STRAWBERRY PRODUCTION AND WEED CONTROL IN SOILS TREATED WITH BASAMID AND CHLOROPICRIN

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Basamid is a methyl isothiocyanate (MITC) generator. MITC can control weeds, nematodes, and fungal pathogens. Previous work found that the combination of 200 lb/A of Basamid plus 200 lb/A of chloropicrin (Pic) provided superior weed control and strawberry yield than either chemical applied alone. Activation of Basamid with drip fumigation raises the question regarding the best placement of Basamid on the planting bed. However, banded applications of Basamid have not been evaluated for strawberry pest control. The objective of this work was to compare weed control and strawberry yield when Basamid is applied to the entire bed top or banded under the drip tapes.

Methods

Experiments were carried out as a randomized complete block design with four replicates, in two research plots at the Monterey Bay Academy (MBA) near Watsonville and at Spence farm with the USDA research station near Salinas, California. Basamid was applied on Oct. 11 at MBA and on Nov. 9, 2005, at Spence farm. Fumigation treatments included 1) untreated control, 2) Pic at 200 lb/A, 3) MbPic (67:33) at 200 lb/A, 4) Basamid at 200 lb/A applied over the entire bed top and incorporated with a rake (Bas-R), and 5) Basamid at 200 lb/A applied as two bands under the drip tapes (Bas-B). All Basamid-treated plots were activated by drip fumigation with Pic at 200 lb/A. Beds were 54-inches wide and 43 feet long at Spence, and 33 feet long at Watsonville.

Yield evaluation: Strawberry (Diamante) was transplanted on Nov. 8, 2005, at Watsonville and on Nov. 29, 2005, at Salinas. Yield was evaluated from a 20-foot section for both Salinas and Watsonville, and reported as marketable and total yields.

Weed evaluation: Nylon mesh bags with weed seeds were buried at a soil depth of two and six inches at the center and sides of the beds prior to fumigation, and were retrieved two weeks after fumigation. Weed seeds included were little mallow, common purslane, common chickweed and knotweed. Seed viability was tested with tetrazolium. Weed densities were evaluated on the 25-inch wide bed tops on Feb. 13 and Apr. 20, 2006, at Salinas and on Dec. 5, 2005, and Feb. 23, 2006, at Watsonville.

Results and discussion

Both broadcast and band-applied Basamid provided good weed control similar to MbPic. Chloropicrin applied alone did not provide adequate weed control of annual bluegrass or total weed at Watsonville or of shepherd's-purse at Salinas (Table 1).

Both application methods of Basamid provided excellent control of buried weed seeds that were better than chloropicrin alone at Watsonville. In some cases, Basamid provided better control of buried weed seeds than MbPic including hard to control seeds such as little mallow seeds. This trend was consistent although not significant (Table 2).

Total and marketable strawberry yields in Basamid-treated plots were similar to plots treated with MbPic at Salinas and Watsonville. In Salinas, both marketable and total strawberry yields from all fumigated plots were significantly higher than the untreated control. No significant differences were detected among the fumigants. In Watsonville, where weed and pathogen pressure are high, the total yield in plots treated with Basamid was significantly higher than in plots treated with Pic alone (Table 3).

Table 1: Accumulated weed densities at Salinas and Watsonville.

Fumigant	Salinas			Watsonville		
	Shepherd's-purse	Scarlet pimpernel	Total weed	Clover species	Annual bluegrass	Total weed
	----------Weeds 1000s /acre ----------					
Control	3.12 a	3.8 a	46.9 a	13.6	148.0 a	257.9 a
Pic 200 lb/A	1.29 a	0.23 b	12.8 b	14.6	85.0 a	162.8 ab
Basamid-B[†]	0.23 b	0.06 b	12.5 b	4.6	0.6 b	16.6 bc
Basamid-R[‡]	0.12 b	0.12 b	8.3 b	6.7	0.5 b	12.7 c
MbPic 67:33[¶]	0.59 b	0.0 b	11.6 b	7.5	2.0 b	14.3 c
ANOVA						
P-value	0.01	0.002	<0.001	ns	0.04	0.02

[†] Basamid was banded under two drip tapes at 200 lb/A and activated with drip-applied chloropicrin at 200 lb/A.
[‡] Basamid was spread over the bed top at 200 lb/A and incorporated into the soil. Chloropicrin was drip-applied at 200 lb/A.
[¶] MbPic (67:33) was drip-applied at 200 lb/A.

Table 2: Survival of weed seeds from seed bags installed prior to the soil fumigation at Salinas and Watsonville.

Fumigant	Salinas				Watsonville			
	Little mallow	Common purslane	Common chickwd	Knotwd	Little mallow	Common purslane	Common chickwd	Knotwd
	---------- Seed viability (%) ----------							
Control	80.7 a	89.9 a	90.7 a	97.0 a	80.4 a	92.2 a	86.5 a	95.1 a
Pic 200 lb/A	52.9 b	0.0 b	0.0 b	37.5 b	72.7 ab	31.4 b	26.0 b	41.7 b
Basamid-B[a]	51.8 b	5.3 b	4.3 b	19.4 b	62.8 c	0.0 c	0.0 c	13.7 c
Basamid-R[b]	56.7 b	6.5 b	6.3 b	22.0 b	62.7 c	0.0 c	0.0 c	0.25 c
MbPic[c]	55.6 b	3.5 b	0.3 b	21.4 b	69.0 bc	0.8 c	0.6 c	16.3 c
ANOVA								
P-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

[a] Basamid was banded under two drip tapes at 200 lb/A and activated with drip-applied chloropicrin at 200 lb/A.
[b] Basamid was spread over the bed top at 200 lb/A and incorporated into the soil. Chloropicrin was drip-applied at 200 lb/A.
[¶c] MbPic (67:33) was drip-applied at 200 lb/A.

Table 3: Effect of band- or bed-top-applied Basamid on strawberry yields until August 1, 2006, at Salinas and Watsonville, CA.

Fumigant	Salinas		Watsonville	
	Marketable yield	Total yield	Marketable yield	Total yield
	---------- 1000 lbs / acre----------			
Untreated control	8.5 b	15.9 b	10.6 c	20.3 c
Pic 200 lb/A	13.6 a	23.9 a	15.9 b	30.5 b
Basamid-B[a]	12.7 a	22.1 a	18.3 ab	36.3 a
Basamid-R[b]	13.8 a	23.7 a	20.3 a	38.0 a
MbPic 67:33[c¶]	12.9 a	23.0 a	16.6 b	32.9 ab
ANOVA				
P-value	0.009	0.001	0.0001	<0.0001
LSD (0.05)	2.9	3.5	3.06	5.5

[a] Basamid was banded under two drip tapes at 200 lb/A and activated with drip-applied chloropicrin at 200 lb/A.
[b] Basamid was spread over the bed top at 200 lb/A and incorporated into the soil. Chloropicrin was drip-applied at 200 lb/A.
[¶c] MbPic (67:33) was drip-applied at 200 lb/A.