

Project Number: 13K 3419 7228

Title: Weed control in vegetable seed crops.

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Reporting Period: 2005-06

Accomplishments: Two weed control trials in vegetable seed were conducted in 2005: one study each in table beet/Swiss chard seed and spinach seed. Weed control and/or crop injury was measured in each study. Additional vegetable seed crop trials conducted included a herbicide screening trial on spinach and beets (funded by the federal IR-4 project) and an organic transition trial using spinach (funded by the WSU Center for Sustainable Agriculture and Natural Resources).

Results: Results will be presented at the Western Washington Horticultural Association meeting in January, 2006.

Table beet/Swiss chard seed. Table beet roots and overwintered beet and Swiss chard seedlings were transplanted May 12 at WSU NWREC. Preplant-incorporated (PPI) treatments were applied May 11, preemergence (PRE) on May 13, and POST on May 20 and 27 and June 5 and 14. Weed control and crop injury were estimated May 27, June 6, and (for beet only) August 12. Swiss chard plants were pulled and fresh weight determined July 19, and beet plants were pulled and fresh weight determined August 18. The trial was a randomized complete block with four replicates. Most treatments resulted in excellent weed control. For repeat micro-rate applications, weed control increased an average of 10 percentage points from a second application, and adding a third application resulted in an increase of 6 percentage points. Fresh weights of beet seedlings did not statistically differ by herbicide treatment; neither did beet seedlings. This indicated that beet was apparently tolerant to these micro-rate applications and timings.

Spinach seed. Spinach was seeded May 4 at WSU NWREC. PPI treatments were applied May 3, PRE May 7, and POST May 20 and 27 and June 5 and 10. Weed control and crop injury were estimated May 27, June 6, and August 12. Five representative spinach plants (if present) were pulled and fresh weight determined August 30. The trial was a randomized complete block with four replicates. Treatments causing moderate crop injury to spinach by August were Dual Magnum + either Define or Matrix; all four micro-rate treatments caused excessive crop injury (70 to 95%), probably due to the UpBeet. Treatments not providing acceptable weed control were Ro-Neet or Dual Magnum + Matrix and Nortron + Dual Magnum. Marginally effective treatments included Dual Magnum + Define and Ro-Neet + Dual Magnum. In general, the better the weed control, the higher the spinach fresh weight by the end of August. Major exceptions were the four micro-rate treatments, which provided very good weed control but excessive early crop injury.

Table 1. Weed control in Swiss chard and table beets after treatment with several herbicides.

Treatment ^a	Rate product/a	Timing ^b	Weed control		
			%	%	%
Hand weeded	---	---	100	100	100
Ro-Neet + Betamix	2.7 pt + 3.1 pt	PPI + P21	98	93	61
Pyramin + Outlook + (Progress + UpBeet + Stinger + MSO)	3.7 lb + 2 pt + (5.7 fl.oz + 0.1 oz + 1.3 fl.oz + 1.5%)	PRE + PRE + (P7)	100	100	91
Pyramin + Outlook + (Progress + UpBeet + Stinger + MSO)	3.7 lb + 2 pt + (5.7 fl.oz + 0.1 oz + 1.3 fl.oz + 1.5%)	PRE + PRE + (P7, P14)	100	100	95
Pyramin + Outlook + (Progress + UpBeet + Stinger + MSO)	3.7 lb + 2 pt + (5.7 fl.oz + 0.1 oz + 1.3 fl.oz + 1.5%)	PRE + PRE + (P7, P14, P21)	100	100	98
Pyramin + Dual Magnum + (Progress + UpBeet + Stinger + MSO)	3.7 lb + 1.75 pt + (5.7 fl.oz + 0.1 oz + 1.3 fl.oz + 1.5%)	PRE + PRE + (P7)	100	100	84
Pyramin + Dual Magnum + (Progress + UpBeet + Stinger + MSO)	3.7 lb + 1.75 pt + (5.7 fl.oz + 0.1 oz + 1.3 fl.oz + 1.5%)	PRE + PRE + (P7, P14)	100	100	93
Pyramin + Dual Magnum + (Progress + UpBeet + Stinger + MSO)	3.7 lb + 1.75 pt + (5.7 fl.oz + 0.1 oz + 1.3 fl.oz + 1.5%)	PRE + PRE + (P7, P14, P21)	100	100	91
Ro-Neet + (Progress + UpBeet + Stinger + MSO) + (Progress + UpBeet + Stinger + MSO)	2.7 pt + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%) + (11.4 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PPI + (P1) + (P7)	100	100	68
Ro-Neet + (Progress + UpBeet + Stinger + MSO) + (Progress + UpBeet + Stinger + MSO)	2.7 pt + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%) + (11.4 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PPI + (P1) + (P7, P14)	99	100	80
Ro-Neet + (Progress + UpBeet + Stinger + MSO) + (Progress + UpBeet + Stinger + MSO)	2.7 pt + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%) + (11.4 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PPI + (P1) + (P7, P14, P21)	100	100	96
Nortron + (Progress + UpBeet + Stinger + MSO) + (Progress + UpBeet + Stinger + MSO)	2 pt + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%) + (11.4 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P1) + (P7)	99	99	63
Nortron + (Progress + UpBeet + Stinger + MSO) + (Progress + UpBeet + Stinger + MSO)	2 pt + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%) + (11.4 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P1) + (P7, P14)	99	99	80
Nortron + (Progress + UpBeet + Stinger + MSO) + (Progress + UpBeet + Stinger + MSO)	2 pt + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%) + (11.4 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P1) + (P7, P14, P21)	96	98	90
Dual Magnum + (Progress + UpBeet + Stinger + MSO) + (Progress + UpBeet + Stinger + MSO)	1.75 pt + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%) + (11.4 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P1) + (P7)	100	100	83
Dual Magnum + (Progress + UpBeet + Stinger + MSO) + (Progress + UpBeet + Stinger + MSO)	1.75 pt + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%) + (11.4 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P1) + (P7, P14)	100	100	89
Dual Magnum + (Progress + UpBeet + Stinger + MSO) + (Progress + UpBeet + Stinger + MSO)	1.75 pt + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%) + (11.4 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P1) + (P7, P14, P21)	100	100	95
Outlook + (Progress + UpBeet + Stinger + MSO) + (Progress + UpBeet + Stinger + MSO)	2 pt + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%) + (11.4 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P1) + (P7)	100	100	84
Outlook + (Progress + UpBeet + Stinger + MSO) + (Progress + UpBeet + Stinger + MSO)	2 pt + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%) + (11.4 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P1) + (P7, P14)	100	100	94
Outlook + (Progress + UpBeet + Stinger + MSO) + (Progress + UpBeet + Stinger + MSO)	2 pt + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%) + (11.4 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P1) + (P7, P14, P21)	100	100	98
LSD _{0.05}	---	---	2	1	11

^aMSO = methylated seed oil.

^bPPI = pre-plant incorporated; PRE = preemergence; P1 = postemergence, 1 day after emergence (DAE); P7 = postemergence, 7 DAE; P14 = postemergence, 14 DAE; P21 = postemergence, 21 DAE.

Table 2. Swiss chard and table beet fresh weight after treatment with several herbicides.

Treatment ^a	Rate product/a	Timing ^b	Swiss chard fresh weight g/plot	Beet sdg. fresh weight g/plot	Beet stklg. fresh weight kg/plot
Hand weeded	---	---	882 (4)	705 (2)	1.85 (12)
Ro-Neet + Betamix	2.7 pt + 3.1 pt	PPI + P21	953 (2)	615 (13)	1.68 (16)
Pyramin + Outlook + (Progress + UpBeet + Stinger + MSO)	3.7 lb + 2 pt + (5.7 fl.oz + 0.1 oz + 1.3 fl.oz + 1.5%)	PRE + PRE + (P7)	780 (12)	553 (18)	1.82 (14)
Pyramin + Outlook + (Progress + UpBeet + Stinger + MSO)	3.7 lb + 2 pt + (5.7 fl.oz + 0.1 oz + 1.3 fl.oz + 1.5%)	PRE + PRE + (P7, P14)	724 (18)	631 (11)	1.94 (7)
Pyramin + Outlook + (Progress + UpBeet + Stinger + MSO)	3.7 lb + 2 pt + (5.7 fl.oz + 0.1 oz + 1.3 fl.oz + 1.5%)	PRE + PRE + (P7, P14, P21)	734 (17)	697 (3)	2.08 (4)
Pyramin + Dual Magnum + (Progress + UpBeet + Stinger + MSO)	3.7 lb + 1.75 pt + (5.7 fl.oz + 0.1 oz + 1.3 fl.oz + 1.5%)	PRE + PRE + (P7)	845 (6)	636 (10)	1.56 (20)
Pyramin + Dual Magnum + (Progress + UpBeet + Stinger + MSO)	3.7 lb + 1.75 pt + (5.7 fl.oz + 0.1 oz + 1.3 fl.oz + 1.5%)	PRE + PRE + (P7, P14)	880 (5)	646 (8)	2.20 (2)
Pyramin + Dual Magnum + (Progress + UpBeet + Stinger + MSO)	3.7 lb + 1.75 pt + (5.7 fl.oz + 0.1 oz + 1.3 fl.oz + 1.5%)	PRE + PRE + (P7, P14, P21)	835 (9)	680 (5)	2.01 (6)
Ro-Neet + (Progress + UpBeet + Stinger + MSO) + (Progress + UpBeet + Stinger + MSO)	2.7 pt + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%) + (11.4 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PPI + (P1) + (P7)	842 (7)	580 (17)	1.57 (19)
Ro-Neet + (Progress + UpBeet + Stinger + MSO) + (Progress + UpBeet + Stinger + MSO)	2.7 pt + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%) + (11.4 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PPI + (P1) + (P7, P14)	959 (1)	694 (4)	2.16 (3)
Ro-Neet + (Progress + UpBeet + Stinger + MSO) + (Progress + UpBeet + Stinger + MSO)	2.7 pt + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%) + (11.4 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PPI + (P1) + (P7, P14, P21)	657 (20)	630 (12)	1.93 (8)
Nortron + (Progress + UpBeet + Stinger + MSO) + (Progress + UpBeet + Stinger + MSO)	2 pt + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%) + (11.4 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P1) + (P7)	838 (8)	508 (20)	1.92 (9)
Nortron + (Progress + UpBeet + Stinger + MSO) + (Progress + UpBeet + Stinger + MSO)	2 pt + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%) + (11.4 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P1) + (P7, P14)	828 (10)	603 (15)	1.90 (10)
Nortron + (Progress + UpBeet + Stinger + MSO) + (Progress + UpBeet + Stinger + MSO)	2 pt + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%) + (11.4 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P1) + (P7, P14, P21)	910 (3)	605 (14)	2.30 (1)
Dual Magnum + (Progress + UpBeet + Stinger + MSO) + (Progress + UpBeet + Stinger + MSO)	1.75 pt + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%) + (11.4 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P1) + (P7)	815 (11)	589 (16)	1.87 (11)
Dual Magnum + (Progress + UpBeet + Stinger + MSO) + (Progress + UpBeet + Stinger + MSO)	1.75 pt + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%) + (11.4 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P1) + (P7, P14)	763 (13)	655 (7)	1.76 (15)
Dual Magnum + (Progress + UpBeet + Stinger + MSO) + (Progress + UpBeet + Stinger + MSO)	1.75 pt + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%) + (11.4 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P1) + (P7, P14, P21)	749 (14)	641 (9)	1.62 (17)
Outlook + (Progress + UpBeet + Stinger + MSO) + (Progress + UpBeet + Stinger + MSO)	2 pt + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%) + (11.4 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P1) + (P7)	676 (19)	532 (19)	1.60 (18)
Outlook + (Progress + UpBeet + Stinger + MSO) + (Progress + UpBeet + Stinger + MSO)	2 pt + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%) + (11.4 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P1) + (P7, P14)	743 (15)	668 (6)	1.84 (13)
Outlook + (Progress + UpBeet + Stinger + MSO) + (Progress + UpBeet + Stinger + MSO)	2 pt + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%) + (11.4 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P1) + (P7, P14, P21)	739 (16)	732 (1)	2.03 (5)
LSD _{0.05}	---	---	148	ns	ns

^aMSO = methylated seed oil.^bPPI = pre-plant incorporated; PRE = preemergence; P1 = postemergence, 1 day after emergence (DAE); P7 = postemergence, 7 DAE; P14 = postemergence, 14 DAE; P21 = postemergence, 21 DAE.

Table 3. Weed control and spinach injury and fresh weight after treatment with several herbicides.

Treatment ^a	Rate product/a	Timing ^b	Crop injury ^c			Weed control ^c			Spinach fresh weight ^d g/5 plts.
			%	%	%	%	%	%	
Ro-Neet + Dual Magnum	1.3 pt + 10.7 fl.oz	PPI + PRE	1	9	4	98	93	79	526
Ro-Neet + Spin Aid	1.3 pt + 1.8 pt	PPI + P21	0	0	5	93	84	86	491
Ro-Neet + Dual Magnum + Spin Aid	1.9 pt + 10.7 fl.oz + 1.8 pt	PPI + PRE + P21	0	6	10	96	94	94	796
Nortron + Dual Magnum	4.8 fl.oz + 10.7 fl.oz	PRE + PRE	1	6	10	89	84	60	432
Nortron + Dual Magnum + Spin Aid	4.8 fl.oz + 10.7 fl.oz + 1.8 pt	PRE + PRE + P21	0	0	0	95	91	90	429
Dual Magnum + Spin Aid	10.7 fl.oz + 1.8 pt	PRE + P21	0	3	13	90	83	81	357
Ro-Neet + Define	1.3 pt + 13.3 oz	PPI + PRE	0	6	3	100	99	89	796
Dual Magnum + Define	10.7 fl.oz + 13.3 oz	PRE	1	14	14	97	93	76	476
Ro-Neet + Matrix	1.3 pt + 0.6 oz	PPI + PRE	3	36	4	99	89	46	612
Dual Magnum + Matrix	10.7 fl.oz + 0.6 oz	PRE + PRE	3	15	14	98	89	59	609
Hand weeded	---	---	0	0	0	100	0	91	510
Pyramin + Outlook + (Progress + UpBeet + Stinger + MSO)	1.5 lb + 10.7 fl.oz + (5.7 fl.oz + 0.1 oz + 1.3 fl.oz + 1.5%)	PRE + PRE + (P7, P14, P21)	94	99	95	100	100	90	--- ^e
Pyramin + Dual Magnum + (Progress + UpBeet + Stinger + MSO)	1.5 lb + 10.7 fl.oz + (5.7 fl.oz + 0.1 oz + 1.3 fl.oz + 1.5%)	PRE + PRE + (P7, P14, P21)	9	63	70	100	100	85	--- ^e
Ro-Neet + (Progress + UpBeet + Stinger + MSO)	1.3 pt + (5.7 fl.oz + 0.1 oz + 1.3 fl.oz + 1.5%)	PPI + (P7, P14, P21)	3	53	70	100	100	88	--- ^e
Ro-Neet + (Progress + UpBeet + Stinger + MSO)	1.3 pt + (11.4 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PPI + (P7, P14, P21)	8	63	80	100	100	88	--- ^e
LSD _{0.05}	---	---	4	19	14	7	8	19	360

^aMSO = methylated seed oil.

^bPPI = pre-plant incorporated; PRE = preemergence; P7 = postemergence, 7 days after emergence (DAE); P14 = postemergence, 14 DAE; P21 = postemergence, 21 DAE.

^cCrop injury and weed control ratings taken May 27, June 6, and August 12.

^dSpinach fresh weight determined August 30.

^eThe few remaining spinach plants in this treatment were large but still very green due to early crop injury.