

Weed control in vegetable seed.

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Four vegetable seed studies were conducted in 1999: two studies in table beet seed, one in spinach seed, and one in cabbage seed.

Materials and Methods.

Table beets. Table beet stecklings were transplanted at Hulbert's home place April 16 and at WSU Mount Vernon the last week of April 28. Hulbert preplant incorporated, preemergence, and postemergence treatments were applied April 15, April 30, and May 30, respectively. WSU Mount Vernon preemergence and postemergence treatments were applied April 27 and June 3, respectively. Weed control and crop injury were estimated July 6 at Hulbert and June 8 and July 6 at WSU Mount Vernon. On September 2, plants in each plot were counted in the on station trial and three representative male plants were cut. These were dried in the field and the seed threshed October 11. Both trials were a randomized complete block with four replicates.

Spinach. Spinach was seeded at WSU Mount Vernon April 24. Preplant incorporated and preemergence herbicides were applied April 23 and 28, respectively. Postemergence applications were made June 4. Weed control and spinach injury were estimated June 8 and July 6. Female plants in each plot were counted August 20, and five representative female plants were cut, dried in the greenhouse, and seed threshed September 18. The trial was a randomized complete block with four replicates.

Cabbage. Cabbage seedlings (2- to 3-leaf) were transplanted August 21, and at-transplant treatments applied August 27. Initial weed control and crop injury were estimated September 7. A split-plot application of Tough was applied to all plots September 10, and crop injury/weed control were again estimated October 13. The cabbage study will be continued through the 2000 growing season. The trial is a split-plot, randomized complete block with four replicates.

Results.

Table Beets. No treatment in either trial caused visible foliar injury (data not shown). Six treatments were still providing >90% weed control by July 6:

- Hulbert (Table 1): Dual Magnum + Nortron (PRE), Dual Magnum + Frontier (PRE), Nortron + Frontier (PRE), and Frontier + Pyramin (PRE + POST).
- On Station (Table 2): Pyramin + Betamix (PRE + POST) and Pyramin + Betamix Progress (PRE + POST).

No treatment in either trial significantly reduced stand counts or seed yield (Table 3).

Spinach. The only treatment still providing > 90% weed control 69 days after treatment (DAT) was Dual Magnum + Frontier (PRE), although it caused moderate (13%) initial crop injury (Table 4). Treatments combining low (< 10%) crop injury and good (> 85%) mid-season weed control were Pyramin + Frontier (PRE), Dual Magnum + Spin Aid (PRE + POST), Spin Aid + Pyramin (POST), and Ro-Neet + Spin Aid (PPI + POST) (87, 87, 87, and 85% control, respectively).

Crop density was severely reduced by treatments including Nortron at the tested rates (Table 5); of the 8 treatments statistically reducing the stand from the handweeded check, six included Nortron. The other two treatments were Ro-Neet + Dual Magnum (PPI + PRE) and Pyramin + Spin Aid (PRE + POST).

Most treatments produced statistically as much seed as the handweeded check (Table 5). Only Ro-Neet + Dual Magnum (PPI + PRE), Nortron + Frontier (PRE), and Dual Magnum + Nortron (PRE) yielded poorer than the handweeded check.

Cabbage. Prowl stunted cabbage transplants, eventually causing 41% growth reduction at 46 DAT (Table 6). Tough initially caused moderate injury, but plants had recovered by 13 DAT (data not shown). Most Tough combinations were providing > 85% weed control by September 23, with Spartan + Tough at 94%.

Table 1. Crop injury and weed control from several herbicide combinations used in table beet seed (off station).

Treatment	Timing ^a	Rate	Weed control ^b
		product/A	%
Ro-Neet + Herb. 273	PPI + POST	4 pt + 0.33 pt	56
Ro-Neet + Betamix	PPI + POST	4 pt + 3 pt	65
Ro-Neet + Beta. Progress	PPI + POST	4 pt + 2.25 pt	68
Ro-Neet + UpBeet	PPI + POST	4 pt + 0.5 oz	78
Ro-Neet + Stinger + UpBeet	PPI + POST	4 pt + 0.25 pt + 0.5 oz	87
Ro-Neet + Pyramin	PPI + POST	4 pt + 2.2 lb	56
Nortron + Herb. 273	PRE + POST	2.9 pt + 0.33 pt	66
Nortron + UpBeet	PRE + POST	2.9 pt + 0.5 oz	85
Nortron + Stinger + UpBeet	PRE + POST	2.9 pt + 0.25 pt + 0.5 oz	87
Nortron + Pyramin	PRE + POST	2.9 pt + 2.2 lb	69
Ro-Neet + Dual Mag.	PPI + PRE	2.67 pt + 1 pt	80
Ro-Neet + Pyramin	PPI + POST	2.67 pt + 2.2 lb	59
Ro-Neet + Nortron	PPI + PRE	2.67 pt + 1.9 pt	64
Ro-Neet + Frontier	PPI + PRE	2.67 pt + 1.33 pt	88
Dual Mag. + Pyramin	PRE + POST	1 pt + 2.2 lb	87
Dual Mag. + Nortron	PRE	1 pt + 1.9 pt	91
Dual Mag. + Frontier	PRE	1 pt + 1.33 pt	94
Nortron + Pyramin	PRE + POST	1.9 pt + 2.2 lb	69
Nortron + Frontier	PRE	1.9 pt + 1.33 pt	96
Pyramin + Frontier	PRE + POST	2.2 lb + 1.33 pt	90
Handweeded check	C	C	100
LSD _{0.05}		C	C

^aPPI = preplant incorporated; PRE = preemergence; POST = postemergence.

^bPercent weed control evaluated July 6.

Table 2. Crop injury and weed control from several herbicide combinations used in table beet seed (on station).

Treatment	Timing ^a	Rate	Weed control	
			6/8	7/6
		product/A	-----	% -----
Pyramin + Herb. 273	PRE + POST	3.7 lb + 0.33 pt	85	74
Pyramin + Betamix	PRE + POST	3.7 lb + 3 pt	93	94
Pyramin + Beta. Progress	PRE + POST	3.7 lb + 2.2 pt	95	94
Pyramin + UpBeet	PRE + POST	3.7 lb + 0.5 oz	90	73
Pyramin + Stinger + UpBeet	PRE + POST + POST	3.7 lb + 0.25 pt + 0.5 oz	89	75
Dual Mag. + Herb. 273	PRE + POST	1.5 pt + 0.33 pt	65	50
Dual Mag. + Betamix	PRE + POST	1.5 pt + 3 pt	88	84
Dual Mag. + Beta. Progress	PRE + POST	1.5 pt + 2.2 pt	85	86
Dual Mag. + UpBeet	PRE + POST	1.5 pt + 0.5 oz	81	70
Dual Mag. + Sting. + UpB.	PRE + POST + POST	1.5 pt + 0.25 pt + 0.5 oz	84	71
Dual Mag. + Pyramin	PRE + POST	1.5 pt + 2.2 lb	83	84
Betamix + Herb. 273	POST	3 pt + 0.33 pt	28	33
Beta. Progress + Herb. 273	POST	2.2 pt + 0.33 pt	23	49
Beta. Progress	POST	2.2 pt	11	35
Betamix + UpBeet	POST	3 pt + 0.5 oz	16	44
Betamix + Stinger + UpBeet	POST	3 pt + 0.25 pt + 0.5 oz	15	38
Betamix + Pyramin	POST	3 pt + 2.2 lb	31	68
Beta. Progress + Pyramin	POST	2.2 pt + 2.2 lb	33	55
Pyramin + Herb. 273	POST	2.2 lb + 0.33 pt	8	16
Handweeded check	C	C		100
				86
LSD _{0.05}	C	C		19
				20

^aPRE = preemergence; POST = postemergence.

Table 3. Crop density and seed yield of table beets treated with several herbicide combinations (on station).

Treatment	Timing ^a	Rate	Crop density	Seed yield
		product/A	no./plot	lbs/A
Pyramin + Herb. 273	PRE + POST	3.7 lb + 0.33 pt	17	3627
Pyramin + Betamix	PRE + POST	3.7 lb + 3 pt	18	3530
Pyramin + Beta. Progress	PRE + POST	3.7 lb + 2.2 pt	18	3631
Pyramin + UpBeet	PRE + POST	3.7 lb + 0.5 oz	17	2522
Pyramin + Stinger + UpBeet	PRE + POST + POST	3.7 lb + 0.25 pt + 0.5 oz	16	2839
Dual Mag. + Herb. 273	PRE + POST	1.5 pt + 0.33 pt	15	2516
Dual Mag. + Betamix	PRE + POST	1.5 pt + 3 pt	18	3631
Dual Mag. + Beta. Progress	PRE + POST	1.5 pt + 2.2 pt	18	3682
Dual Mag. + UpBeet	PRE + POST	1.5 pt + 0.5 oz	16	2271
Dual Mag. + Sting. + UpB.	PRE + POST + POST	1.5 pt + 0.25 pt + 0.5 oz	16	2385
Dual Mag. + Pyramin	PRE + POST	1.5 pt + 2.2 lb	17	3003
Betamix + Herb. 273	POST	3 pt + 0.33 pt	16	2805
Beta. Progress + Herb. 273	POST	2.2 pt + 0.33 pt	18	2306
Beta. Progress	POST	2.2 pt	17	2396
Betamix + UpBeet	POST	3 pt + 0.5 oz	20	1851
Betamix + Stinger + UpBeet	POST	3 pt + 0.25 pt + 0.5 oz	18	2665
Betamix + Pyramin	POST	3 pt + 2.2 lb	16	2759
Beta. Progress + Pyramin	POST	2.2 pt + 2.2 lb	16	2479
Pyramin + Herb. 273	POST	2.2 lb + 0.33 pt	16	1425
Handweeded check	C	C		17
				2967
LSD _{0.05}	C	C		ns
				ns

^aPRE = preemergence; POST = postemergence.

Table 4. Crop injury and weed control from several herbicide combinations used in spinach seed.

Treatment	Timing ^a	Rate	Crop injury	Weed control	
				6/8	7/6
		product/A	%	-----	% ----
Ro-Neet + Dual Magnum	PPI + PRE	1.3 pt + 0.5 pt	3	60	57
Ro-Neet + Pyramin	PPI + PRE	1.3 pt + 1.5 lb	0	82	75
Ro-Neet + Nortron	PPI + PRE	1 pt + 1 pt	40	58	20
Ro-Neet + Frontier	PPI + PRE	1.3 pt + 1 pt	13	93	77
Nortron + Pyramin	PRE	1 pt + 1 lb	30	70	37
Nortron + Frontier	PRE	1 pt + 1 pt	83	93	77
Dual Magnum + Pyramin	PRE	0.5 pt + 1.5 lb	0	85	75
Dual Magnum + Nortron	PRE	0.5 pt + 1.5 pt	70	85	35
Dual Magnum + Frontier	PRE	0.5 pt + 1 pt	13	95	96
Pyramin + Frontier	PRE	1.5 lb + 1 pt	7	93	87
Ro-Neet + Herbicide 273	PPI + POST	1.3 pt + 1.7 floz	0	35	53
Ro-Neet + Spin Aid	PPI + POST	1.3 pt + 3 pt	2	67	85
Ro-Neet + Pyramin	PPI + POST	1.3 pt + 0.75 lb	0	48	68
Nortron + Herbicide 273	PRE + POST	1 pt + 1.7 floz	20	45	25
Nortron + Spin Aid	PRE + POST	1 pt + 3 pt	23	80	83
Nortron + Pyramin	PRE + POST	1 pt + 0.75 lb	25	48	52
Pyramin + Herbicide 273	PRE + POST	1.5 lb + 1.7 floz	0	60	67
Pyramin + Spin Aid	PRE + POST	1.5 lb + 3 pt	5	80	82
Dual Mag. + Herbicide 273	PRE + POST	0.5 pt + 1.7 floz	0	55	62
Dual Mag. + Spin Aid	PRE + POST	0.5 pt + 3 pt	0	88	87
Dual Mag. + Pyramin	PRE + POST	0.5 pt + 0.75 lb	2	73	75
Spin Aid + Herbicide 273	POST	3 pt + 1.7 floz	0	38	75
Spin Aid + Pyramin	POST	3 pt + 0.75 lb	0	33	87
Pyramin + Herbicide 273	POST	0.75 lb + 1.7 floz	0	27	67
Handweeded check	C	C			0
					100
					95
LSD _{0.05}	C	C			15
					25
					26

^aPPI = preplant incorporated; PRE = preemergence; POST = postemergence.

Table 5. Crop density and seed yield of spinach after treatment with several herbicide combinations.

Treatment	Timing ^a	Rate	Crop density	Seed yield
		product/A	no./plot lbs/A	
Ro-Neet + Dual Magnum	PPI + PRE	1.3 pt + 0.5 pt	33	575
Ro-Neet + Pyramin	PPI + PRE	1.3 pt + 1.5 lb	54	1181
Ro-Neet + Nortron	PPI + PRE	1 pt + 1 pt	20	815
Ro-Neet + Frontier	PPI + PRE	1.3 pt + 1 pt	50	1904
Nortron + Pyramin	PRE	1 pt + 1 lb	32	1059
Nortron + Frontier	PRE	1 pt + 1 pt	12	401
Dual Magnum + Pyramin	PRE	0.5 pt + 1.5 lb	55	2192
Dual Magnum + Nortron	PRE	0.5 pt + 1.5 pt	10	349
Dual Magnum + Frontier	PRE	0.5 pt + 1 pt	40	1109
Pyramin + Frontier	PRE	1.5 lb + 1 pt	54	1570
Ro-Neet + Herbicide 273	PPI + POST	1.3 pt + 1.7 floz	56	1906
Ro-Neet + Spin Aid	PPI + POST	1.3 pt + 3 pt	56	1250
Ro-Neet + Pyramin	PPI + POST	1.3 pt + 0.75 lb	56	2119
Nortron + Herbicide 273	PRE + POST	1 pt + 1.7 floz	40	1582
Nortron + Spin Aid	PRE + POST	1 pt + 3 pt	37	1663
Nortron + Pyramin	PRE + POST	1 pt + 0.75 lb	33	1240
Pyramin + Herbicide 273	PRE + POST	1.5 lb + 1.7 floz	54	1407
Pyramin + Spin Aid	PRE + POST	1.5 lb + 3 pt	38	1528
Dual Mag. + Herbicide 273	PRE + POST	0.5 pt + 1.7 floz	58	2034
Dual Mag. + Spin Aid	PRE + POST	0.5 pt + 3 pt	52	1866
Dual Mag. + Pyramin	PRE + POST	0.5 pt + 0.75 lb	58	2435
Spin Aid + Herbicide 273	POST	3 pt + 1.7 floz	61	2495
Spin Aid + Pyramin	POST	3 pt + 0.75 lb	58	2400
Pyramin + Herbicide 273	POST	0.75 lb + 1.7 floz	64	1399
Handweeded check	C	C		57
				1730
LSD _{0.05}		C	C	19
				1060

^aPPI = preplant incorporated; PRE = preemergence; POST = postemergence.

Table 6. Crop injury and weed control from several herbicides and herbicide combinations used in cabbage seed.

Treatment	Timing ^a	Rate	Crop Injury		Weed Control	
			9/7 ^b	10/23	9/7 ^b	10/23
		product/A	-----		%	-----
Dual Magnum	POTR	1 pt	0	0	51	43
Dual Magnum + Tough	POTR + POST	1 pt + 1 pt	B	0	B	84
Spartan	POTR	5.25 oz	0	0	98	81
Spartan + Tough	POTR + POST	5.25 oz + 1 pt	B	0	B	94
Frontier	POTR	0.33 pt	0	0	51	28
Frontier + Tough	POTR + POST	0.33 pt + 1 pt	B	0	B	85
Milestone	POTR	0.5 oz	0	0	91	58
Milestone + Tough	POTR + POST	0.5 oz + 1 pt	B	0	B	85
Resource	POTR	0.33 pt	0	0	79	35
Resource + Tough	POTR + POST	0.33 pt + 1 pt	B	0	B	73
Prowl	POTR	3.6 pt	9	41	97	95
Prowl + Tough	POTR + POST	3.6 pt + 1 pt	B	41	B	96
Paramount	POTR	10 oz	0	0	66	30
Paramount + Tough	POTR + POST	10 oz + 1 pt	B	0	B	78
Simazine	POTR	14 oz	0	0	64	70
Simazine + Tough	POTR + POST	14 oz + 1 pt	B	0	B	88
LSD _{0.05}	C	C		19	12	19
						12

^aPOTR = post-transplant, prior to weed emergence; POST = postemergence to weeds.

^bOn this date, the Tough treatment had not yet been applied.