

PIC-CLOR 60 RETENTION UNDER TOTALLY IMPERMEABLE FILM IN STRAWBERRY

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Summary. Totally impermeable film (TIF) was compared to standard film (STD) for retention of 39% 1,3-dichloropropene, 59% chloropicrin v/v mixture (Pic-Clor 60) at 0, 50, 100, 200, 300 and 400 lb/A applied by chemigation through the drip irrigation system. Weed control was monitored, weed seed bioassays were conducted and strawberry fruit yield was monitored. TIF increased retention of Pic-Clor60 compared to standard film, weed control was improved with TIF and strawberry fruit yields were also higher.

Introduction and methods. The objective was to compare Pic-Clor 60 retention under TIF (Raven 1.4 mil) to standard film (STD; 1 mil TriCal) and the effect on strawberry fruit yield and weed control. The trial location was the USDA/ARS research farm on Spence road near Salinas, CA. Pic-Clor 60 was injected through the drip irrigation system 10.21.08 at 50, 100, 200, 300, and 400 lb ai/A under both STD and TIF. Methyl bromide/chloropicrin (MBPic) was applied on 10.29.08 at 350 lb ai/A also through the drip system. Each treatment was replicated four times and arranged in a randomized complete block. Fumigant concentration under the tarp was monitored with a MiniRae VOC meter at 3, 8, 24, 48, 72, 96, 144, 192, 240 and 336 hours after application. The strawberry variety 'Albion' was transplanted into all plots 11.24.08. Weed density ratings were measured on 12.11.08, 2.03.09, and 3.17.09 in 50 ft long sample areas. Nylon bags containing yellow nutsedge and weed seeds were buried in each plot before the fumigant application at a depth of 6-in. Weed seeds were retrieved two weeks after the MBPic application and evaluated. The yellow nutsedge was planted in potting soil and placed in an illuminated growth chamber at 35°C for 4 weeks. Weed seed (chickweed, knotweed, mallow, and purslane) viability was determined using tetrazolium assays. Visual crop injury estimates were assessed 1.6.09 using a scale of 0=safe to 10=dead. On 3.10.09 plant diameters were measured on 20 plants per plot. Fruit harvest was initiated 3.30.09 and is being sampled from 50 plants per plot. Fruit harvest will continue until the fall of 2009.

Results. Fumigant retention was highest under the TIF compared to the STD film (Table 1). Only the 3, 8, 24, 48 and 96 hour fumigant retention data is shown. These fumigant retention concentrations indicate that fumigant was held at higher concentrations for a longer period under the TIF than the STD film. No crop injury was observed (data not shown). For plant diameters generally there were no tarp effects except at the Pic-Clor60 100 lb rate where TIF plants were larger than the STD plants. For fruit yields the trend was for higher fruit yields with TIF than STD, the differences were significant at the Pic-Clor60 200 and 400 lb/A

rates (Table 2). Weed densities tended to be higher under STD film than TIF, and in Pic-Clor60 at 100 lb/A TIF had significantly fewer weeds than STD film (Table 3). For weed seed viability the differences between the films, if any, were seen at the lower rates of Pic-Clor60. Knotweed viability was similar under both films (Table 3). Common purslane and common chickweed viability were lower under TIF than STD film at 50 lb/A Pic-Clor60 (Table 4). Nutsedge tuber viability was less under TIF than STD at 100 lb/A Pic-Clor60.

Table 1. Normalized MiniRae meter relative readings at 0 to 96 hours after fumigation. Mean separation with Duncan's multiple range at $p = 0.05$.

	rate	film	3h	8h	24h	48h	96h
Control	0	STD	0 f	0 g	0 b	0 cde	0 bc
Control	0	TIF	29 fg	0 g	-65 b	-81 e	11 bc
PicClor60	50	STD	71 efg	71 g	18 b	-20 de	33 bc
PicClor60	50	TIF	288 efg	264 fg	0 b	61 bcde	7 bc
PicClor60	100	STD	280 efg	275 fg	146 b	69 bcde	-28 c
PicClor60	100	TIF	378 def	392 ef	281 b	197 bc	85 b
PicClor60	200	STD	398 de	565 de	85 b	88 bcde	52 bc
PicClor60	200	TIF	859 bc	855 bc	988 a	233 b	23 bc
PicClor60	300	STD	652 cd	728 cd	280 b	50 bcde	83 b
PicClor60	300	TIF	1102 ab	1060 ab	820 a	548 a	184 a
PicClor60	400	STD	715 cd	730 cd	270 b	137 bcd	59 bc
Pic60	400	TIF	1227 a	1125 a	322 b	190 bc	78 b

Table 2. Effect of film type and Pic-Clor60 dose on strawberry plant diameters, and fruit yields (3.30 to 8.17.09).

Treatment	Rate Lb/A	Plant diameters		Fruit	
		TIF	STD	TIF	STD
		cm		g/plant	
Control	0	19.0 f	20.0 ef	343 ef	335 f
Pic-Clor60	50	21.0 cde	20.0 ef	416 e	355 ef
Pic-Clor60	100	24.0 ab	21.0 def	584 abc	517 cd
Pic-Clor60	200	22.0 bcd	22.0 bcd	619 ab	503 d
Pic-Clor60	300	23.0 abc	22.0 bcd	652 a	609 ab
Pic-Clor60	400	23.0 ab	23.0 bcd	643 a	562 bcd
MBPic	350	25.0 a	23.0 ab	628 ab	610 ab

Table 3. Effect of film type and Pic-Clor60 dose on weed densities and knotweed seed viability.

Treatment	Rate Lb/A	Weed densities		Knotweed	
		TIF	STD	TIF	STD
		No. 50 ft of bed		Viability (%)	
Control	0	982.0 ab	1104.8 a	63.0 a	59.0 ab
Pic-Clor60	50	453.0 cde	737.8 bc	54.8 ab	50.3 b
Pic-Clor60	100	273.3 ef	603.0 cd	24.8 c	24.8 c
Pic-Clor60	200	90.0 f	344.0 def	7.3 de	16.5 cd
Pic-Clor60	300	61.0 f	330.5 def	4.0 e	1.3 e
Pic-Clor60	400	54.0 f	190.3 ef	0.5 e	9.0 de
MBPic	350	181.8 ef	69.3 f	5.5 de	2.8 e

Table 4. Effect of film type and Pic-Clor60 dose on purslane and chickweed seed viability and nutsedge tuber viability.

Treatment	Rate	Purslane		Nutsedge		Chickweed	
		TIF	STD	TIF	TIF	STD	TIF
		----- viability (%) -----					
Control	0	47.8 a	53.3 a	73.8 a	69.4 a	37.8 ab	47.8 a
Pic-Clor60	50	22.8 b	53.0 a	45.0 b	41.3 bc	11.3 c	22.8 b
Pic-Clor60	100	1.0 c	1.5 c	12.5 d	28.1 c	0.3 c	1.0 c
Pic-Clor60	200	1.5 c	1.0 c	0.6 d	2.5 d	0.3 c	1.5 c
Pic-Clor60	300	0.0 c	0.0 c	0.0 d	6.9 d	0.0 c	0.0 c
Pic-Clor60	400	0.8 c	0.0 c	5.6 d	0.0 d	0.0 c	0.8 c
MBPic	350	0.3 c	0.0 c	0.6 d	3.1 d	0.0 c	0.3 c