EFFECT OF IRRIGATION ACTIVATION ON WEED CONTROL IN STRAWBERRY WITH OXYFLUORFEN

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Summary. Field studies were conducted to further develop the use pattern of oxyfluorfen herbicide (GoalTender) which is used to control weeds such as little mallow and filaree in strawberry. Oxyfluorfen herbicide is labeled for application on strawberry beds at least 30 days before transplanting. Oxyfluorfen treated soil must be tarped prior to strawberry transplanting to avoid injury to strawberry. Studies were conducted to determine if oxyfluorfen must be activated with sprinkler irrigation prior to tarp installation or if fallow beds can be tarped as soon as the oxyfluorfen has been applied. We found that when oxyfluorfen was applied and tarped right away without sprinkler irrigation activation that weed control was as good as when oxyfluorfen was irrigated before tarp installation.

Introduction. Oxyfluorfen is applied at least 30 days before transplanting, and is often watered in with sprinkler irrigation to activate the herbicide prior to tarp installation on the planting beds. Eliminating the irrigation activation step would allow installation of the tarp directly after the herbicide application and would both reduce costs and simplify the process. The primary objective was to verify whether or not the irrigation activation step is necessary for effective weed control with oxyfluorfen. A second objective was to evaluate oxyfluorfen in combination with napropamide (Devrinol), pendimethalin (Prowl H_20) and dazomet (Basamid).

Materials and methods. Two field studies were conducted to evaluate the effect of irrigation activation of several herbicide treatments on weed control and crop tolerance. The treatments were arranged in a randomized complete block with four replicates. Each plot was 20-ft long by 52-in wide with a 26-in bed top. The first herbicide trial was conducted at Monterey Bay Academy at Watsonville, CA on soil previously fumigated with methyl bromide/chlorpicrin (MBPic) at 350 lbs/A. Black medic and little mallow were seeded throughout the trial on Oct. 6, 2005. On Oct. 7 herbicide treatments were applied to the bed top using a single nozzle backpack type CO_2 sprayer at a volume of 40 GPA. Treatments included oxyfluorfen at 0.125, 0.25, 0.375 and 0.5 lb ai/A plus an untreated control. One-half of the plots were then directly tarped without sprinkler irrigation, while the other half of the plots received 0.5-in irrigation and were not tarped until just before transplanting. Strawberry 'Albion' was transplanted on Nov. 7, 2005.

The second trial was initiated at the USDA-ARS/UCCE Spence research farm near Salinas, CA on soil previously fumigated with MBPic at 350 lbs/A. As in the previous trial, black medic and little mallow were planted on the bed tops prior to herbicide application. At Salinas, oxyfluorfen at 0.125 lb ai/A, 0.25 lb ai/A, 0.375 lb ai/A, and 0.5 lb ai/A and flumioxazin (Chateau) at 0.063 lb ai/A were applied on Oct. 28, 2005 (30 days pre transplant). Other treatments included: pendimethalin at 1.0 lb/A, napropamide at 2.0 lb/A, pendimethalin plus oxyfluorfen at 1.0 plus 0.125 lb ai/A, and napropamide plus oxyfluorfen at 2.0 plus 0.125 lb ai/A. A sequential application of dazomet at 150 lb followed by 0.125 lb ai/A oxyfluorfen was also evaluated. Untreated control treatments were also included. One-half of the plots were then immediately tarped without sprinkler irrigation, while the other half of the plots received 0.55 in sprinkler

irrigation on Nov. 2 and were not tarped until just before transplanting. On Nov. 29, 2005 strawberry 'Diamante' was transplanted.

At Watsonville, crop injury ratings, 0 = safe, 10= dead, were taken on Dec. 15, 2005, Jan. 16, and Feb. 9, 2006. Weed densities were measured on: Nov. 16, and Dec. 15, 2005 and Feb. 23, 2006. Planted weeds were counted separately from native weed species. Fruit was harvested twice weekly from April 6, to Sept. 14, 2006. At Salinas, crop injury ratings were taken on: Jan. 9, Feb. 7, and Mar. 8, 2006. Weed densities were measured Nov. 28, 2005, Jan. 12, and Mar. 1, 2006. Fruit was harvested May 9, to Sept. 22, 2006. Analysis of variance was performed on the data and mean separation was performed using LSD's. Analysis was also conducted to determine the main effect of irrigation activation of the herbicides on weed control.

Results. Oxyfluorfen caused little crop injury at Watsonville, but at Salinas the 0.375 and 0.50 lb ai/A rates caused moderate crop injury (Tables 1 and 2). The data also shows that irrigation activation had no effect on fruit production at either Watsonville or Salinas. Weed control in the no irrigation activation treatments was essentially the same as the treatments that received irrigation activation and delayed tarping. At Watsonville and Salinas, oxyfluorfen at 0.375 ai/A and above controlled little mallow and black medic (Tables 3 and 4). Control of little mallow and black medic was excellent with the combination of pendimethalin plus oxyfluorfen at 1.0 plus 0.125 ai/A. The napropamide plus oxyfluorfen 2 plus 0.125 lb ai/A combination gave good control of little mallow and black medic, much better than napropamide alone. The sequential application of dazomet (150 lb ai/A) followed by oxyfluorfen (0.125 lb ai/A) gave excellent control of planted black medic and little mallow. Overall weed control results at Watsonville and Spence suggests that sprinkler irrigation activation of oxyfluorfen on fallow beds is not required for effective weed control.

Table 1. Strawberry injury ratings and fruit yields at Watsonville, CA.

Treatment	Rate lb ai/A	Irrigation Activation	Crop injury 0 = safe, 10 = dead		Mkt.yield
			12.15.05	1.12.06	gr./plant
1 Untreated	0	Yes	0.0 d	0.0 d	651
2 Untreated	0	No	0.0 d	0.0 d	668
3 Oxyfluorfen	0.125	Yes	0.4 cd	0.1 cd	640
4 Oxyfluorfen	0.125	No	0.0 d	0.7 abc	652
5Oxyfluorfen	0.25	Yes	0.5 bc	0.8 abc	710
6 Oxyfluorfen	0.25	No	0.3 cd	0.5 bcd	643
7 Oxyfluorfen	0.375	Yes	0.9 ab	1.3 a	667
8 Oxyfluorfen	0.375	No	0.6 bc	1.0 ab	621
9 Oxyfluorfen	0.5	Yes	1.1 a	1.3 a	674
10 Oxyfluorfen	0.5	No	0.6 bc	1.3 a	656
Main effects					
GoalTender			0.0001	0.0001	0.7340
Activation			0.0157	0.9449	0.3212

Table 2. Strawberry injury ratings, and fruit yields at Salinas, CA.

Treatment	Rate lb ai/A	Irrigation Activation	Crop injury 0 = safe, 10 = dead		Mkt.yield
			1-9-06	2-7-06	gr./plant
1 Untreated	0	Yes	0.0 g	0.0 h	633
2 Untreated	0	No	0.0 g	0.0 h	679
3 Oxyfluorfen	0.125	Yes	0.3 g	0.5 e-h	712
4 Oxyfluorfen	0.125	No	0.4 fg	0.1 gh	696
5 Oxyfluorfen	0.25	Yes	0.5 efg	0.6 d-g	706
6 Oxyfluorfen	0.25	No	1.3 cd	1.1 cd	761
7 Oxyfluorfen	0.375	Yes	1.1 cde	1.5 bc	789
8 Oxyfluorfen	0.375	No	1.5 bc	2.0 ab	677
9 Oxyfluorfen	0.5	Yes	2.3 a	2.4 a	696
10 Oxyfluorfen	0.5	No	2.0 ab	2.1 a	661
11 flumioxazin	0.063	Yes	0.1 g	0.1 gh	659
12 flumioxazin	0.063	No	0.4 fg	0.8 def	685
13Oxyfluorfen/pendimethalin	0.125/1.0	Yes	0.6 d-g	0.8 def	658
14Oxyfluorfen/pendimethalin	0.125/1.0	No	1.0 c-f	1.5 bc	742
15 pendimethalin	1.0	Yes	0.3 g	0.5 e-h	624
16 pendimethalin	1.0	No	0.6 d-g	0.4 fgh	710
17 Oxyfluorfen/napropamide	0.125/2.0	Yes	0.4 fg	0.4 fgh	673
18 Oxyfluorfen/napropamide	0.125/2.0	No	1.0 c-f	1.0 cde	669
19 napropamide	2.0	Yes	0.1 g	0.3 fgh	644
20 napropamide	2.0	No	0.3 g	0.4 fgh	685
21 dazomet	150	Yes	0.4 fg	0.4 fgh	696
22 dazomet /Oxyfluorfen	150/0.125	Yes	1.1 cde	1.1 cd	784
LSD			0.56	0.72	164
Treatment probability			0.0001	0.0001	0.584

Table 3. Season total weed densities at Watsonville, CA.

Treatment	Rate lb ai/A	Irrigation Activation	Blk.Medic Planted	L.Mallow Planted	Total resident weeds
			---------- No./20 ft. --------		No. 41.7 ft^2
1 Untreated	0	Yes	139.0 ab	25.8 b	28.0 a
2 Untreated	0	No	150.3 a	71.0 a	19.3 ab
3 Oxyfluorfen	0.125	Yes	78.8 bc	5.0 c	11.5 bc
4 Oxyfluorfen	0.125	No	34.0 cd	9.0 bc	11.0 bc
5Oxyfluorfen	0.25	Yes	30.3 cd	1.0 c	1.8 c
6 Oxyfluorfen	0.25	No	11.0 d	3.5 c	4.0 c
7 Oxyfluorfen	0.375	Yes	15.8 d	0.3 c	2.0 c
8 Oxyfluorfen	0.375	No	3.5 d	0.0 c	0.8 c
9 Oxyfluorfen	0.5	Yes	16.3 d	0.3 c	1.3 c
10 Oxyfluorfen	0.5	No	2.0 d	0.0 c	1.0 c
LSD			61.15	19.72	11.31
Main effects					
GoalTender			0.0001	0.0001	0.0002
Activation			0.25	0.0244	0.5

Table 4. Season total weed densities at Salinas, CA.

Treatment	Rate lb ai/A	Irrigation Activation	Blk.Medic Planted	Mallow Planted	Total Weeds
			--------No. /20 linear feet------		No./ 41.6 ft2
1 Untreated	0	Yes	310.5 a	99.8 a	10.3 a
2 Untreated	0	No	174.5 b	86.8 a	6.5 b
3 Oxyfluorfen	0.125	Yes	21.5 de	24.0 bc	1.4de
4 Oxyfluorfen	0.125	No	29.3 de	13.3 cd	1.4 de
5 Oxyfluorfen	0.25	Yes	10.0 de	5.0 cd	0.5 de
6 Oxyfluorfen	0.25	No	9.0 de	3.8 cd	0.4 de
7 Oxyfluorfen	0.375	Yes	4.3 e	0.0 d	0.2 e
8 Oxyfluorfen	0.375	No	9.8 de	0.8 cd	0.4 e
9 Oxyfluorfen	0.5	Yes	3.3 e	0.8 cd	0.1 e
10 Oxyfluorfen	0.5	No	8.3 e	0.3 d	0.4 e
11 flumioxazin	0.063	Yes	4.0 e	1.0 cd	0.2 e
12 flumioxazin	0.063	No	16.5 de	4.0 cd	0.6 de
13Oxyfluorfen/pendimethalin	0.125/1.0	Yes	5.8 e	1.0 cd	0.3 e
14Oxyfluorfen/pendimethalin	0.125/1.0	No	3.3 e	0.3 d	0.1 e
15 pendimethalin	1.0	Yes	110.3 c	47.3 b	4.2 c
16 pendimethalin	1.0	No	62.8 cd	16.5 cd	2.0 d
17 Oxyfluorfen/ napropamide	0.125/2.0	Yes	11.5 de	2.8 cd	0.4 de
18 Oxyfluorfen/ napropamide	0.125/2.0	No	17.0 de	0.8 d	0.5 de
19 napropamide	2.0	Yes	185.5 b	101.8 a	7.3 b
20 napropamide	2.0	No	200.0 b	105.5 a	7.7 b
21 dazomet	150	Yes	12.3 de	16.8 cd	1.0 de
22 dazomet/Oxyfluorfen	150/0.125	Yes	2.0 e	1.5 cd	0.2 e
LSD			54.399	23.620	1.623
Treatment probability			0.0001	0.0001	0.0001