Strawberry Yield under Reduced Application Rates of Chloropicrin and Inline in Combination with Metam Sodium and VIF

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Applying fumigant combinations and using Virtually Impermeable Films (VIF) can enhance soil pest control and produce profitable crops. Our early studies showed that sequential application of metam sodium after InLine or chloropicrin (Pic) and application of reduced rates under VIF produced strawberry yields equivalent to standard methyl bromide/chloropicrin fumigation. The objective of our research was to determine minimum application rates of Pic and InLine applied under VIF and in combination with metam sodium.

Methods

Research and demonstration studies were conducted in Oxnard, Santa Maria, and Watsonville, CA. In the research trials, Pic and Inline were drip applied at five rates (50, 100, 200, 300 and 400 lbs/ac). In the demonstration trails, Pic and InLine were applied at three rates (100, 200, and 300 lbs/ac) followed by metam sodium (Vapam HL) applied at 35 gal/ac four to seven days later. In all studies, fumigants were applied in 1.5 inches of water into soil covered with VIF and standard polyethylene mulch. Methyl bromide/chloropicrin (MBPic) was shank-injected at 350 lb/ac. Strawberry was planted four weeks after fumigation. Strawberry fruit was harvested by commercial crews and separated into market quality and culls.

Summary of Results

Table 1 lists yield data for the research trials. In Watsonville, the soil had high pathogen pressure and the untreated control produced less than 75% relative to MB/Pic shank injection. Application rates at or above 200 lbs/ac produced comparable yields to MB/Pic shank injection (Table 1). In Oxnard, pathogen pressure was not severe and all chemical rates produced yields comparable to MB/Pic. Chloropicrin benefited more than InLine from the use of VIF. The use of VIF compared to standard mulch increased average yields (over all chemicals) by 3%. With the exception of the 50 lb Pic/ac rate, however, no significant differences (at P=0.05) were found between VIF and standard mulch for the chemical treatments.

Table 2 lists yield data for one of the demonstration trials in Oxnard. In general, the higher fumigation rates (200 and 300 lbs/ac) benefited from the use of VIF. Metam sodium application did not significantly affect yields for high Pic and

InLine application rates. Only the low rate of Pic or InLine (100 lbs/ac) under standard mulch benefited from metam sodium application. These and other demonstration trials trials suggest that metam sodium can be used to reduce application rates of InLine and Pic (i.e., 100 lbs/ac) without a loss in yield.

Table 1: Strawberry total fruit yields relative to MB/Pic (350 lbs/ac) from soils treated with various rates of Pic and InLine drip-applied under VIF and standard polyethylene mulch.

Fumigants	Rate (lb/ac)	Watsonville[1]		Oxnard[1]	
		VIF	Standard	VIF	Standard
		%		%	
Control	0	70	75	87	83
Chloropicrin	50	108	90	104	103
	100	96	87	105	106
	200	103	100	112	108
	300	105	100	120	115
	400	103	107	116	112
Inline	50	91	85	98	99
	100	92	94	107	108
	200	98	98	117	105
	300	105	101	120	121
	400	101	106	120	115
MB/Pic	350	106	**100**	111	**100**

[1] All chemical treatments were not significantly different (at P=0.05) from each other. The untreated control was significantly different from all treatments except the 100 lb/ac under standard mulch. Total fruit yields from the MB/Pic (standard film) treatment were 72897 lb/ac in Watsonville and 39942 lbs/ac in Oxnard.

Table 2: Strawberry total fruit yields relative to MB/Pic (350 lbs/ac) from soils treated with three rates of Pic and InLine drip-applied in combination with metam sodium under VIF and standard polyethylene mulch in Oxnard (Demonstration Project).

Fumigants	Rate (lb/ac)	With metam sodium[1] (35 gal/ac)		Without metam sodium[1]	
		VIF	Standard	VIF	Standard
		%		%	
Control	0	75	75	63	65
Chloropicrin	100	89	95	91	87
	200	99	94	99	101
	300	101	100	105	97
Inline	100	101	98	97	90
	200	110	100	109	102
	300	108	102	106	107
MB/Pic	350	--	--	102	100

[1] Metam sodium was applied 7 days after application of Pic and InLine.