

Project Number: 13K 3419 7228

Title: Weed control in vegetable seed crops.

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Reporting Period: 2008-09

Accomplishments: Three weed control trials in vegetable seed were conducted in 2008: 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:

Cabbage seed trial. Ten lines of cabbage seed crops were transplanted at WSU Mount Vernon NWREC September 5-6, 2007. All plots received simazine treatment October 23 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 February 18, 2008 and an application of fluroxypyr was made April 3. Crop injury and weed control was estimated April 17. All plants were pulled from the soil May 5 and plant population and fresh weight from each plot were recorded. The trial was a split-block, randomized complete block with three replicates.

Neither Goal nor Goaltender showed significant crop injury from the mid-February application by the April evaluation (Table 1). Starane applied in February at the 1.3 pt/a rate caused moderate injury (16%) by April, although plants treated with 0.67 pt/a appeared normal at the April evaluation. Damage from Starane applied on April 3 was slight (1% at 2 WAT). Weed control from Goal at either rate or Goaltender at 1.5 pt/a was excellent; Goaltender at 1 pt/a and all Starane treatments provided fair to good weed control (78-83%, Table 1). Herbicides did not affect cabbage stand, but fresh weight was reduced by the two rates of Goal and the EPOST Starane applications (Table 1). Based on these data, further testing of these products is warranted.

Spinach seed. Spinach was seeded June 15 at WSU Mount Vernon NWREC. Preplant-incorporated (PPI) treatments were applied June 2, preemergence (PRE) June 17, and POST July 12, 19, and 25. Weed control and crop injury were estimated October 2 (end of season). All plants in a single row per plot were pulled from the soil October 2 and fresh weight was recorded. Since the planting was equidistant between two different commercial production fields, no male lines were seeded; consequently, no seed was available for harvest. The trial was a randomized complete block with four replicates.

Weed control with these treatments was maximized by Nortron + either Dual Magnum or Define, by Lorox, by Asulam, and by all the micro-rate applications, ranging from 79 to 91% control (Table 2). Slowing of spinach growth in most micro-rate treatments was apparent by October, however (Table 2). In 2009, micro-rate treatments will include one or two POST treatments as well as the three tested in this trial. Additional Lorox and Asulam treatments will also be tested next season.

Table beet herbicide screen. Beet stecklings were transplanted June 13-14 at WSU Mount Vernon NWREC. PPI treatments were applied June 2, PRE treatments were applied June 17 and POST treatments were applied July 6, 12, and 19. The lay-by treatments were applied July 22, but were applied only between rows using a shielded sprayer. Weed control was estimated and beet plants were counted October 2 (end of season). Because of the delay in transplanting due to wet weather, beet emergence was very poor; therefore fresh weight was not determined. Seed stalks were collected, however, and resultant seed will be germinated this winter to determine if there are detrimental effects of the herbicide treatments on seed germination. The trial was a randomized complete block with four replicates.

There was no significant crop injury resulting from herbicide applications (data not shown), although stand counts were very low resulting from the late planting date. Weed control was excellent for all the micro-rate applications, ranging from 94 to 100% by October (Table 3). Improved weed control resulting the more times the micro-rates were applied (three times was better than one or two). The lay-by treatments appeared to provide good weed control without causing unacceptable crop injury, although weed control was not as good as with the micro-rate treatments. Based on these results, additional testing is warranted in 2009.

Table 1. Crop injury and weed control from spring herbicide application to an overwintered cabbage seed crop (2007-08).

Treatment	Rate	Timing	Crop injury	Weed control	Fresh weight	Stand
			Apr 17	April 17		
	product/a		%	%	kg/plant	plants/plot
Goal (2 lb/gal product)	2.0 pt	EPOST	0 b	93 a	1.81 bc	15.8
Goal (2 lb/gal product)	3.0 pt	EPOST	0 b	93 a	1.79 c	15.9
Goaltender (4 lb/gal product)	1.0 pt	EPOST	0 b	83 bc	1.96 a	15.4
Goaltender (4 lb/gal product)	1.5 pt	EPOST	0 b	88 ab	1.93 a	15.5
Starane	0.67 pt	EPOST	0 b	83 bc	1.77 c	15.7
Starane	1.3 pt	EPOST	16 a	78 c	1.54 d	15.4
Starane	0.67 pt	LPOST	1 b	78 c	1.96 a	15.8
Non-treated check	---	---	0 b	67 d	1.92 ab	15.5

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 5-6, 2007; simazine applied October 23, 2007; EPOST herbicides were applied February 18 and LPOST was applied April 3, 2008. Cabbage fresh weight was determined May 5.

Table 2. Crop injury and weed control in spinach seed after treatment with several herbicides (2008).

Treatment ^a	Rate	Timing ^b	Weed control	Spinach weight
	product/a		%	kg/plant
Ro-Neet + Pyramin	1.3 pt + 1.5 lb	PPI + PRE	69 f-h	3.54 fg
Ro-Neet + Dual Magnum	1.3 pt + 8.4 fl.oz	PPI + PRE	74 d-h	4.26 b-g
Ro-Neet + Define	1.3 pt + 13.3 oz	PPI + PRE	74 d-h	5.06 a-g
Ro-Neet + Spin Aid	1.3 pt + 1.8 pt	PRI + POST	76 b-h	5.09 a-g
Nortron + Pyramin	4.6 fl.oz + 1.1 lb	PRE + PRE	69 f-h	4.82 a-g
Nortron + Dual Magnum	4.6 fl.oz + 5.9 fl.oz	PRE + PRE	79 a-h	3.14 g
Nortron + Define	4.6 fl.oz + 13.3 oz	PPI + PRE	80 a-g	4.75 a-g
Nortron + Spin Aid	4.6 fl.oz + 1.8 pt	PRE + POST	76 b-h	5.40 a-f
Pyramin + Dual Magnum	1.5 lb + 8.4 fl.oz	PRE + PRE	63 h	5.23 a-f
Pyramin + Define	1.5 lb + 13.3 oz	PRE + PRE	66 gh	5.81 a-d
Pyramin + Spin Aid	1.5 lb + 1.8 pt	PRE + POST	75 c-h	5.23 a-f
Dual Magnum + Define	8.4 fl.oz + 13.3 oz	PRE + PRE	74 d-h	6.26 a
Dual Magnum + Spin Aid	10.7 fl.oz + 1.8 pt	PRE + POST	75 c-h	5.15 a-f
Lorox	1.0 lb	PRE	90 a-d	6.22 ab
Eptam	3.6 pt	PPI	71 e-h	3.96 d-g
Ro-Neet +	1.3 pt +	PPI +	94 a	5.59 a-e
(Progress + Stinger + MSO)	(5.7 fl.oz + 1.3 fl.oz + 1.5%)	(P7, P14, P21)		
Nortron +	4.6 fl.oz +	PRE +	91 a-c	3.73 e-g
(Progress + Stinger + MSO)	(5.7 fl.oz + 1.3 fl.oz + 1.5%)	(P7, P14, P21)		
Dual Magnum +	10.7 fl.oz +	PRE +	88 a-e	4.20 c-g
(Progress + Stinger + MSO)	(5.7 fl.oz + 1.3 fl.oz + 1.5%)	(P7, P14, P21)		
Pyramin +	1.5 lb +	PRE +	89 a-d	5.31 a-f
(Progress + Stinger + MSO)	(5.7 fl.oz + 1.3 fl.oz + 1.5%)	(P7, P14, P21)		
Define +	13.3 oz +	PRE +	85 a-f	4.18 c-g
(Progress + Stinger + MSO)	(5.7 fl.oz + 1.3 fl.oz + 1.5%)	(P7, P14, P21)		
Hand weeded	---	---	93 ab	6.50 a
Asulam	3.0 pt	POST	85 a-f	5.93 a-c

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

^aMSO = methylated seed oil.

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

Spinach was seeded June 15. PPI herbicides were applied June 2; PRE was applied June 17; POST July 12, 19, and 25. Weed control was estimated October 2.

Table 3. Weed control in table beets after treatment with several herbicides (2008).

Treatment ^a	Rate product/a	Timing ^b	Weed control %
Hand weeded	---	---	90 cd
Ro-Neet + Betamix	2.7 pt + 3.1 pt	PPI + P21	80 e
Pyramin + (Progress + UpBeet + Stinger + MSO)	3.7 lb + (5.7 fl.oz + 0.1 oz + 1.3 fl.oz + 1.5%)	PRE + (P7)	94 a-d
Pyramin + (Progress + UpBeet + Stinger + MSO)	3.7 lb + (5.7 fl.oz + 0.1 oz + 1.3 fl.oz + 1.5%)	PRE + (P7, P14)	98 a
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)	100 a
Ro-Neet + (Progress + UpBeet + Stinger + MSO)	2.7 pt + (5.7 fl.oz + 0.1 oz + 1.3 fl.oz + 1.5%)	PPI + (P7)	94 a-d
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)	96 a-c
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)	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)	94 a-d
Nortron + (Progress + UpBeet + Stinger + MSO)	2 fl.oz + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P7, P14)	98 a
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)	100 a
Dual Magnum + (Progress + UpBeet + Stinger + MSO)	2 fl.oz + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P7)	97 ab
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)	100 a
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)	98 a
Outlook + (Progress + UpBeet + Stinger + MSO)	1.75 fl.oz + (5.7 fl.oz + 0.2 oz + 1.3 fl.oz + 1.5%)	PRE + (P7)	96 a-c
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)	100 a
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)	99 a
Ro-Neet + Betamix + Prowl	2.7 pt + 3.1 pt + 2 pt	PPI + P21 + P21L	88 d
Ro-Neet + Betamix + Dual Magnum	2.7 pt + 3.1 pt + 2 pt	PPI + P21 + P21L	94 a-d
Ro-Neet + Betamix + Outlook	2.7 pt + 3.1 pt + 1.75 pt	PPI + P21 + P21L	90 b-d
Ro-Neet + Betamix + Nortron	2.7 pt + 3.1 pt + 2 pt	PPI + P21 + P21L	88 d
Ro-Neet + Betamix + Pyramin	2.7 pt + 3.1 pt + 3.7 lb	PPI + P21 + P21L	88 d

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

^aMSO = methylated seed oil.

^bPPI = 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 June 13-14. PPI herbicides were applied June 2; PRE were applied June 17; POST were applied July 6, 12, and 19; Lay-by's were applied July 22, between rows using a shielded sprayer. Weed control was estimated October 2.