Radish Tolerance to Starane Herbicide

2019

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Methods

A trial was set at the OSU Vegetable Research Farm on a Chehalis silty clay loam soil with a CEC of 24.12 meq/100 g soil, 6.7 pH, and 3.65% organic matter. Experimental plots were 30 feet long with 3 rows on 26 in. centers. Treatments were replicated 4 times. Treflan was applied to designated treatments on 1-May 2019 followed the same day by planting an open pollinated red globe variety of red radish. Post plant surface (PPS) herbicides were applied on 2-May. Two and four-leaf treatments were applied on 14-May and 20-May, respectively. Herbicides were applied as written in Table 1. Weed-free plots were hand-hoed on 24-May and 12-Jun, and all plots were cultivated on 28-May. A crop biomass cut was taken on 12-Jul from 12 ft of the middle row. Radish plants were pulled from the soil and windrowed in early September to hasten drying given the wet conditions in September. Seed was harvested with a Hege combine on 8-Oct. Seed germination was tested on a germination temperature gradient table for 6 days with a temperature range of 59 to 86 F at 6.75 F intervals.

Table 1. Herbicide application data.

Date	1-May, 2019	2-May, 2019	14-May, 2019	20-May, 2019
Herbicide/treatment	Treflan PPI 1 pt	Tr. 5,6,10	Tr. 1,2	Tr. 3,4
Application timing	PPI treatments	PPS	2 leaf radish	4 leaf radish
Start/end time	6:30-7:15 AM	6:30-6:50	5-5:30 PM	10-10:15 AM
Air temp/soil t (2")/surface t	48/52/50	46/48/44	63/67/70	56/55/56
Rel humidity	55%	67%	86%	76%
Wind direction/velocity	0	0	SW 2.3-5.1	SSE 2.5 to 4.0
Cloud cover	0%	0%	95%	100%
Soil moisture	0	0	Very wet	Very wet
Plant moisture	0	0	Dry	Damp
Sprayer/PSI	BP CO_2/25 psi	BP CO_2/25 psi	BP CO_2/25 psi	BP CO_2/25 psi
Mix size	3 gal	2100 mls	2100 mls	2100 mls
Gallons H20/acre	20	20	20	20
Nozzle type	5-XR8003	5-XR8003	5-XR8003	5-XR8003
Nozzle spacing and height	20/20	20/20	20/20	20/20
Soil inc. method/implement	Shallowest setting on Kuhn tiller, one pass	Irrigation 0.5 in	-	-

Results

As in previous studies, fluroxypyr may have caused slight stunting of the crop and some phytotoxicity shortly after treatment. At two weeks after the 4-lf treatment was applied, stunting was even more visible and may have reduced crop growth by 33% when fluroxypyr was applied to 4-lf radish at 0.131 lb ai/a (Table 2). However, when the crop was harvested, the improvement in weed control was substantial, particularly for hairy nightshade, and the average seed yield of treatments that caused stunting was nearly the same as the yield in the hand-weeded plot. Seed germination tests indicated no effect on seed germination with the exception that the nontreated weedy treatments had a slightly slower germination rate than most other treatments at 4 days after the start of the germination test (Table 3).

Table 2. Effect of rate and timing of fluroxypyr on radish growth, 2019.

	Herbicide	Timing	Product rate		Date	13-May			16-May		24-May		28-May		6-Jun		Weed control (6-Jun)			
						Plant stand	Phyto [a]	Stunting [b]	Phyto	Stunting	Phyto	Stunting	Phyto	Stunting	Phyto	Stunting	hairy night shade	Pigweed	Lambs-quarters	Overall
			#/acre			*no/6 ft*	*0-10*	*%*	*0-10*	*%*	*0-10*	*%*	*0-10*	*%*	*0-10*	*%*	---------- *%*----------			
1	Fluroxypyr	2 lf	2	oz	14-May	15.5	0.0	0	0.4	0	0.3	4	0.0	11	0.0	19	89	100	100	93
	Treflan PPI	PPI	16	oz	1-May															
2	Fluroxypyr	2 lf	4	oz	14-May	15.8	0.0	0	0.8	0	0.5	11	0.5	16	0.5	25	70	75	75	70
	Treflan PPI	PPI	16	oz	1-May															
3	Fluroxypyr	4 lf	6	oz	20-May	13.3	0.0	0	0.0	0	2.3	6	1.0	13	0.8	33	93	100	95	91
	Treflan PPI	PPI	16	oz	1-May															
4	Fluroxypyr	4 lf	12	oz	20-May	16.0	0.0	0	0.0	0	2.8	9	1.0	13	1.3	23	94	100	100	94
	Treflan PPI	PPI	16	oz	1-May															
5	Dual Magnum	PPS	10.7	oz	1-May	16.5	0.0	0	0.0	0	0.3	1	0.0	3	0.0	8	95	100	99	97
	Treflan PPI	PPI	16	oz	1-May															
6	Devrinol	PPS	2	lbs	1-May	13.0	0.0	0	0.0	0	0.0	5	0.0	8	0.0	11	13	98	98	23
	Treflan PPI	PPI	16	oz	1-May															
7	Treflan PPI	PPI	16	oz	1-May	18.3	0.0	0	0.0	0	0.0	5	0.0	6	0.0	24	61	96	95	61
	Dual Magnum	2 lf	10.7	oz	14-May															
8	Nontreated	-	-			12.0	0.0	0	0.0	0	0.0	4	0.0	0	0.5	5	0	0	0	0
9	Nontreated	Hand-weeded				14.5	0.0	0	0.0	0	0.0	1	0.0	0	0.0	0	0	0	0	0
10	Sonalan	PPS	2	pts	1-May	14.0	0.0	0	0.0	0	0.0	1	0.0	3	0.0	14	64	100	98	56
	FPLSD (0.05)					ns	-	-	0.2	-	0.9	ns	0.6	7	0.8	15	29	23	24	28

[a] 0, no effect; 10=plant completely injured or dead. [b] Percent growth reduction compared to nontreated plots.

Table 3. Effect of rate and timing of Starane on radish growth and seed yield.

	Herbicide	Timing	Rate			Date	Mid-season biomass harvest		Seed yield and germination				
							No. plants	Biomass	Seed wt.	100 seed wt.	Germination across temp of 59 to 84F		
			#/A		*lb ai/A*		*no/12 ft*	*lbs/12 ft*	*lb/A*	*g*	*No. of 10 seeds that germinated at 2, 4, and 6 days after start*		
1	Starane 1x	2 lf	2	oz	0.044	14-May	28	13.6	589	1.07	7.4	9.7	9.9
	Treflan PPI	PPI	16	oz	0.500	1-May							
2	Starane 2x	2 lf	4	oz	0.088	14-May	27	19.6	591	1.05	6.3	9.3	9.7
	Treflan PPI	PPI	16	oz	0.500	1-May							
3	Starane 1x	4 lf	6	oz	0.131	20-May	28	18.0	622	1.10	8.1	9.7	9.9
	Treflan PPI	PPI	16	oz	0.500	1-May							
4	Starane 2x	4 lf	12	oz	0.263	20-May	32	14.8	634	1.12	7.8	9.9	9.9
	Treflan PPI	PPI	16	oz	0.500	1-May							
5	Dual Magnum	PPS	10.66	oz	0.650	1-May	31	16.2	653	1.06	7.5	9.5	9.7
	Treflan PPI	PPI	16	oz	0.500	1-May							
6	Devrinol	PPS	2	lbs	1.000	1-May	28	10.0	652	1.09	7.1	9.3	9.5
	Treflan PPI	PPI	16	oz	0.500	1-May							
7	Treflan PPI	PPI	16	oz	0.500	1-May	25	12.1	617	1.08	7.0	9.2	9.8
	Dual Magnum	2 lf	10.66	oz	0.650	1-May							
8	Nontreated	-	-		-		25	11.3	469	1.03	6.8	8.8	9.8
9	Nontreated	Hand-weeded					29	14.1	647	1.06	7.3	9.9	10.0
10	Sonalan	PPS	2	pts	0.75	1-May	31	12.6	509	1.07	7.7	9.9	10.0
	FPLSD (0.05)						ns	5.9	ns	ns	ns	0.7	ns

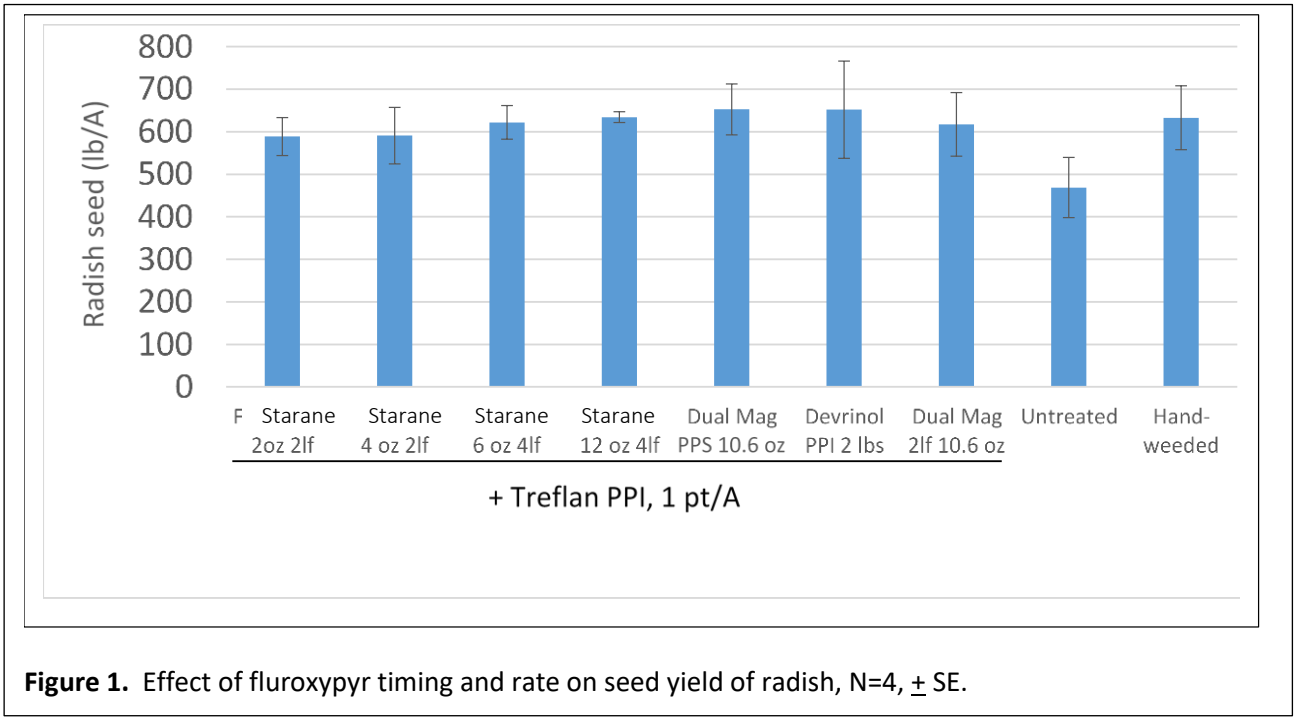

Figure 1. Effect of fluroxypyr timing and rate on seed yield of radish, N=4, ± SE.

Starane
4 oz/A, 2 lf

Starane
6 oz/A, 4 lf

Starane
12 oz/A, 4 lf

Treflan PPI
Dual Magnum PPS

Figure 2. Effect of Starane on hairy nightshade control in radish grown for seed. Pictures taken 14 and 8 days after 2lf and 4lf applications, respectively. Hairy nightshade weed density can be seen where Treflan and Dual Magnum had no effect on emergence of this weed.