on June 16.

At Corvallis, the soil was a silt loam with an OM content of 4.91% and a CEC of 21.5 meq/100g of soil. Granular fertilizer (435 Lbs 12-29-10) and Roneet herbicide (4pts/A) were broadcast on May 12. The soil was tilled within 5-10 minutes after the Roneet application. Table beets were planted on May 17 with a Gaspardo vacuum precision planter with a 2" spacing between seedlings. Plots were 32' long and four rows wide with 18" between rows and 2' between the outside rows of each plot. Additional fertilizer (260 lbs 12-29-10) was dribbled on the surface between rows at planting. Rain (0.42 inches) fell on May 18 one day after planting. Preemergence herbicides were applied on May 19 to very wet soil. Pyramin was applied to all plots to help reduce weed competition with the crop. Irrigation (0.6 in.) was applied on May 20 to incorporate the PES herbicides. The plots were kept relatively wet through the early season to maximize potential effects of Dual Magnum on beet growth. Another 1.20 in. of irrigation water was applied on June 3 following application of the EPOST herbicides on June 1, and 1.01 in. of rain fell from June 6 to June 10. POST herbicides of Spinaid and Aim were applied on June 12 to 4-leaf seedlings. Stand counts were made on June 14 from 6.5 ft of row. Growth reduction estimates due to herbicides were made on June 11 and 23. Beets were harvested on July 30 from 8.2' of one middle row in each plot. Tops were removed and beets were graded to size as follows: <1" dia., Grade 1 (1"-1 5/8"), Grade 2 (1 5/8"-2 5/8), Grade 3 (2 5/8" - 3.5"), and >3.5".

Results

Jefferson (Tables 1-4, Figures 1 and 2). Weed control estimates at harvest accounted for approximately 60% of the yield variability. Dual Magnum PPS alone did not provide adequate control (Table 1), even though crop yield was significantly greater than the check treatment (Table 2). Dual Magnum applied PPS with Roneet or Roneet + Pyramin treatments significantly improved weed control compared to either Roneet or Pyramin applied singly.

Crop injury was greatest when Aim herbicide was applied. The split application of Dual Magnum did not improve yield compared to the check. Dual Magnum applied with Roneet or both Roneet and Pyramin significantly improved yield compared to Roneet or Roneet + Pyramin. Field day participants were given 2 votes to rate treatments and rated the following treatments as promising: Treatments 3 (2 votes), 4 (4votes), 5 (1), 18 (1), 19 (1), 23 (1), 26 (1), 30 (2), and 34 (4). The sequential applications of Betanex, Betamix, and Spinaid following Pyramin or Dual PES provided reasonable weed control and yields. The cost of most treatments was high because of the excessive cost of Pyramin, Spinaid, Betamix, and Betanex. Treatments with Roneet and Dual Magnum would be the most reasonable but were not tested in this experiment. A major point of justification for this research was to find a replacement for Roneet, which is unsettled in the marketplace at this point. If Roneet is unavailable, Dual Magnum plus sequential applications of Upbeet and Spinaid would reduce the cost and amount of herbicides and allow an integrated approach to weed control.

Corvallis (Tables 5 and 6, Figure 3). Stunting of beet growth from Dual Magnum was significant at rates of 0.64 lbs ai/A or above through June 11, but only at 0.96 lbs ai/A on June 23. The effect of Dual Magnum on beet growth was much less when the herbicide was applied EPOST. Stunting was severe with all rates and timings of Outlook herbicide.

Crop yield averaged 22.4 t/A in the check plots. Hand weeding was not needed in any of the plots because Roneet and Pyramin controlled weeds exceptionally well. Crops yields with Dual Magnum applied PES at 0.32 to 0.96 lbs ai/A were statistically equivalent to the untreated check. However, the application of Dual Magnum at 0.96 lbs ai/A reduced the percentage of beets in the combined size class of 1 and 2 from 80 to 60 %, an indication of fewer but larger beets (Figure 3B). The cause for the lower than expected yield of 19.1 t/A in Tr. 1 is unclear. A yield reduction was not expected, even at this very low rate of herbicide (0.32 lbs ai/A) because few in any weeds survived the Roneet and Pyramin applications.

Growing conditions at this site mimicked wet spring conditions that are often encountered in Oregon. Dual Magnum applied PES and EPOST had little to no effect on crop yield at this site at anticipated label rates.

Table 1. Treatment effects on table beet growth and weeds, Jefferson, OR 2004.

Treatments		Timing	POST application dates			Rate	Crop Response						Weed control			
							20-May	30-May		4-Jun		29-Jun	24-June			
			Coty	*2 leaf*	*4 leaf*		Emergence	Phyto	Stunting	Phyto	Stunting	Stunting	Pigweed	Lambs-quarters	Hairy night-shade	Total
						lb ai/A	no/3ft	0-10	%	0-10	%	%	%			
1	Roneet	PPI				3.000	47	0	5	1	3	11	53	74	81	53
2	Roneet	PPI				3.000	36	0	6	0	6	3	99	98	100	99
	Pyramin	PPS				3.250										
3	Roneet	PPI				3.000	38	0	29	0	23	10	99	99	99	99
	Pyramin	PPS				3.250										
	Dual Mag	PPS				0.638										
4	Roneet	PPI				3.000	37	0	13	0	10	5	100	100	100	100
	Pyramin	PPS				3.250										
	Dual Mag	POST	*14-May*			0.638										
5	Roneet	PPI				3.000	45	1	13	1	13	0	100	100	100	100
	Pyramin	PPS				3.250										
	Spin aid	POST		*20-May*	*31-May*	0.488										
6	Roneet	PPI				3.000	45	0	24	1	19	5	100	100	100	100
	Pyramin	PPS				3.250										
	Betanex	POST	*14-May*	*20-May*	*31-May*	0.244										
7	Roneet	PPI				3.000	47	0	18	0	20	8	100	100	100	100
	Pyramin	PPS				3.250										
	Betamix	POST	*14-May*	*20-May*	*31-May*	0.244										
8	Roneet	PPI				3.000	46	0	13	0	10	4	100	100	100	100
	Pyramin	PPS				3.250										
	Betamix	POST	*14-May*	*20-May*	*31-May*	0.081										
	Upbeet	POST	*14-May*	*20-May*	*31-May*	0.004										
	MSO		*14-May*	*20-May*	*31-May*	1.5%										
9	Roneet	PPI				3.000	38	3	75	1	58	10	100	100	100	100
	Pyramin	PPS				3.250										
	Upbeet	POST	*14-May*			0.004										
	Aim	POST	*14-May*			0.003										
	MSO	POST	*14-May*			1.5%										
10	Roneet	PPI				3.000	51	5	50	2	43	5	100	100	100	100
	Pyramin	PPS				3.250										
	Spin-Aid	POST	*14-May*	*20-May*		0.244										
	Aim	POST		*20-May*		0.003										

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Treatments		Timing	POST application dates			Rate	Crop Response						Weed control			
							20-May	30-May		4-Jun		29-Jun	24-June			
			Coty	*2 leaf*	*4 leaf*		Emergence	Phyto	Stunting	Phyto	Stunting	Stunting	Pigweed	Lambs-quarters	Hairy night-shade	Total
						lb ai/A	no/3ft	0-10	%	0-10	%	%	%			
11	Roneet	PPI				3.000	39	2	45	0	35	3	100	100	100	100
	Pyramin	PPS				3.250										
	Stinger	POST	*14-May*	*20-May*		0.062										
	Aim	POST		*20-May*		0.003										
12	Roneet	PPI				3.000	44	0	9	0	9	0	97	98	99	97
	Pyramin	PPS				3.250										
	Stinger	POST			*31-May*	0.188										
13	Roneet	PPI				3.000	42	0	14	2	10	13	99	85	98	99
	Pyramin	PPS				3.250										
	Nortron	PPS				1.625										
14	Pyramin	PPS				3.250	47	0	0	1	0	8	30	40	55	30
15	Pyramin	PPS				3.250	41	0	13	0	9	10	97	95	100	97
	Dual Mag	PPS				0.638										
16	Pyramin	PPS				3.250	36	0	1	0	6	21	43	63	74	43
	Dual Mag	POST	*14-May*			0.638										
17	Pyramin	PPS				3.250	48	0	16	0	9	15	85	97	100	85
	Spin-Aid	POST		*20-May*	*31-May*	0.488										
18	Pyramin	PPS				3.250	33	0	18	0	8	5	100	100	100	100
	Betanex	POST	*14-May*	*20-May*	*31-May*	0.244										
19	Pyramin	PPS				3.250	43	0	13	0	11	3	100	100	100	100
	Betamix	POST	*14-May*	*20-May*	*31-May*	0.244										
20	Pyramin	PPS				3.250	45	0	19	0	20	8	100	100	100	100
	Betamix	POST	*14-May*	*20-May*	*31-May*	0.081										
	Upbeet	POST	*14-May*	*20-May*	*31-May*	0.004										
	MSO		*14-May*	*20-May*	*31-May*	0.015										
21	Dual Mag	PPS				0.638	40	0	3	0	3	8	88	96	80	88
22	Dual Mag	PPS				0.319	37	0	10	0	8	13	64	56	43	64
	Dual Mag	POST	*14-May*			0.319										
23	Dual Mag	PPS				0.638	37	0	23	0	21	8	100	100	100	100
	Spin-Aid	POST		*20-May*	*31-May*	0.488										
24	Dual Mag	PPS				0.638	46	0	19	0	11	3	96	99	99	96

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Treatments		Timing	POST application dates			Rate	Crop Response						Weed control			
							20-May	30-May		4-Jun		29-Jun	24-June			
			Coty	*2 leaf*	*4 leaf*		Emergence	Phyto	Stunting	Phyto	Stunting	Stunting	Pigweed	Lambs-quarters	Hairy night-shade	Total
						lb ai/A	no/3ft	0-10	%	0-10	%	%	%			
	Betanex	POST	*14-May*	*20-May*	*31-May*	0.244										
25	Dual Mag	PPS				0.638	47	0	15	0	13	3	100	100	100	100
	Betamix	POST	*14-May*	*20-May*	*31-May*	0.244										
26	Dual Mag	PPS				0.638	40	0	15	2	10	6	100	100	100	100
	Betamix	POST	*14-May*	*20-May*	*31-May*	0.081										
	Upbeet	POST	*14-May*	*20-May*	*31-May*	0.004										
	MSO		*14-May*	*20-May*	*31-May*	0.015										
27	Pyramin	PPS				3.250	43	0	4	0	6	15	95	70	91	95
	Dual Mag	PPS				0.314										
28	Pyramin	PPS				3.250	40	0	18	0	15	5	99	93	94	99
	Dual Mag	PPS				0.953										
29	Pyramin	PPS				3.250	45	0	15	0	13	3	99	97	97	99
	Dual Mag	PPS				1.267										
30	Pyramin	PPS				3.250	47	0	8	0	13	23	25	43	55	25
	Dual Mag	POST	*14-May*			0.314										
31	Pyramin	PPS				3.250	45	0	4	0	4	18	33	66	68	33
	Dual Mag	POST	*14-May*			0.953										
32	Pyramin	PPS				3.250	46	0	13	0	13	13	61	69	84	61
	Dual Mag	POST	*14-May*			1.267										
33	Betamix	POST	*14-May*	*20-May*	*31-May*	0.081	49	0	11	0	10	0	100	100	100	100
	Upbeet	POST	*14-May*	*20-May*	*31-May*	0.004										
	MSO		*14-May*	*20-May*	*31-May*	0.015										
34	Betamix	POST	*14-May*	*20-May*	*31-May*	0.081	46	0	14	0	13	3	100	100	100	100
	Upbeet	POST	*14-May*	*20-May*	*31-May*	0.004										
	Stinger		*14-May*	*20-May*	*31-May*	0.062										
	MSO		*14-May*	*20-May*	*31-May*	0.015										
35a	Spin-Aid	POST			*31-May*	0.244	44	0	0	0	0	8	80	94	94	80
	Aim	POST			*31-May*	0.003										
35b	Check				*31-May*	0.000	50	0	0	6	0	15	0	0	0	0
36	Weeded Check					0.000		0	0	0	0	0	-	-	-	-
FPLSD (0.05)							NS	0.5	12	1	12	10	18	25	21	18

Table 2. Treatment effects on yield of table beets, Jefferson, OR 2004.

Treatments		Timing		POST2	POST3	Rate	Cost	Yield		Grad		Weed control at harvest			
								Mean	SD	Mean	SD	Pigweed	Hairy nightshade	Lambs-quarters	Total
							$/A	---t/A---		----% # 1---		----------%----------			
1	Roneet	PPI				3.000	26	11.6	4.5	29	7	18	18	0	15
2	Roneet	PPI	=Preplant incorporated			3.000	109	15.6	1.3	21	5	86	95	64	69
	Pyramin	PPS	=Post plant surface			3.250									
3	Roneet	PPI				3.000	118	18.0	3.6	16	2	96	96	69	90
	Pyramin	PPS				3.250									
	Dual Mag	PPS				0.64									
4	Roneet	PPI				3.000	118	20.3	2.6	24	11	91	93	96	88
	Pyramin	PPS				3.250									
	Dual Mag	POST	14-May			0.64									
5	Roneet	PPI				3.000	166	21.7	4.4	16	4	94	96	100	94
	Pyramin	PPS				3.250									
	Spin aid	POST		20-May	31-May	0.488									
6	Roneet	PPI				3.000	171	21.7	6.6	14	2	100	98	99	98
	Pyramin	PPS				3.250									
	Betanex	POST	14-May	20-May	31-May	0.244									
7	Roneet	PPI				3.000	171	19.1	6.0	17	12	99	100	100	98
	Pyramin	PPS				3.250									
	Betamix	POST	14-May	20-May	31-May	0.244									
8	Roneet	PPI				3.000	153	20.4	3.7	20	4	100	100	95	98
	Pyramin	PPS				3.250									
	Betamix	POST	14-May	20-May	31-May	0.081									
	Upbeet	POST	14-May	20-May	31-May	0.0039									
	MSO		14-May	20-May	31-May										
9	Roneet	PPI				3.000	133	18.2	2.7	17	5	94	92	69	85
	Pyramin	PPS				3.250									
	Upbeet	POST	14-May			0.0039									
	Aim	POST	14-May			0.003									
	MSO	POST	14-May												
10	Roneet	PPI				3.000	138	15.5	1.6	21	7	93	81	92	78
	Pyramin	PPS				3.250									
	Spin-Aid	POST	14-May	20-May		0.244									
	Aim	POST		20-May		0.003									
11	Roneet	PPI				3.000	131	24.3	4.4	14	2	96	81	84	79
	Pyramin	PPS				3.250									
	Stinger	POST	14-May	20-May		0.062									
	Aim	POST		20-May		0.003									

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Table 2. Treatment effects on yield of table beets, Jefferson, OR 2004.

Treatments		Timing		POST2	POST3	Rate	Cost	Yield		Grad		Weed control at harvest			
								Mean	SD	Mean	SD	Pigweed	Hairy nightshade	Lambs-quarters	Total
							$/A	---t/A---		----% # 1---		----------%			
12	Roncet	PPI				3.000	141	20.1	2.4	15	5	78	90	92	75
	Pyramin	PPS				3.250									
	Stinger	POST			31-May	0.1875									
13	Roncet	PPI				3.000	152	20.6	5.3	23	12	95	88	94	90
	Pyramin	PPS				3.250									
	Nortron	PPS				1.625									
14	Pyramin	PPS				3.250	83	8.2	3.1	39	10	0	18	0	13
15	Pyramin	PPS				3.250	92	19.1	5.8	17	5	94	45	70	53
	Dual Mag	PPS				0.64									
16	Pyramin	PPS				3.250	92	8.5	3.0	37	6	0	0	13	0
	Dual Mag	POST	14-May			0.64									
17	Pyramin	PPS				3.250	140	13.1	5.5	24	3	20	69	65	28
	Spin-Aid	POST		20-May	31-May	0.488									
18	Pyramin	PPS				3.250	145	20.9	4.3	24	7	99	98	100	96
	Betanex	POST	14-May	20-May	31-May	0.244									
19	Pyramin	PPS				3.250	145	23.0	3.4	15	1	99	96	100	96
	Betamix	POST	14-May	20-May	31-May	0.244									
20	Pyramin	PPS				3.250	104	20.5	2.4	20	6	95	94	98	95
	Betamix	POST	14-May	20-May	31-May	0.081									
	Upbeet	POST	14-May	20-May	31-May	0.0039									
	MSO		14-May	20-May	31-May	1.5%									
21	Dual Mag	PPS				0.64	9	13.9	4.4	24	10	80	25	33	28
22	Dual Mag	PPS				0.32	9	7.3	3.1	38	7	51	0	0	8
	Dual Mag	POST	14-May			0.32									
23	Dual Mag	PPS				0.64	66	17.0	3.3	19	6	95	96	100	94
	Spin-Aid	POST		20-May	31-May	0.488									
24	Dual Mag	PPS				0.64	71	20.7	1.8	18	4	100	89	100	93
	Betanex	POST	14-May	20-May	31-May	0.244									
25	Dual Mag	PPS				0.64	71	20.2	5.2	16	5	100	95	100	94
	Betamix	POST	14-May	20-May	31-May	0.244									
26	Dual Mag	PPS				0.64	53	23.1	3.7	15	4	98	93	91	90
	Betamix	POST	14-May	20-May	31-May	0.081									
	Upbeet	POST	14-May	20-May	31-May	0.0039									
	MSO		14-May	20-May	31-May	1.5%									

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Table 2. Treatment effects on yield of table beets, Jefferson, OR 2004.

Treatments		Timing		POST2	POST3	Rate	Cost	Yield		Grad		Weed control at harvest			
								Mean	SD	Mean	SD	Pigweed	Hairy nightshade	Lambs-quarters	Total
							$/A	---t/A---		----% # 1---		----------%----------			
27	Pyramin	PPS				3.250	87	17.0	3.7	19	7	58	25	33	33
	Dual Mag	PPS				0.31									
28	Pyramin	PPS				3.250	96	17.7	5.2	21	7	93	45	86	59
	Dual Mag	PPS				0.95									
29	Pyramin	PPS				3.250	100	16.6	3.0	19	7	84	79	63	58
	Dual Mag	PPS				1.27									
30	Pyramin	PPS				3.250	87	5.5	1.4	44	11	0	0	0	0
	Dual Mag	POST	14-May			0.31									
31	Pyramin	PPS				3.250	96	8.0	4.2	35	7	17	17	32	13
	Dual Mag	POST	14-May			0.95									
32	Pyramin	PPS				3.250	100	12.5	2.9	31	11	24	20	30	28
	Dual Mag	POST	14-May			1.27									
33	Betamix	POST	14-May	20-May	31-May	0.081	44	17.7	5.5	18	3	83	85	88	81
	Upbeet	POST	14-May	20-May	31-May	0.0039									
	MSO		14-May	20-May	31-May	1.5%									
34	Betamix	POST	14-May	20-May	31-May	0.081	76	22.3	4.8	15	10	98	100	99	95
	Upbeet	POST	14-May	20-May	31-May	0.0039									
	Stinger		14-May	20-May	31-May	0.062									
	MSO		14-May	20-May	31-May	1.5%									
35-1	Spin-Aid	POST			31-May	0.244	58	6.5	3.7	42	8	89	40	90	50
	Aim	POST			31-May	0.003									
35-2	Check				31-May	0	0	5.9	3.4	44	8	27	23	35	0
36	Weeded Check					0	0	16.1	5.2	29	15	0	0	0	0
FPLSD (0.05)								5.6		11		22	25	32	19

Table 3. Summary table for Dual Magnum effects on weed control and yield, Jefferson, OR 2004.

Treatment		Timing	Rate	Crop response						Weed control at harvest	Yield	Grade
				20-May	30-May		4-Jun		29-Jun			
				Emer.	P	GR	P	GR	GR			
			lb ai/A	no/3ft	0-10	%	0-10	%	0-10	%	t/A	% # 1
Standard treatments												
1	Roneet	PPI	3.00	47	0	5	1	3	11	15	11.6	29
2	Roneet Pyramin	PPI PPS	3.00 3.25	36	0	6	0	6	3	69	15.6	21
Dual Magnum efficacy												
21	Dual Mag	PPS	0.64	40	0	3	0	3	8	28	13.9	24
22	Dual Mag Dual Mag	PPS POST	0.32 0.32	37	0	10	0	8	13	8	7.3	38
Dual Magnum PPS with Pyramin only												
27	Pyramin Dual Mag	PPS PPS	3.25 0.32	43	0	4	0	6	15	33	17.0	19
15	Pyramin Dual Mag	PPS PPS	3.25 0.64	41	0	13	0	9	10	53	19.1	17
28	Pyramin Dual Mag	PPS PPS	3.25 0.96	40	0	18	0	15	5	59	17.7	21
29	Pyramin Dual Mag	PPS PPS	3.25 1.28	45	0	15	0	13	3	58	16.6	19
Dual Magnum PPS with Roneet and Pyramin												
3	Roneet Pyramin Dual Mag	PPI PPS PPS	3.00 3.25 0.64	38	0	29	0	23	10	90	18.0	16
4	Roneet Pyramin Dual Mag	PPI PPS POST	3.00 3.25 0.64	37	0	13	0	10	5	88	19.1	17
Dual Magnum POST with Pyramin												
30	Pyramin Dual Mag	PPS POST	3.25 0.32	47	0	8	0	13	23	0	5.5	44
16	Pyramin Dual Mag	PPS POST	3.25 0.64	36	0	1	0	6	21	0	8.5	37
31	Pyramin Dual Mag	PPS POST	3.25 0.96	45	0	4	0	4	18	13	8.0	35
32	Pyramin Dual Mag	PPS POST	3.25 1.28	46	0	13	0	13	13	28	12.5	31
Check plots												
35-2	Unweeded		-	50	0	0	6	0	15	0	5.9	44
36	Weeded check		-	-	0	0	0	0	0	-	16.1	29
FPLSD (0.05)				ns	0.5	12	1	12	10	19	6	11

Table 4. Site description and herbicide application data, Jefferson, OR 2004.

Site characteristics					
Plot size/exp. design	6.5 x 30	4 reps	RCBD		
Proceeding crop	Sweet corn				
Herbicide application data					
Date	4/27/04	4/30/04	5/14/2004	5/20/2004	5/30/2004
Crop stage		Planted on 4-29	cotyledon, true leaves emerging	2 true leaves	4 leaf
Weeds			Lambsquarters, hairy nightshade, pigweed, all max. 1-2 true leaves		4" weeds in check plots
Application timing	PPI	PPS	EPOST	EPOST2	EPOST3
Start/end time	10-11 A	6-10 A	11-3 P	6:30-8 A	6:30 -8 A
Air temp/soil temp (2")/surface	74/78/83	72/62/76	71/81/87	53/55/54	61//59/59
Rel. humidity	50%	75%	62%	92	90%
Wind direction/velocity	0-2 N	0	all, 1-3	0	<0
Cloud cover	0	0	50-30	0	70%
Soil moisture	good	dry on surface	dry on surface	dry on surface	nearly dry on surface
Plant moisture	-	-	dry	heavy dew	no dew, nearly dry
Sprayer/PSI	BP/30/4 nozzles	BP/30/3 nozzles	BP/30/3 nozzles	BP/30/3 nozzles	BP/30/3 nozzles
Mix size	2100	2100/8 plots	2100/8 plots	2100/8 plots	2100/8 plots
Gallons H20/acre	30	20	20	20	20
Nozzle type	8002	8002	8002	8002	8002
Nozzle spacing and height	20/18	20/18	20/18	20/18	20/18
Soil inc. method/implement	disk		rain on 5-18 should have incorporated Dual		

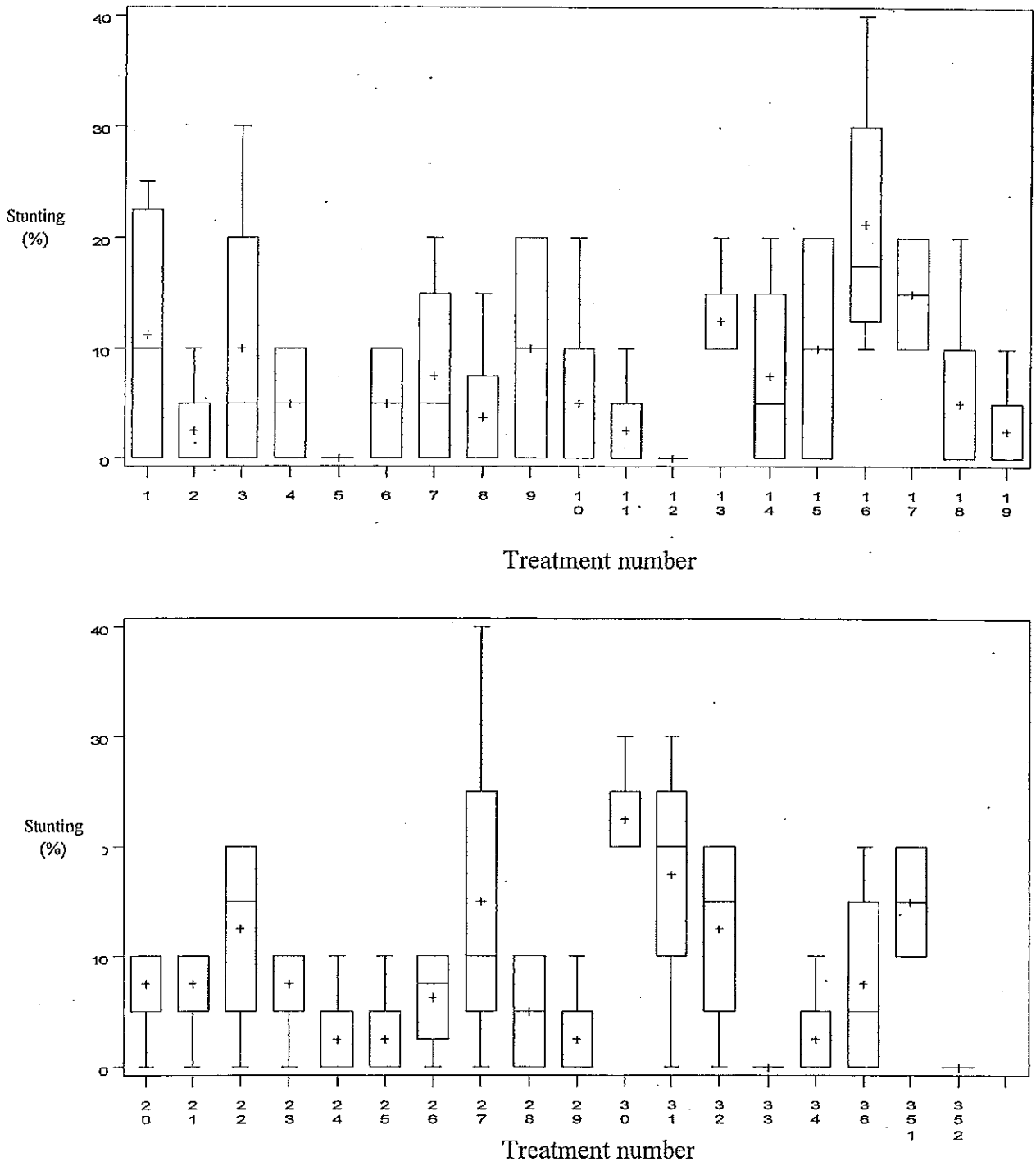
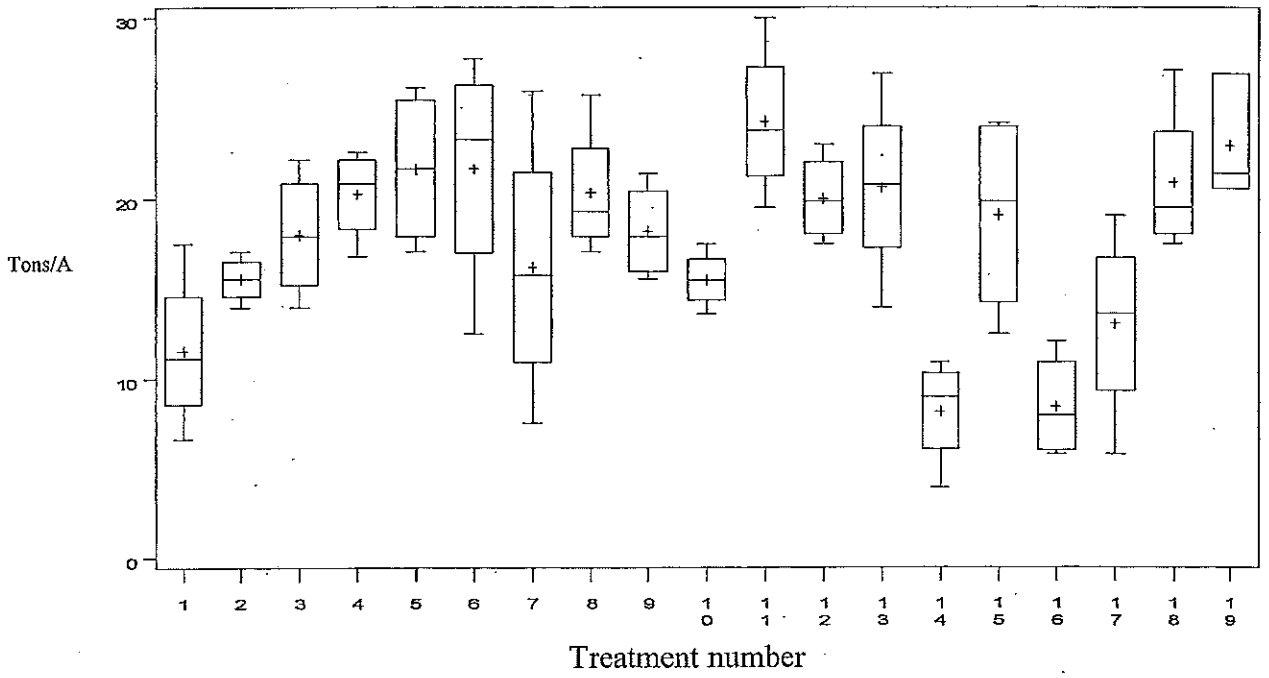


Figure 1. Box and whisker diagram for treatment effects on stunting of table beets on June 29, 2004 (2 months after planting). Mean (+), median (center line), and range (upper and lower slash marks).



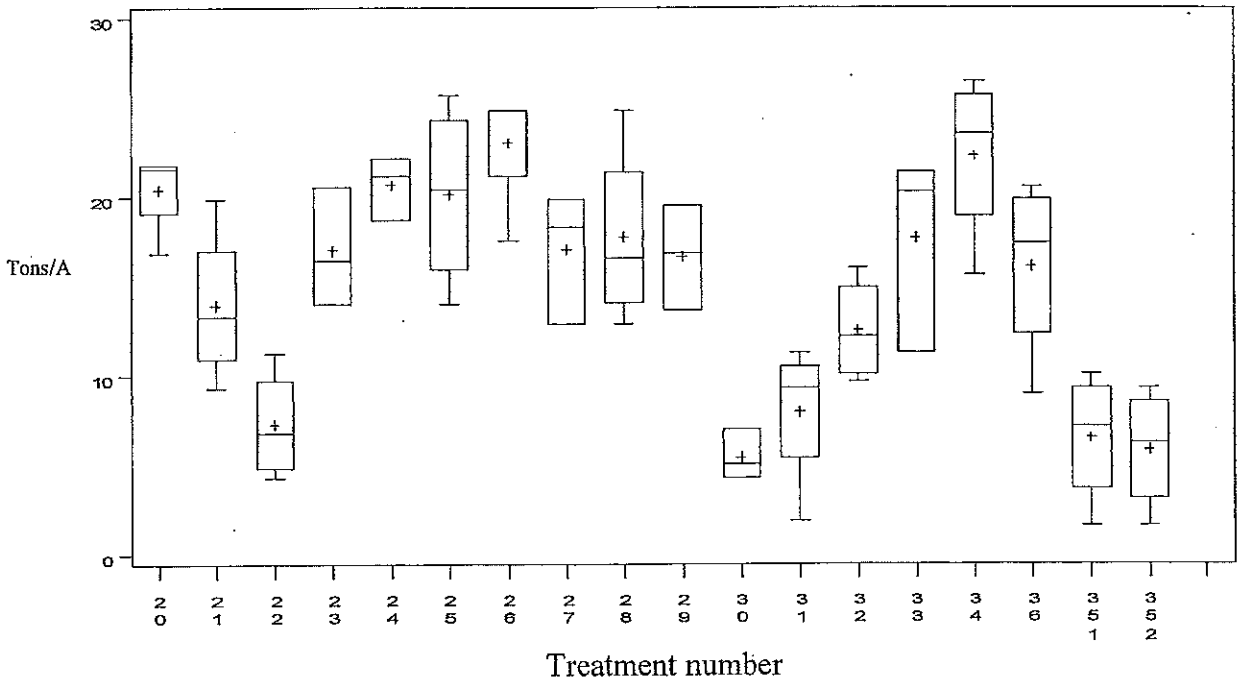


Figure 2. Box and whisker diagram for treatment effects on table beet yield variability. Mean (+), median (center line), and range (upper and lower slash marks).

Table 5. Table beet tolerance to herbicides, Corvallis, 2004.

	Herbicide	Timing	Rate	Obs.	Stand count	Crop injury assessment				Harvest	
						11-Jun-04		23-Jun-04			
						Stunting	Phyto	Stunting	Phyto	Yield	Grade
			lbs ai/A		no/3 ft	%	1-10	%	1-10	t/a	% 1-2
1	Dual Magnum	PES	0.32	4	32	3	0	3	0.3	19.1	88
2	Dual Magnum	PES	0.64	4	33	14	0	8	0.0	21.1	83
3	Dual Magnum	PES	0.96	4	28	33	3	30	0.0	21.4	60
4	Dual Magnum	EPOST	0.32	4	33	0	0	0	0.0	20.2	82
5	Dual Magnum	EPOST	0.64	4	32	10	0	8	0.8	21.3	86
6	Dual Magnum	EPOST	0.96	4	36	14	0	10	0.0	21.8	79
7	Outlook	PES	0.54	4	28	58	1	48	0.0	20.2	58
8	Outlook	PES	1.08	4	12	94	2	86	0.0	14.0	38
9	Outlook	EPOST	0.54	4	31	23	1	15	0.0	20.1	82
10	Outlook	EPOST	1.08	4	36	38	2	25	0.0	19.8	79
11	Spinaid/Aim	POST	0.16/0.003	4	32	0	0	45	5.0	16.6	80
12	Spinaid	POST	0.65	3	37	0	0	3	0.0	21.9	84
13	Check	-	0	8	36	0	0	0	0	22.4	80
	FPLSD $_{(0.05)}$				8	12	ns	13	0.9	4.1	11

Table 6. Schedule and herbicide application data.

Site characteristics				
Plot size/exp. Design	6.5*32	4 reps	RCBD	
Proceeding crop	Broccoli			
Soil test	pH 4.8	OM 4.91% LOI	CEC 21.5 meq/100 gr soil	
Herbicide application data				
Date	May 12, 2004	May 19, 2004	1-Jun	12-Jun
Crop stage		Planted on may 17	Cotyledon, first true leaves visible	4th leaf emerging, 3.5 inches max ht.
Weeds				
Herbicide/treatment	Roneet	PES including Pyramin on all plots	EPOST Dual M and Outlook	POST
Application timing	PPI	PES	EPOST	POST
Start/end time	2-2:30 PM	6:30-8:30 A	6:30-7A	9:45-9:45A
Air temp/soil temp (2")/surface	62	58/58 /62	54/56/53	65/65/67
Rel humidity		80%	76%	80%
Wind direction/velocity	W 2-4	E 0-1	0	W 1-4 S
Cloud cover	0	100	0	50%
Soil moisture	damp	very wet, rain 0.5" on 5-18	Dry	damp
Plant moisture	-	-		no dew
Sprayer/PSI	Farm tractor 30PSI	Backpack 30 PSI	Backpack 30 PSI	Backpack 30 PSI
Mix size	25gal	2100 mls for non-Pryamin treatments, 3 gal for Pyramin	2100 mls	2100
Gallons H20/acre	30GPA	20 GPA	20 GPA	20 GPA
Nozzle type	8002	8002	8002	8002
Nozzle spacing and height	10"	20/18	20/18	20/18
Soil inc. method/implement	Incorporated within 5 to 10 minutes with roterra set on H with new tines	Irrigation	-	-

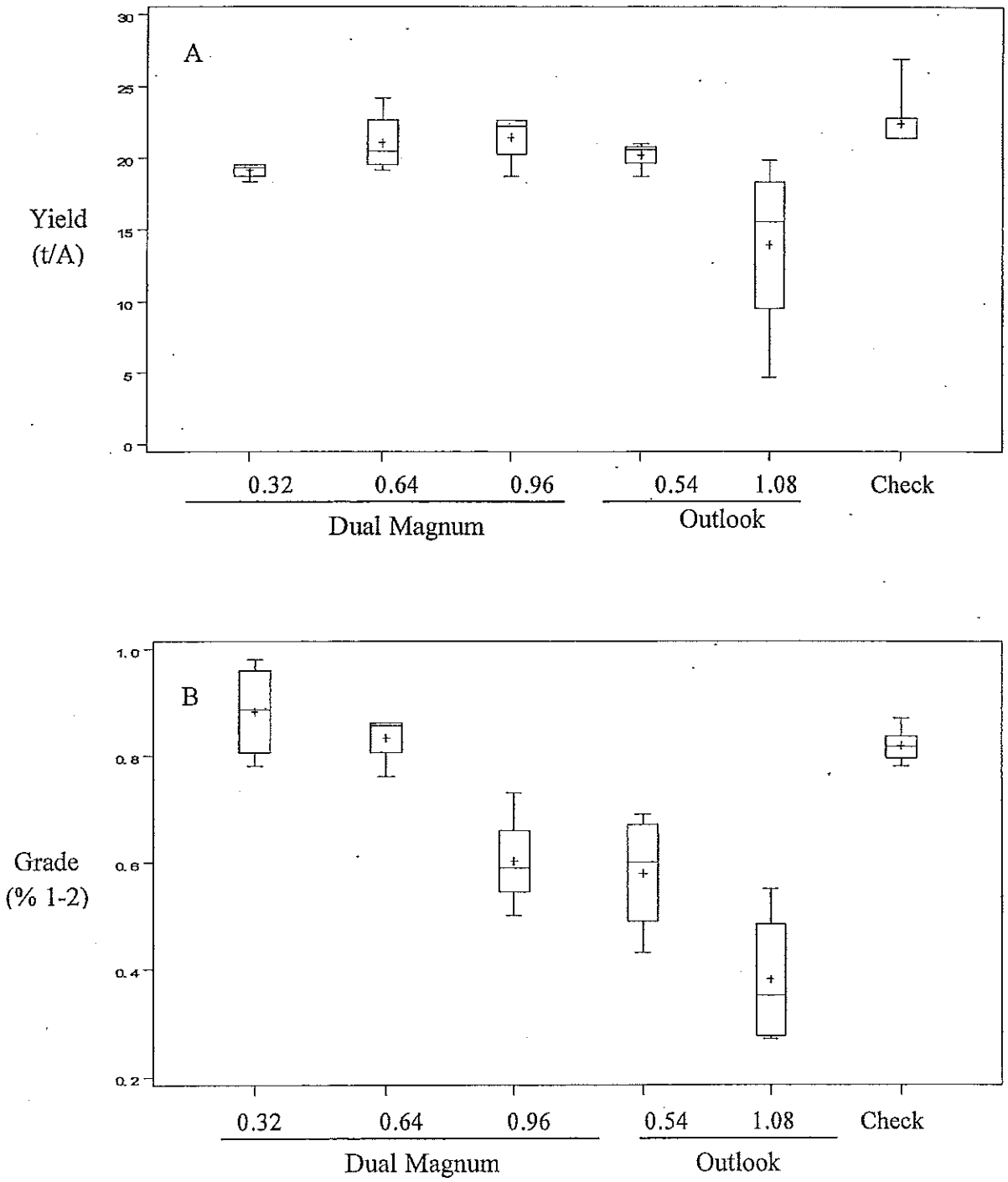


Figure 3. Effect of Dual Magnum and Outlook herbicides applied PES on table beet yield (A) and grade (B), Corvallis, 2004.