DEVELOPMENT OF NEW HERBICIDE OPTIONS FOR WEED CONTROL IN POTATO PRODUCTION, 2002

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Introduction

Weed control in potatoes is essential for production of high-yielding marketable tubers. Herbicide options in potato production are often limited. Several herbicides currently registered for use in other crops show promise for use in potatoes. Spartan (sulfentrazone) and Valor (flumioxazin) are protoporphyrinogen oxidase (PPO) inhibitors that disrupt the enzyme system necessary for the production of chlorophyll. These herbicides represent a mode of action that is not currently used in potatoes and offer more effective hairy nightshade control than current herbicide programs. Outlook (dimethenamid-P) is similar to Dual (metolachlor) but controls a larger spectrum of weeds. Trials were conducted to evaluate new herbicides for weed control in potatoes.

Materials and Methods

General

Four trials were conducted at the Malheur Experiment Station to evaluate new herbicides for weed control efficacy and crop tolerance in potatoes. Potatoes were planted April 11 and 12 in an Owyhee silt loam soil with pH 7.5, 0.9 percent organic matter content, and a cation exchange capacity of 14. 'Russet Burbank' seed pieces were planted every 9 inches in 36-inch-wide rows. Potato seed pieces were treated with the fungicide/insecticide formulation Tops-MZ plus Gaucho at seed cutting. Experimental plots were four rows wide and 30 ft long. Plots were sidedressed with fertilizer (90 lb N, 4 lb Zn, 4 lb Mn, 1 lb B, 44 lb elemental S/acre) and beds were reshaped with a Lilliston cultivator on April 18. Preemergence herbicides were applied and incorporated with sprinkler irrigation on May 2. Postemergence treatments were applied on May 22 and 30. Treatments were broadcast applied with a CO_2-pressurized backpack sprayer delivering 20 gal/acre at 30 psi. Plots were sprinkler irrigated 14 times during the growing season according to crop requirements. Plots were treated with Ridomil Gold plus Bravo at 2 lbs product/acre on June 4, Dithane on June 15 and July 1 to prevent late blight, and with liquid sulfur on June 20 and August 14 to control powdery mildew. Potato injury and weed control were evaluated throughout the growing season. Tuber yields were taken by harvesting the center two rows of each plot. Weed biomass samples were taken from 5 ft of row within each plot on August 26. Plots were harvested on September 9-12. Potatoes were graded for yield and size on September 17-24.

Weed Control with Valor and Spartan Rates
Weed control with preemergence applications of Valor at rates of 0.063, 0.078, 0.094, and 0.125 lb ai/acre and Spartan at rates of 0.125, 0.141, and 0.188 lb ai/acre were compared to Sencor (0.5 lb ai/acre) plus Dual Magnum (1.0 lb ai/acre) and Matrix (0.008 lb ai/acre) plus Dual Magnum (1.0 lb ai/acre). Treatments were replicated four times.

Weed Control with Valor and Spartan Combinations
Preemergence treatments of Valor and Spartan were applied alone and in combination with Outlook (0.656 lb ai/acre), Dual Magnum (1.0 lb ai/acre), Prowl (1.0 lb ai/acre), and Eptam (3.0 lb ai/acre). Treatment rates for Valor and Spartan were 0.094 and 0.141 lb ai/acre, respectively. Valor and Spartan treatments were compared to Outlook, Dual Magnum, Prowl, and Eptam alone, and to a tank mixture of Sencor plus Dual Magnum. Treatments were replicated four times.

Weed Control with Outlook Combinations
Outlook at 0.656 lb ai/acre was applied preemergence with several herbicides including Prowl (1.0 lb ai/acre), Prowl H_2O (1.0 lb ai/acre), Sencor (0.5 lb ai/acre), Matrix (0.0156 lb ai/acre), and Prowl plus Sencor. Outlook treatments were compared to combinations of Dual Magnum (1.0 lb ai/acre) plus Prowl, Sencor, or Matrix, Prowl plus Sencor, and Prowl plus Eptam plus Sencor. Treatments were replicated three times.

Matrix Combinations with New Herbicides for Weed Control in Potato
Preemergence applications of Matrix at 0.024 lb ai/acre were applied alone and in combination with Outlook (0.656 lb ai/acre), Valor (0.094 lb ai/acre), Spartan (0.094 lb ai/acre), Sencor (0.5 lb ai/acre), and Dual Magnum (1.0 lb ai/acre). Matrix plus methylated seed oil (MSO) (1.0% v/v) were applied postemergence following preemergence applications of Outlook, Valor, and Spartan. Postemergence Matrix applications were inadvertently applied at one-third (0.008 lb ai/acre) of the desired rate on May 22, therefore a second application of 0.016 lb ai/acre was applied on May 30 to achieve the intended rate of 0.024 lb ai/acre. Treatments were replicated three times.

Results and Discussion

Weed Control with Valor and Spartan Rates
Control of pigweed species (i.e., Powell amaranth and redroot pigweed) and common lambsquarters with Spartan treatments, Sencor plus Dual Magnum, and Matrix plus Dual Magnum was greater than with all Valor treatments on June 5 (34 days after treatment [DAT]) and August 26 (116 DAT) (Table 1). Valor at 0.063 to 0.125 lb ai/acre provided hairy nightshade control ranging from 56 to 89 percent on June 5 compared to 100 percent control with all Spartan rates. However, on August 26 hairy nightshade control was similar with all Spartan rates and Valor at 0.125 lb ai/acre (93-99 percent). Valor at 0.125 lb ai/acre, Sencor plus Dual Magnum, and Matrix plus Dual Magnum provided similar hairy nightshade control on June 5. However, by August 26 hairy nightshade control was greater with Valor at 0.063, 0.094, and 0.125 (81-93 percent) than from either Sencor plus Dual Magnum or Matrix plus Dual Magnum(66-67

percent). Barnyardgrass control on June 5 was significantly less with Valor at 0.063 and 0.078 lb ai/acre than from all other treatments. Total weed biomass was significantly greater with Valor treatments. In general, weed control increased with increasing Valor rates while weed control with Spartan was similar among rates.

Based on weed biomass samples, there was a strong correlation between weed control and marketable potato yield (Fig. 1). Total marketable potato yields ranged from 161 to 435 cwt/acre. Potato yields were significantly less with Valor treatments compared to all other treatments (Table 2). Marketable potato yields with Spartan treatments were similar to Sencor plus Dual Magnum and Matrix plus Dual Magnum.

Weed Control with Valor and Spartan Combinations

Outlook and Spartan were the only single-product treatments that provided Powell amaranth and redroot pigweed, hairy nightshade, and common lambsquarters control similar to tank-mix treatments on June 5 (34 DAT) (Table 3). On June 5, control of these weeds with Outlook was not significantly improved by the addition of Valor or Spartan. Similarly, weed control was not improved when Outlook, Dual Magnum, Prowl, or Eptam were applied with Spartan compared to Spartan alone. However, hairy nightshade control was significantly greater on August 26 (116 DAT) when Valor or Spartan were tank-mixed with Outlook, compared to Outlook alone. Prowl alone and Prowl plus Valor provided poor weed control on both evaluation dates. All treatments with either Valor or Spartan provided similar hairy nightshade control on August 26 (69-100 percent). When Outlook and Eptam were applied with Valor, barnyardgrass and hairy nightshade control were greater on June 5 and control of pigweed species and common lambsquarters were greater on June 5 and August 26 compared to Valor alone. Dual Magnum plus Valor provided greater pigweed, hairy nightshade, barnyardgrass, and common lambsquarters control on June 5 and greater pigweed control on August 26 compared to Valor alone. Outlook provided greater control of common lambsquarters than Dual Magnum, Prowl, Eptam, or Valor. Total weed biomass production was significantly less than the untreated check with Outlook alone and all tank-mix treatments except Valor plus Prowl. Hairy nightshade control was greater with all treatments including Spartan and the combination of Valor plus Outlook compared to Sencor plus Dual Magnum.

Weed biomass samples indicated a strong correlation between weed control and marketable potato yield (Fig. 2). Total marketable potato yields ranged from 165 to 479 cwt/acre (Table 4). Marketable yields increased when Outlook, Dual Magnum, or Eptam were applied with Valor compared to Valor alone. The addition of a tank-mix partner to Spartan did not provide greater U.S. No. 1 or total marketable potato yields over those obtained with Spartan alone.

Weed Control with Outlook Combinations

Pigweed control was excellent (93 to 100 percent) with all treatments except Dual Magnum plus Prowl, which provided 63 and 52 percent control on June 5 (34 DAT) and August 26 (116 DAT), respectively (Table 5). Hairy nightshade control with Outlook plus Prowl H_2O was less on June 5 than from Outlook plus Sencor and Outlook plus

Prowl plus Sencor. On August 26, Outlook plus Prowl provided significantly less hairy nightshade control than Outlook plus Sencor. All herbicide treatments provided greater common lambsquarters control than Dual Magnum plus Prowl on June 5 and August 26. On both evaluation dates, Outlook alone provided less common lambsquarters control than treatments including Sencor. Total weed biomass was greatest in plots treated with Dual Magnum plus Prowl and was not different from the untreated control.

U.S. No. 1 and total marketable potato yields were less with Dual Magnum plus Prowl than with all other treatments (Table 6). Marketable potato yields with Outlook plus Sencor, Outlook plus Prowl plus Sencor, and Prowl plus Sencor were greater than with Outlook alone. All Outlook treatment combinations provided similar U.S. No. 1, U.S. No. 2, total marketable, and total yields.

Matrix Combinations with New Herbicides for Weed Control in Potato

All treatments except Valor alone provided greater than 94 and 89 percent pigweed control on June 5 (34 DAT) and August 26 (116 DAT), respectively (Table 7). The combination of Matrix plus Valor provided 78 and 65 percent greater pigweed control compared to Valor alone on June 5 and August 26, respectively. Matrix plus Valor provided less hairy nightshade control compared with all other Matrix combinations on June 5. The combination of Matrix plus Sencor provided greater late-season (August 26) hairy nightshade and common lambsquarters control than either herbicide alone. Outlook applied with Matrix improved late-season hairy nightshade control by 69 percent over Matrix alone. Valor applied with Matrix improved late-season hairy nightshade control by 54 percent over Matrix alone. Matrix plus Valor controlled pigweed, barnyardgrass, and common lambsquarters better than Valor alone. Spartan applied with Matrix increased common lambsquarters control by 10 percent on June 5 and late-season hairy nightshade control by 59 percent compared to Matrix alone. Weed control was not different when Matrix (0.024 lb ai/acre) was applied preemergence with either Outlook or Spartan or when Matrix (0.008 followed by 0.016 lb ai/acre) was applied in sequential postemergence applications following preemergence applications of Outlook or Spartan. Preemergence Valor followed by sequential postemergence applications of Matrix provided greater hairy nightshade control on June 5 compared to the preemergence combination of Matrix plus Valor. Late-season common lambsquarters control was greater with the preemergence combination of Matrix plus Valor compared to the split PRE/POST treatment of Valor followed by Matrix. Total weed biomass production was less than the untreated control with all preemergence Matrix combinations, the PRE/POST treatment combinations of Outlook or Spartan followed by Matrix, and Outlook alone.

Total marketable potato yields in herbicide-treated plots ranged from 219 to 452 cwt/acre. U.S. No. 1 and total marketable potato yields were significantly greater than the untreated control with all herbicide treatments except Valor alone (Table 8). Total marketable potato yield with Matrix plus Valor was 212 cwt/acre greater than from Valor alone.

Table 1. Valor and Spartan rates for weed control in potato, Malheur Experiment Station, Oregon State University, Ontario, OR, 2002.

		Weed control‡								
		Pigweed spp.†		Hairy nightshade		Barnyardgrass		Common lambsquarters		Total weed biomass
Treatment*	Rate	6-05	8-26	6-05	8-26	6-05	8-26	6-05	8-26	8-26
	lb ai/acre	%								g/m²
Untreated check	--	0	0	0 d	0	0	0	0 f	0	908
Valor	0.063	30	36	60 c	81	39	78	28 e	41	748
Valor	0.078	40	30	56 c	74	43	61	46 d	38	692
Valor	0.094	46	38	68 c	85	81	85	63 c	62	666
Valor	0.125	61	56	89 b	93	85	86	62 cd	63	709
Spartan	0.125	100	95	100 a	92	88	88	100 a	97	6
Spartan	0.141	100	99	100 a	99	95	88	100 a	98	29
Spartan	0.188	100	96	100 a	95	98	91	100 a	100	20
Sencor + Dual Magnum	0.5 + 1.0	100	96	89 b	67	100	100	98 ab	98	6
Matrix + Dual Magnum	0.008 + 1.0	100	99	87 b	66	100	99	95 b	96	25
LSD (0.05)		19	21	--	15	34	23	--	21	232

*Herbicide treatments were applied preemergence on May 2, 2002.
†Pigweed species predominantly Powell amaranth mixed with some redroot pigweed.
‡In columns where letter designations occur the ANOVA was performed on arcsine square root percent transformed data. Mean separations are applied to non-transformed data.

Table 2. Valor and Spartan rates for weed control in potato, Malheur Experiment Station, Oregon State University, Ontario, OR, 2002.

		Potato yield							
		U.S. No. 1					Total	Total	Total
Treatment*	Rate	4-6 oz	6-12 oz	>12 oz	Total	%	No. 2	marketable	yield
	lb ai/acre	cwt/acre				%	cwt/acre		
Untreated check	--	93	57	4	154	96	8	161	161
Valor	0.063	95	72	6	172	94	11	183	184
Valor	0.078	104	79	9	191	95	12	203	203
Valor	0.094	90	77	12	178	89	23	201	202
Valor	0.125	97	88	18	203	91	22	225	226
Spartan	0.125	111	186	78	375	85	60	435	440
Spartan	0.141	111	182	56	349	85	61	410	413
Spartan	0.188	115	208	57	380	85	63	443	446
Sencor + Dual Magnum	0.5 + 1.0	129	185	48	362	87	47	409	415
Matrix + Dual Magnum	0.008 + 1.0	128	184	57	369	87	56	425	427
LSD (0.05)		22	38	24	47	5	19	57	57

*Herbicide treatments were applied preemergence on May 2, 2002.

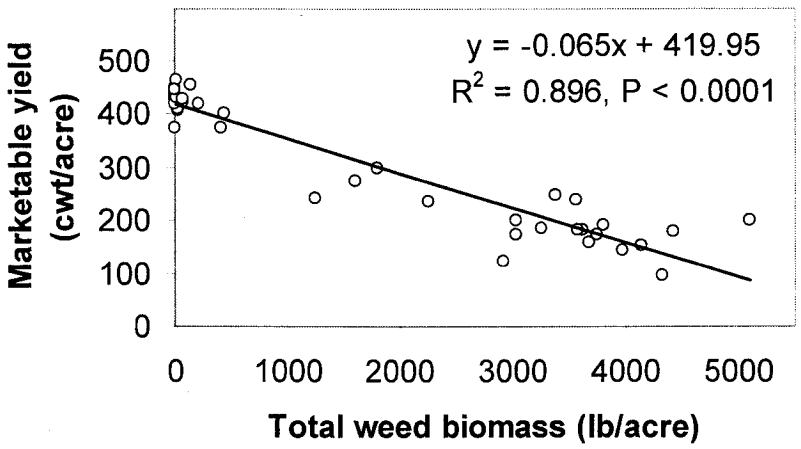

Figure 1. Response of marketable potato yields to total weed biomass (dry-weight basis). Malheur Experiment Station, Oregon State University, Ontario, OR, 2002.

Table 3. Valor and Spartan combinations for weed control in potato, Malheur Experiment Station, Oregon State University, Ontario, OR, 2002.

		Weed control								Total weed biomass
		Pigweed spp.†		Hairy nightshade		Barnyardgrass		Common lambsquarters		
Treatment*	Rate	6-05	8-26	6-05	8-26	6-05	8-26‡	6-05	8-26	8-26
	lb ai/acre	%								g/m²
Untreated check	--	0	0	0	0	0	0 d	0	0	807
Outlook	0.656	92	89	81	33	100	92 ab	88	89	190
Dual Magnum	1.0	81	79	43	48	91	96 ab	51	37	855
Prowl	1.0	20	47	15	26	10	94 ab	24	26	822
Eptam	3.0	75	71	70	43	86	89 ab	65	51	549
Valor	0.094	55	44	65	72	28	86 ab	48	24	724
Spartan	0.141	100	100	100	96	91	87 ab	100	99	5
Valor + Outlook	0.094 + 0.656	96	95	96	91	99	96 ab	93	89	55
Spartan + Outlook	0.141 + 0.656	100	99	99	98	100	95 ab	100	100	1
Valor + Dual Magnum	0.094 + 1.0	90	79	86	84	87	95 ab	81	51	254
Spartan + Dual	0.141 + 1.0	100	100	100	100	95	95 ab	100	100	3
Valor + Prowl	0.094 + 1.0	39	56	62	69	15	82 b	40	36	764
Spartan + Prowl	0.141 + 1.0	100	99	99	98	86	87 ab	100	99	20
Valor + Eptam	0.094 + 3.0	86	68	89	78	90	41 c	77	62	291
Spartan + Eptam	0.141 + 3.0	100	98	100	100	92	84 ab	100	100	2
Sencor + Dual Magnum	0.5 + 1.0	100	98	83	54	95	97 a	100	98	101
LSD (0.05)		15	19	19	31	17	--	19	31	359

*Herbicide treatments were applied preemergence on May 2, 2002.
†Pigweed species were predominantly Powell amaranth mixed with some redroot pigweed.
‡The ANOVA was performed on arcsine square root percent transformed data. Mean separations are applied to non-transformed data.

Table 4. Valor and Spartan combinations for weed control in potato, Malheur Experiment Station, Oregon State University, Ontario, OR, 2002.

		Potato yield							
		U.S. No. 1					Total	Total	Total
Treatment*	Rate	4-6 oz	6-12 oz	>12 oz	Total	%	No. 2	marketable	yield
	lb ai/acre	cwt/acre				%	cwt/acre		
Untreated check	--	92	66	9	167	52	8	175	308
Outlook	0.656	119	154	47	320	68	53	373	474
Dual Magnum	1.0	105	81	25	211	58	18	228	353
Prowl	1.0	78	55	11	144	46	23	167	298
Eptam	3.0	130	109	28	266	63	19	286	410
Valor	0.094	78	53	11	143	48	23	165	283
Spartan	0.141	119	195	81	395	68	84	479	576
Valor + Outlook	0.094 + 0.656	128	189	59	377	67	82	458	565
Spartan + Outlook	0.141 + 0.656	112	165	47	324	64	77	401	508
Valor + Dual Magnum	0.094 + 1.0	114	140	25	278	64	38	316	423
Spartan + Dual Magnum	0.141 + 1.0	104	174	57	335	67	71	406	503
Valor + Prowl	0.094 + 1.0	87	71	7	165	53	19	185	303
Spartan + Prowl	0.141 + 1.0	117	187	66	370	70	56	426	525
Valor + Eptam	0.094 + 3.0	118	111	13	242	59	50	292	408
Spartan + Eptam	0.141 + 3.0	113	184	92	389	69	82	471	654
Sencor + Dual Magnum	0.5 + 1.0	105	163	66	333	69	61	394	486
LSD (0.05)		31	58	32	103	12	37	124	124

*Herbicide treatments were applied preemergence on May 2, 2002.

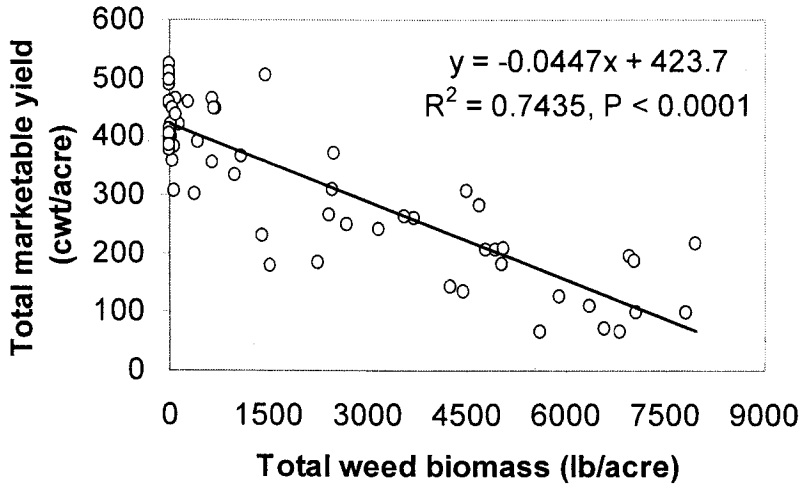

Figure 2. Response of marketable potato yields to total weed biomass (dry-weight basis). Malheur Experiment Station, Oregon State University, Ontario, OR, 2002.

Table 5. Outlook combinations for weed control in potato, Malheur Experiment Station, Oregon State University, Ontario, OR, 2002.

		Weed control								Total weed biomass
		Pigweed spp.†		Hairy nightshade		Barnyardgrass		Common lambsquarters		
Treatment*	Rate	6-05	8-26‡	6-05	8-26	6-05	8-26	6-05	8-26	8-26
	lb ai/acre	%								g/m²
Outlook + Prowl	0.656 + 1.0	98	97 ab	89	83	100	100	91	90	25
Outlook + Prowl H_2O	0.656 + 1.0	95	93 b	88	86	100	100	91	93	39
Outlook + Sencor	0.656 + 0.5	100	97 ab	97	98	100	100	100	100	4
Outlook + Matrix	0.656 + 0.0156	99	99 ab	94	88	100	100	94	90	15
Prowl + Eptam + Sencor	1.0 + 3.06 + 0.5	100	97 ab	95	89	100	100	100	98	2
Prowl + Outlook + Sencor	1.0 + 0.656 + 0.5	100	100 a	97	93	100	100	100	100	0
Dual Magnum + Prowl	1.0 + 1.0	63	52 c	73	79	100	100	52	50	624
Dual Magnum + Sencor	1.0 + 0.5	100	97 ab	93	88	100	100	100	100	9
Dual Magnum + Matrix	1.0 + 0.0156	100	100 a	92	80	100	99	93	96	0
Outlook	0.656	99	94 ab	85	77	100	99	88	88	1
Prowl + Sencor	1.0 + 0.5	100	97 ab	89	84	99	100	100	100	15
Untreated check	--	0	0 d	0	0	0	0	0	0	675
LSD (0.05)		3	--	8	13	0.6	0.8	14	10	136

*Herbicide treatments were applied preemergence on May 2, 2002.
†Pigweed species were predominantly Powell amaranth mixed with some redroot pigweed.
‡The ANOVA was performed on arcsine square root percent transformed data. Mean separations are applied to non-transformed data.

Table 6. Outlook combinations for weed control in potato, Malheur Experiment Station, Oregon State University, Ontario, OR, 2002.

		Potato yield							
		U.S. No. 1					Total	Total	Total
Treatment*	Rate	4-6 oz	6-12 oz	>12 oz	Total	%	No. 2	marketable	yield
	lb ai/acre	cwt/acre				%	cwt/acre		
Outlook + Prowl	0.656 + 1.0	129	193	57	378	67	56	434	560
Outlook + Prowl H_2O	0.656 + 1.0	124	215	50	389	69	58	446	562
Outlook + Sencor	0.656 + 0.5	136	121	50	399	69	66	464	579
Outlook + Matrix	0.656 + 0.0156	124	195	57	376	67	60	436	557
Prowl + Eptam + Sencor	1.0 + 3.06 + 0.5	111	194	64	370	66	73	443	557
Prowl + Outlook + Sencor	1.0 + 0.656 + 0.5	122	200	74	396	70	63	459	566
Dual Magnum + Prowl	1.0 + 1.0	124	120	19	262	62	30	292	416
Dual Magnum + Sencor	1.0 + 0.5	134	184	65	383	71	52	434	539
Dual Magnum + Matrix	1.0 + 0.0156	150	181	59	389	68	64	453	571
Outlook	0.656	116	174	50	339	65	58	397	523
Prowl + Sencor	0.094 + 1.0	124	191	78	394	69	67	461	574
Untreated check	--	88	57	6	151	49	20	171	308
LSD (0.05)		21	45	32	66	9	35	61	55

*Herbicide treatments were applied preemergence on May 2, 2002.

Table 7. Matrix combinations with new herbicides for weed control in potato, Malheur Experiment Station, Oregon State University, Ontario, OR, 2002.

			Weed control[§]								Total weed biomass[¶]
			Pigweed spp.[‡]		Hairy nightshade		Barnyardgrass		Common lambsquarters		
Treatment	Rate*	Timing[†]	6-05	8-26	6-05	8-26	6-05	8-26	6-05	8-26	8-26
	lb ai/acre % v/v		%								g/m^2
Untreated check	--	--	0	0 d	0	0	0	0	0 f	0 f	415 ab
Matrix + Outlook	0.024 + 0.656	1	100	99 ab	93	94	100	94	98 ab	98 ab	5 c
Matrix + Valor	0.024 + 0.094	1	100	100 a	62	79	94	86	97 abc	95 ab	43 c
Matrix + Spartan	0.024 + 0.094	1	100	96 ab	95	84	83	78	100 a	98 ab	11 c
Matrix + Sencor	0.024 + 0.5	1	100	99 ab	88	72	93	97	100 a	100 a	12 c
Matrix	0.024	1	100	93 ab	79	25	83	89	90 bcd	88 bc	100 bc
Sencor	0.5	1	100	92 ab	73	39	95	91	100 a	97 ab	67 bc
Outlook fb Matrix + MSO fb Matrix + MSO	0.656 0.008 + 1.0% 0.016 + 1.0%	1 2 3	100	98 ab	98	96	100	100	98 ab	93 ab	1 c
Valor fb Matrix + MSO fb Matrix + MSO	0.094 0.008 + 1.0% 0.016 + 1.0%	1 2 3	98	95 ab	97	86	100	99	91 cd	57 d	137 bc
Spartan fb Matrix + MSO fb Matrix + MSO	0.094 0.008 + 1.0% 0.016 + 1.0%	1 2 3	100	98 ab	98	98	100	93	100 a	97 ab	9 c
Outlook	0.656	1	94	89 b	79	75	100	99	82 d	74 cd	17 c
Valor	0.094	1	22	35 c	48	73	3	43	25 e	29 e	577 a
Spartan	0.094	1	99	98 ab	92	91	33	51	100 a	100 a	99 bc
Matrix + Dual Magnum	0.024 + 1.0	1	100	99 ab	87	79	100	96	94 abc	93 ab	20 c
LSD (0.05)			3	--	24	26	18	28	--	--	--

*Postemergence applications of Matrix were inadvertently applied at one-third (0.008 lb ai/acre) of the desired rate resulting in a second postemergence Matrix (0.016 lb ai/acre) application.

[†]Application (1) was applied preemergence on May 2, application (2) was applied postemergence on May 22, and application (3) was applied postemergence on May 30, 2002.

[‡]Pigweed species were predominantly Powell amaranth mixed with some redroot pigweed.

[§]In columns where letter designations occur the ANOVA was performed on arcsine square root percent transformed data. Mean separations are applied to non-transformed data.

[¶]ANOVA performed on log transformed data. Mean separations are applied to non-transformed data.

Table 8. Matrix combinations with new herbicides for weed control in potato, Malheur Experiment Station, Oregon State University, Ontario, OR, 2002.

			Potato yield							
			U.S. No. 1					Total	Total	Total
Treatment	Rate*	Timing†	4-6 oz	6-12 oz	>12 oz	Total	%	No. 2	marketable	yield
	lb ai/acre % v/v		cwt/acre				%	cwt/acre		
Untreated control	--	--	105	73	9	187	56	12	199	326
Matrix + Outlook	0.008 + 0.656	1	123	196	61	379	70	57	436	540
Matrix + Valor	0.008 + 0.094	1	113	182	75	369	69	62	431	537
Matrix + Spartan	0.008 + 0.094	1	126	194	66	386	73	40	426	528
Matrix + Sencor	0.008 + 0.5	1	125	203	59	387	71	42	429	538
Matrix	0.008	1	137	165	24	327	68	32	358	477
Sencor	0.5	1	128	215	48	390	75	34	424	520
Outlook fb Matrix + MSO fb Matrix + MSO	0.656 0.008 + 1.0% 0.016 + 1.0%	1 2 3	129	193	74	396	71	56	452	558
Valor fb Matrix + MSO fb Matrix + MSO	0.094 0.008 + 1.0% 0.016 + 1.0%	1 2 3	119	162	47	328	70	40	367	471
Spartan fb Matrix + MSO fb Matrix + MSO	0.094 0.008 + 1.0% 0.016 + 1.0%	1 2 3	104	180	56	339	68	51	390	497
Outlook	0.656	1	122	171	53	346	70	39	385	494
Valor	0.094	1	103	85	14	202	58	17	219	347
Spartan	0.094	1	128	172	63	363	69	47	410	525
Matrix + Dual Magnum	0.008 + 1.0	1	112	165	64	341	63	71	411	538
LSD (0.05)			NS	45	31	78	9	40	97	90

*Postemergence applications of Matrix were inadvertently applied at one-third (0.008 lb ai/acre) of the desired rate resulting in a second postemergence Matrix (0.016 lb ai/acre) application.

†Application (1) was applied preemergence on May 2, application (2) was applied postemergence on May 22, and application (3) was applied postemergence on May 30, 2002.