CONTINUOUS USE OF ALTERNATIVE FUMIGANTS FOR THREE YEARS IN STRAWBERRIES

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Summary. Field studies were conducted at the Spence USDA-ARS research farm in Salinas, CA and at a commercial field near Oxnard, CA during the 2005-06, 2006-07, and 2007-08 seasons. The objective of this research was to evaluate three years of continuous use of Telone II/InLine/ Telone C35 (formulations of 1,3-dichloropropene + chloropicrin) and Midas (50% iodomethane + 50% chloropicrin, included at Salinas only) for strawberry fruit production and weed control compared to MB Pic (67% methyl bromide + 33% chloropicrin). At both locations continuous use of InLine/ Telone C35 or Midas performed similarly to MB Pic in all three years. Repeated use of InLine/Telone or Midas did not result in reduced efficacy after continuous use.

Introduction. In some California strawberry fields methyl bromide (MB) has been applied annually for a decade or more without loss of performance. However, the phase out of MB is now resulting in continuous use of alternative fumigants on the same fields. It is not known whether there will be loss in performance where alternative fumigants are used continuously. The objective of this work was to compare the continuous use performance of MBPic and InLine/Telone or Midas on strawberry yield and weed control at Salinas and at Oxnard, CA.

Materials and Methods.

At both sites fumigants were applied by commercial broadcast shank application in the 2005-06 and 2007-08 seasons, and by drip chemigation in the 2006-07 season (Table 1).

Salinas. The study was initiated on Aug. 17, 2005 when broadcast shank applications of MB Pic at 350 lbs/A, Telone II (97.5% 1,3-dichloropropene, 1,3-D) at 15 GPA co-injected with chloropicrin (Pic) at 200 lbs/A, and Midas (50% iodomethane, IM; 50% Pic) at 300 lbs/A were made (Table 1). Plots were 33 ft wide by 280 ft long, and individual beds were 52 inches wide. 'Diamante' (2005-06) or 'Albion' (2006-07 and 2007-08) strawberry were planted at a spacing of 10 inches between rows and 15 inches between plants within rows. Weed densities were measured in two 50 ft sample areas per plot and converted to weed densities per acre. Weed densities were recorded on Jan. 31 and Apr. 20, 2006, Feb. 20, Mar. 22 and May 22, 2007, Feb. 7, Feb. 15, Apr. 28 and July 8, 2008. Fruit yields for all trials were recorded from two sample areas per plot of 40 plants each. Fruit

was harvested twice a week and the fresh weight of marketable berries was recorded (Table 1).

Table 1. Location, fumigation date, treatments and rates, fumigant application method, strawberry variety, transplant date and harvest intervals for repeat application studies conducted in 2005-06, 2006-07 and 2007-08.

Location	Fumigation	Treatment	Rate	Method	Variety	Planted	Harvest
Oxnard	Sept. 9, 2005	1. MBPic 2. 1,3-D + Pic	350 lb/A 15 GPA + 200 lb/A	shank	Agoura	Oct. 12, 2005	Jan. 19 – June 16, 2006
Oxnard	Sept. 9, 2006	1. MBPic 2. 1,3-D + Pic	350 lb/A 325 lb/A	drip	Agoura	Oct. 10, 2006	Feb. 5 – May 30, 2007
Oxnard	Aug. 17, 2007	1. MBPic 2. TelC35	350 lb/A 40 GPA	shank	Agoura	Oct. 10, 2007	Feb. 15 – May 23, 2008
Salinas	Aug. 17, 2005	1. MBPic 2. 1,3-D + Pic 3. IMPic	350 lb/A 15 GPA + 200 lb/A 300 lb/A	shank	Diamante	Nov. 25, 2005	May 9 – Sept. 22, 2006
Salinas	Nov. 13, 2006	1. MBPic 2. 1,3-D + Pic 3. IMPic	350 lb/A 300 lb/A 300 lb/A	drip	Albion	Dec 5, 2006	Apr. 9, - Sept. 11, 2007
Salinas	Oct. 15, 2007	1. MBPic 2. TelC35 3. IMPic	350 lb/A 40 GPA 300 lb/A	shank	Albion	Nov 11, 2007	Apr. 18, - present

Oxnard. The study was initiated Sept. 9, 2005 with a broadcast shank application of both treatments (Table 1). Plots were 33 ft wide by 300 ft long and beds were 64 inches wide. 'Agoura' strawberry was the variety used all three years at this site. Each plot had two 80 plant sample areas where yields were monitored twice weekly. Weed densities were determined Jan. 26, 2006, Feb. 12, and Apr. 11, 2007 and Mar. 26, and June 16, 2008. Weed densities were measured in two sample areas per plot consisting of one bed wide by 100 ft long.

For all trials, the experimental design was a randomized complete block replicated four times. All data were analyzed using ANOVA and means separated using LSD at $P = 0.05$.

Results

Weed density ratings and crop yields did not differ among treatments at both locations (Tables 2, 3, 4 and 5). We conclude that three years of continuous application of 1,3-D Pic (two locations), or IM Pic (one location) did not result in reduced fruit yield or loss of weed control compared to MB Pic.

Table 2. Weed density, and weed biomass at the Oxnard, CA repeat fumigation test in seasons 2005-06, 2006-07 and 2007-08.

Treatments	Weed densities			Weed biomass		
	2005-06	2006-07	2007-08	2005-06	2006-07	2007-08
	---------- No. /Acre (1,000) ----------			---------- Lbs. / Acre ----------		
MBPic	1.2	5.5	1.1	24.7	359.6	19.3
1,3-D Pic	1.1	6.5	1.1	23.4	341.0	28.7
LSD P=.05	0.8	1.7	0.8	32.6	322.6	27.6
Trt. Prob.	0.51	0.2	0.78	0.91	0.87	0.36

Table 3. Fruit yields at the Oxnard, CA repeat fumigation test in seasons 2005-06, 2006-07 and 2007-08.

Treatments	Fruit yields		
	2005-06	2006-07	2007-08
	---------- Grams/Plant ----------		
MBPic	363	550	470
1,3-D Pic	371	560	461
LSD P=.05	108	135	143
Trt. Prob.	0.83	0.83	0.84

Table 4. Weed density, and weed biomass at the Salinas, CA repeat fumigation test in seasons 2005-06, 2006-07 and 2007-08.

Treatments	Weed densities			Weed biomass		
	2005-06	2006-07	2007-08	2005-06	2006-07	2007-08
	---------- No. /Acre (1,000) ----------			---------- Lbs. / Acre ----------		
MBPic	90.6	54.1	45.1	3207.0	118.9	1918.9
1,3-D Pic	41.6	15.1	21.5	1237.0	61.7	1949.0
IMPic	98.9	82.7	39.8	3368.9	138.0	1875.4
LSD P=.05	59.4	63.0	24.5	1914.3	135.0	852.2
Trt. Prob.	0.11	0.1	0.08	0.11	0.70	0.98

Table 5. Fruit yields at the Salinas, CA repeat fumigation test in seasons 2005-06, 2006-07 and 2007-08.

Treatments	Fruit yields		
	2005-06	2006-07	2007-08
	---------- Grams/Plant ----------		
MBPic	565	556	242
1,3-D Pic	595	580	284
IMPic	563	522	246
LSD P=.05	35	87	53
Trt. Prob.	0.12	0.33	0.18