WEED CONTROL IN STRAWBERRIES WITH OXYFLUORFEN ('GOAL ™ and GOALTENDER 4F)

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Weeding costs in production strawberries ranges from $300 to $700 per acre in Southern California even with methyl bromide fumigation Transition to methyl bromide alternatives, which are usually more expensive and less effective, requires additional weed control tools. Goal (oxyfluorfen) herbicide is registered for 30 day pre-plant application in California strawberries, yet its use have been limited mostly to weed control in furrows between strawberry beds.

Studies in Ventura County, California. The first study evaluated Goal XL at 2 pint/A (full label rate) and 1 pint/A for weed control in fall planted 'Ventana' strawberries. Herbicide was sprayed on tops of shaped beds on 18 Sept., 2003, clear PVC mulch was laid three days later and InLine (1, 3 D + Chlorpicrin) was applied the following day to all plots with a custom applicator. The experiment was designed as a randomized complete block with three replications; individual plot size was 100-ft by 42 inches (bed width). Soil type was a sandy loam (coarse loamy, mixed thermic Aquic Xerofluvents) with pH 7.35 and 0.85% OM. Visual crop injury was assessed on Oct. 27, 2004. Weed densities by species were measured, and weeding time was recorded for each plot. Green biomass of each weed species was air dried at 60 C and weighed. Marketable fruit yield was sampled from 20 randomly selected plants on Feb. 27, 2004. Visual crop injury was not observed and there were no significant yield differences in marketable fruit yield among treatments. Goal at 1 and 2 pints./A reduced total weeding time 20 and 38%, compared to no herbicide. Both rates of Goal were effective in controlling little mallow (*Malva parviflora*) providing 72 and 86% reduction in plant number at 1 and 2 pint rates, respectively). However, fleabane (*Conyza* spp.) was not controlled by either rate and 1-pint rate did not control burclover (*Medicago polymorpha*) plant number, while 2-pint rate reduced it 300%. Estimated material and application costs were less than the potential savings in the weeding costs, suggesting that the 2 pint/A Goal treatment provides cost-effective weed control.

The second study examined weed control and safety of Goaltender 4F formulation (at 1 pint /A, a full rate) for 'E26' summer planted strawberries. Experiment was designed similar to fall planted study but the field had been flat fumigated with methyl bromide. Goaltender 4F was applied (26 June 2004) immediately after bed shaping and 30 days before transplanting. In this study green plastic mulch was installed 40 days after transplanting. Absence of mulch post-application allowed GoalTender 4F to "lift off" with water vapor following irrigations (sprinkler,

followed by drip) and resulted in about 8% injury, observed during Aug. 8 evaluations. Goal 4F provided near complete weed control (August 13 sampling) reducing average weed number per plot (compared to untreated control) from 18 to 2 for little mallow, 8 to 0 for goosefoot (*Chenopodium* spp.) and 43 to 2 for nightshade (*Solanum* spp). Average per plant biomass was also reduced for the three weeds 82 to 100% with GoalTender 4F, indicating lack of competitive ability of the survived weeds. Weeding time (and associated costs), were reduced 61% compared to the no herbicide control.

Studies in Monterey County, California

The first study was conducted at the Spence USDA farm near Salinas, CA in soil previously flat fumigated with 33 gal/A of Telone C35. The second study was conducted at Monterey Bay Academy (MBA) near Watsonville, CA in soils previously flat fumigated with 350 lbs per acre of methyl bromide chloropicrin. At the Spence location pre-transplant treatments (PreT) of Goal 2XL at 2 pints/A and GoalTender 4F at 1 pint/A, were applied on October 22, 2003 (31 days PreT) and November 6, 2003 (16 days PreT) (Table 1). At MBA, PreT applications of Goal 2XL at 2 pints/A, were made October 7, 2003 (37 days PreT) and October 23, 2003 (21 days PreT). At MBA, Goaltender 4F at 1 pint/A was applied only at the 37 day PreT timing. At Spence, Devrinol 2E was applied 31 days PreT at 8 pints/A. The treatments were activated with about 0.75 acre inches of sprinkler irrigation immediately after herbicide application. Prior to transplanting, one set of the Goal treated fallow beds were covered with clear mulch, while the other set was left bare. 'Diamante' strawberries were transplanted at MBA on November 13, 2003 and at Spence on November 22, 2003. All treatments were replicated four times,and crop injury ratings, as well as weed counts were taken periodically. Fruit harvest began March 16, 2004 at MBA and April 6, 2004 at Spence.

Visual injury symptoms on strawberry foliage caused by either Goal 2XL or GoalTender 4F, were much less where mulch was in place at time of transplanting compared to no mulch (Tables 1 & 2). At Spence, fruit yields were higher in the tarped 16 day PreT Goal treatment than in the no tarp 16 day PreT Goal treatment. Goal 2XL applied 21 days before transplanting at MBA, produced higher yields where mulch was used compared to no mulch (Table 2). Little mallow and clover (*Medicago* spp.) control were not affected by mulch with the exception that GoalTender 4F provided better clover control on the no tarp plots than on the tarped plots. All Goal treatments provided excellent control of little mallow.
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- Oxyfluorfen may provide excellent and economical weed control in strawberries, especially of the weeds difficult to control with alternative fumigants, such as little mallow.
- Plastic mulch film is required before planting to prevent plant injury.
- For best performance, a light sprinkler irrigation should be applied as soon as possible after Goal 2XL or Goaltender application.

Table 1. Crop injury, marketable fruit yield and weed control evaluations at Spence farm, Salinas, CA.

Treatment	Rate Lbs ai./A	Product rate per acre	Days before transplanting [a]	Crop injury [b]		Yield [c]		Little mallow [d]	
				Tarp	No tarp	Tarp	No tarp	Tarp	No tarp
				0 = safe, 10 = dead		Grams per plant		Control %	
Goal™ 2XL	0.5	2 pints	31	0.6	7.0 *	534	436	97	100
Goal™ 2XL	0.5	2 pints	16	1.1	7.1 *	582	460 *	100	100
GoalTender 4 F	0.5	1 pint	31	1.1	6.5 *	548	468	95	92
GoalTender 4 F	0.5	1 pint	16	1.9	7.6 *	516	436	97	100
Devrinol™ 2E	2.0	8 pints	31		1.6		618		50
Untreated	0.0				1.5		584		0
LSD 0.05				1.3		87		26	

[a] Days before transplanting. [b] Crop injury ratings from the February 18, 2004 evaluation. [c] Total season marketable fruit data from April 6 through Aug. 17, 2004. [d] Weed counts from the February 23, 2004 evaluation. * indicates that the effect of tarp vs. no tarp at time of transplanting was significant (P=0.05) within one herbicide rate and timing.

Table 2. Crop injury, marketable fruit yield and weed control evaluations at Monterey Bay Academy, Watsonville, CA.

Treatment	Rate lbs ai./A	Product rate per acre	Days before transplanting [a]	Crop injury [b]		Yield [c]		Little mallow [d]		Sweet clover [d]	
				Tarp	No tarp	Tarp	No tarp	Tarp	No tarp	Tarp	No tarp
				0 = safe, 10 = dead		Grams per plant		---------- Control % ----------			
Goal™ 2XL	0.5	2 pints	37	0.9	4.4 *	698	591	100	100	75	78
Goal™ 2XL	0.5	2 pints	21	1.3	4.9 *	787	640 *	100	100	99	100
GoalTender 4 F	0.5	1 pint	37	1.0	4.6 *	672	623	100	100	46	77 *
Untreated	0.0				0.3		705		0		
LSD 0.05				0.7		128		47		23	

[a] Days before transplanting. [b] Crop injury from the February 3, 2004 evaluation. [c] Marketable fruit data from March 16 through Aug. 9, 2004 evaluations. [d] Weed counts from the December 3, 2003 evaluation. * indicates that the effect of tarp vs. no tarp at time of transplanting was significant (P=0.05) within one herbicide rate and timing.