Project Number: 13K 3419 7228

Title: Weed control in vegetable seed crops.

Personnel: Tim Miller and Carl Libbey, WSU NWREC

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Accomplishments: Three weed control trials in vegetable seed were conducted in 2007: one study in cabbage seed and one study each in table beet/Swiss chard seed and spinach seed. Weed control and/or crop injury was measured in each study.

Results: Results will be presented at the Western Washington Horticultural Association meeting in January, 2008.

Cabbage seed trial. Seven lines of cabbage seed crops were transplanted at WSU Mount Vernon NWREC September 30, 2006. All plots received simazine treatment October 11 for general weed control prior to the spring applications of interest. Postemergence (POST) applications of two oxyfluorfen formulations or fluroxypyr were made over-the-top of cabbage plants April 11, 2007 and an application of fluroxypyr was made one week later (April 18). Crop injury and weed control was estimated April 17 and May 3. All plants from three bolting lines were pulled from the soil May 5 and plant population and fresh weight from each plot were recorded. The remaining four lines did not bolt, but were counted and weighed as above July 2. The trial was a split-block, randomized complete block with three replicates.

Crop injury from Goaltender was 1/3 or 1/4 that of Goal used at equivalent rates at 1 week after treatment (WAT; Table 1). By 3 WAT, damage from Goal was still moderately severe (19 and 27% for 2 and 3 pt/a, respectively), while plants had recovered from the slight Goaltender injury. Starane applied to bolting cabbage caused 10 and 25% injury at 1 WAT, but plants had nearly recovered by 3 WAT. Damage from Starane applied on April 18 was slight (4% at 2 WAT). There were no significant differences in fresh weight among the seven cabbage lines due to herbicide treatment, although stand count after treatment with Goal at 3 pt/a was trending lower than with other products. Based on these data, further testing of these products is warranted.

Spinach seed. Spinach was seeded May 17 at WSU Mount Vernon NWREC. Preplant-incorporated (PPI) treatments were applied May 15, preemergence (PRE) May 18, and POST June 16, 23, and 30. Weed control and crop injury were estimated June 26. Three spinach plants from each plot were pulled in September 26, and are currently drying in the greenhouse. Dry weight of plants and seed will be will be determined during October. The trial was a randomized complete block with four replicates.

Most treatments resulted in reasonably good crop safety (0 to 13% by late June; Table 2). Slowing of spinach growth in all micro-rate treatments was apparent by July, however (data not shown). Spinach biomass may show the level of growth retarding these treatments caused. In 2008, micro-rate treatments will include one or two POST treatments as well as the three tested in this trial.

Table beet herbicide screen. Beet stecklings and two lines of overwintered seedlings were transplanted May 10, each in its own row per plot (three rows total). PPI treatments were applied May 8, PRE treatments were applied May 14 and POST treatments were applied June 2, 9, and 16. The lay-by treatments were also applied June 16, but were applied only between rows using a shielded sprayer. Weed control and crop injury were estimated June 26. All beet plants from each row were pulled and fresh weight determined July 3. The trial was a split-plot, randomized complete block with four replicates.

Crop injury ratings for these treatments were all non-significantly different, and were generally low (Table 3). Weed control by late June was generally excellent, with improved weed control resulting the more times the micro-rates were applied (three times was better than one or two). Because these crops were not pinned for this location, however, full season weed control evaluation was not possible. The lay-by treatments appeared to provide good weed control without causing unacceptable crop injury, although full-season growth from these applications would be good to evaluate in 2008. There were no significant differences in stand count or fresh weight of stecklings or seedlings due to herbicide treatment, indicating that crop tolerance was excellent.

Table 1. Crop injury and weed control from spring herbicide application to an overwintered cabbage seed crop (2006-07).

Treatment	Rate	Crop injury		Weed control	Fresh weight	Stand
		Apr 17	May 3	May 3		
	product/a	%	%	%	g/plant	plants/plot
Goal (2 lb/gal product)	2.0 pt	21 b	19 b	87 a	906	8.2 ab
Goal (2 lb/gal product)	3.0 pt	28 a	27 a	85 ab	836	7.8 b
Goaltender (4 lb/gal product)	1.0 pt	7 c	2 ef	72 ab	907	9.0 ab
Goaltender (4 lb/gal product)	1.5 pt	7 c	3 ef	70 ab	1146	8.8 ab
Starane	0.67 pt	10 c	6 d	60 b	1485	8.2 ab
Starane	1.3 pt	25 ab	10 c	82 ab	934	9.5 a
Starane	0.67 pt	---	4 de	60 b	1072	9.4 a
Non-treated check	---	0 d	0 f	0 c	1097	8.9 ab

Means followed the same letter are not statistically different ($P < 0.05$). The active ingredient in both Goal and Goaltender is oxyfluorfen. Cabbage was transplanted September 30, 2006; simazine applied October 11, 2006; POST applied April 11 and 18, 2007. Fresh weight determined May 5 (3 lines) and July 2 (4 lines).

Table 2. Crop injury and weed control in spinach seed after treatment with several herbicides (2007).

Treatment[a]	Rate	Timing[b]	Crop injury	Weed control[c]
	product/a		%	%
Ro-Neet + Pyramin	1.3 pt + 1.5 lb	PPI + PRE	0 c	79 de
Ro-Neet + Dual Magnum	1.3 pt + 8.4 fl.oz	PPI + PRE	3 c	88 abcd
Ro-Neet + Define	1.3 pt + 13.3 oz	PPI + PRE	1 c	94 a
Ro-Neet + Spin Aid	1.3 pt + 1.8 pt	PRI + POST	1 c	91 ab
Nortron + Pyramin	4.6 fl.oz + 1.1 lb	PRE + PRE	3 c	65 f
Nortron + Dual Magnum	4.6 fl.oz + 5.9 fl.oz	PRE + PRE	1 c	79 de
Nortron + Define	4.6 fl.oz + 13.3 oz	PPI + PRE	0 c	90 abc
Nortron + Spin Aid	4.6 fl.oz + 1.8 pt	PRE + POST	1 c	80 de
Pyramin + Dual Magnum	1.5 lb + 8.4 fl.oz	PRE + PRE	0 c	80 de
Pyramin + Define	1.5 lb + 13.3 oz	PRE + PRE	3 c	81 cde
Pyramin + Spin Aid	1.5 lb + 1.8 pt	PRE + POST	0 c	79 de
Dual Magnum + Define	8.4 fl.oz + 13.3 oz	PRE + PRE	3 c	90 abc
Dual Magnum + Spin Aid	10.7 fl.oz + 1.8 pt	PRE + POST	0 c	96 a
Lorox	16 lb	PRE	8 b	80 de
Eptam	3.6 pt	PPI	13 a	84 bcde
Ro-Neet +	1.3 pt +	PPI +	3 c	76 e
(Progress + Stinger + MSO)	(5.7 fl.oz + 1.3 fl.oz + 1.5%)	(P7, P14, P21)		
Nortron +	4.6 fl.oz +	PRE +	3 c	75 e
(Progress + Stinger + MSO)	(5.7 fl.oz + 1.3 fl.oz + 1.5%)	(P7, P14, P21)		
Dual Magnum +	10.7 fl.oz +	PRE +	4 bc	90 abc
(Progress + Stinger + MSO)	(5.7 fl.oz + 1.3 fl.oz + 1.5%)	(P7, P14, P21)		
Pyramin +	1.5 lb +	PRE +	1 c	76 e
(Progress + Stinger + MSO)	(5.7 fl.oz + 1.3 fl.oz + 1.5%)	(P7, P14, P21)		
Define +	13.3 oz +	PRE +	0 c	90 abc
(Progress + Stinger + MSO)	(5.7 fl.oz + 1.3 fl.oz + 1.5%)	(P7, P14, P21)		
Hand weeded	---	---	0 c	100 a

Means followed the same letter are not statistically different ($P < 0.05$).

[a]MSO = methylated seed oil.

[b]PPI = pre-plant incorporated; PRE = preemergence; P7 = postemergence, 7 DAE; P14 = postemergence, 14 DAE; P21 = postemergence, 21 DAE.

Spinach was seeded May 17. PPI applied May 15; PRE applied May 18; POST June 16, 23, and 30. Weed control and crop injury estimated June 26.

Table 3. Weed control in table beets after treatment with several herbicides (2007).

Treatment[a]	Rate	Timing[b]	Crop injury	Weed control
	product/a		%	%
Hand weeded	---	---	0	100 a
Ro-Neet + Betamix	2.7 pt + 3.1 pt	PPI + P21	3	88 de
Pyramin + (Progress + UpBeet + Stinger + MSO)	3.7 lb + (5.7 fl.oz + 0.1 oz + 1.3 fl.oz + 1.5%)	PRE + (P7)	6	81 fg
Pyramin + (Progress + UpBeet + Stinger + MSO)	3.7 lb + (5.7 fl.oz + 0.1 oz + 1.3 fl.oz + 1.5%)	PRE + (P7, P14)	3	84 ef
Pyramin + (Progress + UpBeet + Stinger + MSO)	3.7 lb + (5.7 fl.oz + 0.1 oz + 1.3 fl.oz + 1.5%)	PRE + (P7, P14, P21)	11	97 ab
Ro-Neet + (Progress + UpBeet + Stinger + MSO)	2.7 pt + (5.7 fl.oz + 0.1 oz + 1.3 fl.oz + 1.5%)	PPI + (P7)	4	97 ab
Ro-Neet + (Progress + UpBeet + Stinger + MSO)	2.7 pt + (5.7 fl.oz + 0.1 oz + 1.3 fl.oz + 1.5%)	PPI + (P7, P14)	4	97 ab
Ro-Neet + (Progress + UpBeet + Stinger + MSO)	2.7 pt + (5.7 fl.oz + 0.1 oz + 1.3 fl.oz + 1.5%)	PPI + (P7, P14, P21)	4	99 a
Nortron + (Progress + UpBeet + Stinger + MSO)	2 fl.oz + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P7)	5	78 g
Nortron + (Progress + UpBeet + Stinger + MSO)	2 fl.oz + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P7, P14)	6	88 de
Nortron + (Progress + UpBeet + Stinger + MSO)	2 fl.oz + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P7, P14, P21)	11	94 bc
Dual Magnum + (Progress + UpBeet + Stinger + MSO)	2 fl.oz + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P7)	5	76 g
Dual Magnum + (Progress + UpBeet + Stinger + MSO)	2 fl.oz + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P7, P14)	4	88 de
Dual Magnum + (Progress + UpBeet + Stinger + MSO)	2 fl.oz + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P7, P14, P21)	6	95 abc
Outlook + (Progress + UpBeet + Stinger + MSO)	1.75 fl.oz + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P7)	1	84 ef
Outlook + (Progress + UpBeet + Stinger + MSO)	1.75 fl.oz + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P7, P14)	13	88 de
Outlook + (Progress + UpBeet + Stinger + MSO)	1.75 fl.oz + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P7, P14, P21)	8	95 abc
Ro-Neet + Betamix + Prowl	2.7 pt + 3.1 pt + 2 pt	PPI + P21 + P21L	3	86 def
Ro-Neet + Betamix + Dual Magnum	2.7 pt + 3.1 pt + 2 pt	PPI + P21 + P21L	4	90 cd
Ro-Neet + Betamix + Outlook	2.7 pt + 3.1 pt + 1.75 pt	PPI + P21 + P21L	9	95 abc
Ro-Neet + Betamix + Nortron	2.7 pt + 3.1 pt + 2 pt	PPI + P21 + P21L	6	86 def
Ro-Neet + Betamix + Pyramin	2.7 pt + 3.1 pt + 3.7 lb	PPI + P21 + P21L	11	88 de

Means followed the same letter are not statistically different ($P < 0.05$).

[a]MSO = methylated seed oil.

[b]PPI = pre-plant incorporated; PRE = preemergence; P7 = postemergence, 7 DAE; P14 = postemergence, 14 DAE; P21 = postemergence, 21 DAE; P21(L) = postemergence, 21 DAE, lay-by.

Table beets were transplanted May 10. PPI treatments applied May 8; PRE applied May 14; POST applied June 2, 9, and 16; Lay-by applied June 16, between rows using a shielded sprayer. Weed control and crop injury were estimated June 26.