

<i>DESCRIPTION:</i>	Evaluation of the Sprayable Codling Moth Pheromone Formulation
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Evaluation of the Sprayable Codling Moth pheromone formulation

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Abstract

We compared three different rates of the sprayable codling moth formulation, Suterra CM-F , to the grower standard and an untreated control. The three rates were: a) 20 g/acre applied every row, b) 10 g/acre applied every other row and c) 10 g/acre applied every row. The experiment was conducted in 5 orchards (2 in Mendocino, 1 in Solano and 2 in Sacramento counties) with each individual orchard being a replication. Codling moth damage was evaluated after the first codling moth flight and at pre-harvest. In all orchards the damage was statistically less in the grower standard than in the control. There was no statistical difference in CM infestation among the sprayable pheromone CM-F^c plots and the grower standard or untreated control.

Introduction

Pear growers in California have made a rapid transition from a organophosphate (OP) based codling moth (CM) control program to a mating disruption control program with few OP insecticides. Partially as a result of past years' Pest Management Alliance efforts, the transition became nearly complete. Now nearly all of the pear acreage is under mating disruption for codling moth control.

The current standard method of CM control in Mendocino and Sacramento Counties is the use of either pheromone dispensers Isomate C+ (400/acre), Isomate Ctt (200/acre) or CheckMate CM WS (160/acre applied twice), along with supplemental OP sprays as needed. This standard method has generally proven to be effective when CM populations are low to moderate. If CM populations remain low, then growers would be inclined to use "softer" chemicals, such as insect growth regulators or other reduced risk insecticides instead of OP. Most of these products have been shown to be very effective against oblique-banded leafroller and afford some control for CM.

One problem with the currently used mating disruption technique of hanging Isomate C+, Ctt or Checkmate CM WS dispensers is that they are labor intensive and costly to apply. The standard mating disruption program utilizes either 200 to 400 dispensers per acre, as discussed above. However, studies conducted by Dr. Steven Welter in 2001 showed that the use of sprayable pheromones performed equally well under low to moderate CM populations. Sprayable pheromones would likely save growers money since they could tank mix them with other sprays being applied during the growing season.

Objective: Evaluate the efficacy of the sprayable CM pheromone formulation for codling moth control.

Plans and Procedures

The goal of this trial was to compare three different rates of the sprayable CM pheromone formulation (CM-F [Suterra]), to a grower standard and an untreated control. The treatments were: a) 20 g/acre of sprayable pheromone applied every row, b) 20 g of sprayable pheromone applied every other row (resulting in a rate of 10g/acre skip row), c) 10 g/ acre of sprayable pheromone applied every row, d) grower standard and e) an untreated control. Each treatment was approximately 10 acres except for the untreated control that was half an acre. The untreated control was placed upwind from all pheromone plots. Five orchards with moderate CM populations were used for the trial. Two orchards were in the Ukiah Valley of Mendocino County; two orchards were in the Delta, Sacramento County and one orchard in Fairfield, Solano County. Because blocks must be large, no replication within orchards was used; individual orchards served as replications. When CM populations were high, an OP or Danitol spray was applied to the pheromone treatments or to all the treatments. Please see Table 1 for spray timing.

CM adult populations in each block were monitored using two sets of two traps each; one set of traps was baited with 1-mg codling moth lures and the other with 10-mg lures. We evaluated 1,000 fruit from each treatment at each orchard twice: 1) at the end of the first CM generation, and 2) at pre-harvest. At each sampling, we determined the percent damage caused by CM, OBLR, and green fruitworm.

Results and Discussion

Results for the mid-season fruit evaluation are presented in Table 2. Very low damage was detected during this evaluation (see Table 2). By this date all plots in the orchard Ukiah 2 had been sprayed twice (see Table 1) due to high moth counts (see Fig. 1). Similarly, by the time of the mid-season evaluation, all plots in orchard Delta T had been sprayed once due to high moth catches (see Fig. 2).

The pre-harvest evaluation results are presented in Table 3. Two orchards (Ukiah 2 and Delta T) received two cover sprays in addition to the plan treatments. Due to these supplemental sprays, no damage was observed in any of the plots at the Ukiah 2 orchard. In the Delta T orchard codling moth trap catches increased dramatically to a maximum of 8 moths/trap/day during the sampling of 5/28 (Fig. 2). Thus, on 5/31 Danitol was applied to the pheromone sprayable plots and the reduced-risk insecticide Confirm was applied to the grower standard that in this orchard was Isomate Ctt. Again codling moth populations increased on 6/25 and an Imidan cover spray was applied to all plots except to a 1/4 or the area in the control. Control data reported is from the untreated area. Damage in the three sprayable plots of the Delta T orchard was a tenth of the damage in the control but the damage in the Grower Standard plot was 1/100 that of the control.

In the other three orchards (Ukiah 1, Fairfield and Delta S) codling moth populations were moderate to low (see Figs 3, 4 and 5 respectively). In the Ukiah 1 orchard, CM populations remained at less than 5 moths/week until after harvest in August. In the Fairfield and Delta S orchards, populations peaked at 3 moths/trap/day in June with a maximum of 4 moths in one plot of the Fairfield orchard in July. In these three orchards, damage in the three-pheromone sprayable treatments was similar to the damage in the control plots. However the damage on the

grower standard was lower. The grower standards were Danitol applied once for Ukiah 1, Danitol and Guthion for Fairfield and CheckMate for Delta S (Table 1).

In all orchards the damage was statistically less CM infested fruit in the grower standard than in the control. There was no statistical difference in CM infestation among the sprayable pheromone CM-F^c plots and the grower standard or untreated control (see Table 3). Further studies are needed to determine the most appropriate use of this new technology.

Table 1 - Insecticide applied and dates in the three sprayable pheromone and the grower standard plots in five orchards.

	Ukiah 1	Ukiah 2	Fairfield	Delta S	Delta T
Treatment	Date of Application				
Sprayable CM--F ^e (all three treatments) ^A	4/10 1 st Spray 5/10 2 nd Spray 6/11 3 rd Spray 7/17 4 th Spray	4/8 1 st Spray 5/9 2 nd Spray 6/13 3 rd Spray	4/10 1 st Spray 5/15 2 nd Spray 6/11 3 rd Spray	4/8 1 st Spray 5/3 2 nd Spray 6/11 3 rd Spray	4/8 1 st Spray 5/6-7 2 nd Spray 5/31 3 rd Spray 5/31 Danitol ^B 7/1 4 th Spray 7/1 Imidan ^G
Grower Standard	6/5 Danitol ^B		5/16 Danitol ^B 6/11 Guthion ^C	4/8 CheckMate ^D	4/8 Isomate ^E 5/31 Confirm ^F 7/1 Imidan ^G
Spray over all 5 plots		5/1 Guthion ^C 6/10 Danitol ^B	4/17 Asana for GFW & OBLR		

^A Sprayable CM-Fe treatments: 1) 20 g/acre applied every row, 2) 10 g/acre applied every other row and 3) 10 g/acre applied every row.

^B Danitol at 20 oz/acre

^C Guthion at 3 lb/acre

^D CheckMate 200/acre

^E Isomate Ctt 200/acre

^F Confirm 24 oz/acre

^G Imidan 5 lb/acre (applied to all pheromone plots, grower standard and 3/4 of control)

Table 2 – Mid-season fruit evaluation for codling moth damage in the five treatment plots in five orchards.

	Ukiah 1	Ukiah 2	Fairfield	Delta S	Delta T	Mean ^a
Treatment	% codling moth damage					
20 g/acre CM-F ^e (every row)	0.0	0.0	0.7	0.0	0.0	0.14 a
10 g/acre CM-F ^e (skip row)	0.0	0.0	0.0	0.0	0.1	0.02 a
10 g/acre CM-F ^e (every row)	0.0	0.0	0.0	0.0	0.2	0.04 a
Grower Standard	0.0	0.0	0.1	0.0	0.0	0.02 a
Untreated Control	0.0	0.0	0.3	0.0	0.2	0.10 a
Date of evaluation	6/24/02	6/24/02	6/10/02	6/11/02	6/11/02	

^aMeans followed by the same letter within a column are not significantly different (Fisher's protected LSD, P < 0.05).

Table 3 – Pre-harvest fruit evaluation for codling moth damage in the five treatment plots in five orchards.

	Ukiah 1	Ukiah 2	Fairfield	Delta S	Delta T	Mean^a
Treatment	% codling moth damage					
20 g/acre CM-F ^c (every row)	0.6	0.1	2.4	0.8	1.3	1.0 ab
10 g/acre CM-F ^c (skip row)	1.0	0.0	0.0	0.1	1.5	0.5 ab
10 g/acre CM-F ^c (every row)	0.9	0.0	0.3	0.1	2.3	0.7 ab
Grower Standard	0.4	0.0	0.0	0.1	0.1	0.1 a
Untreated Control	2.3	0.0	1.3	0.2	13.0	3.4 b
Date of evaluation	7/29/02	7/29/02	7/16/02	7/11/02	7/11/02	

^aMeans followed by the same letter within a column are not significantly different (Fisher's protected LSD, P < 0.05).

Figure 1 - Male Codling moth trap catches with traps baited with 10 mg pheromone lures in three treatments in the Ukiah 2 orchard.

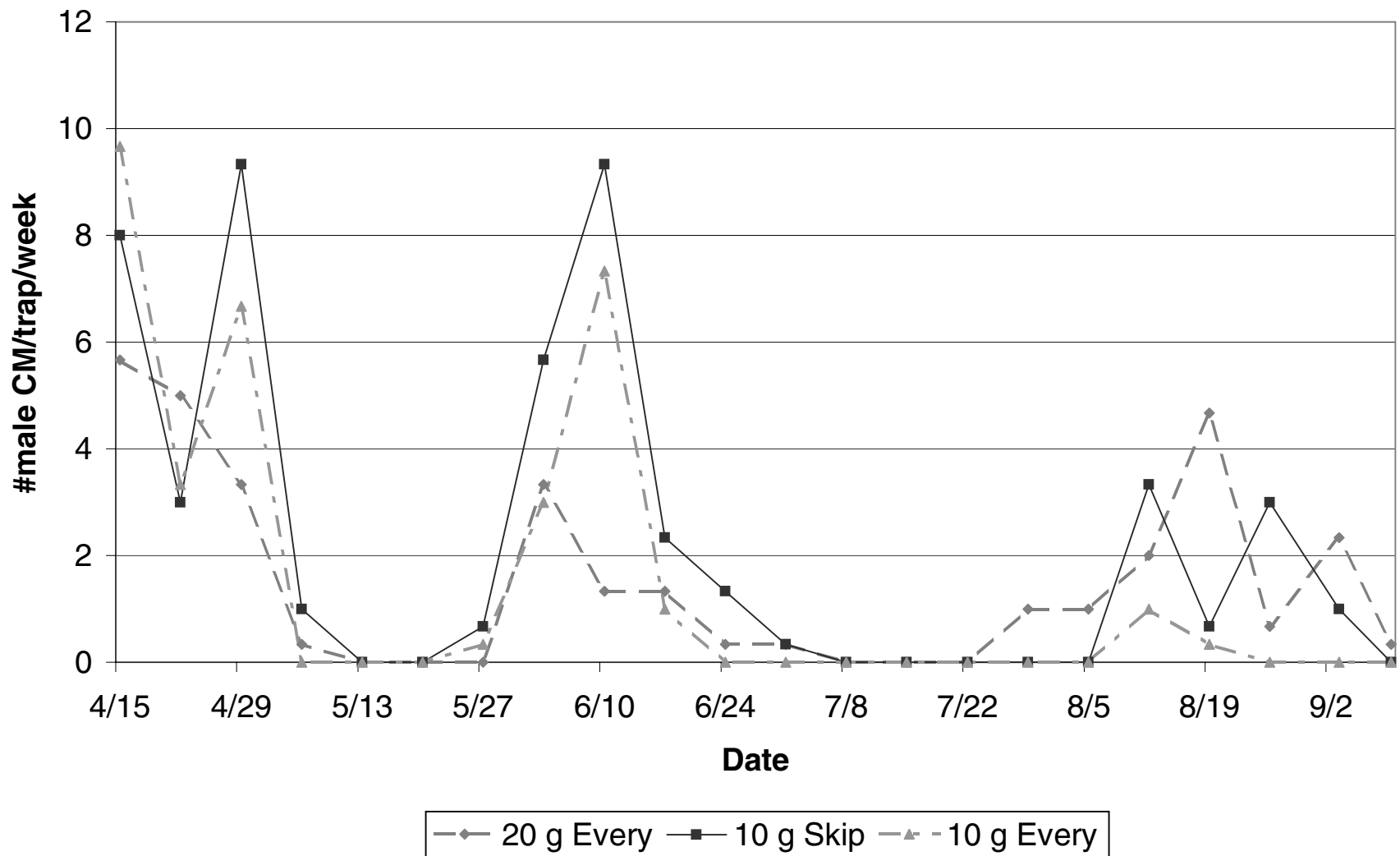


Figure 2 - Male Codling moth trap catches with traps baited with 10 mg pheromone lures in five different treatments in the Delta T orchard

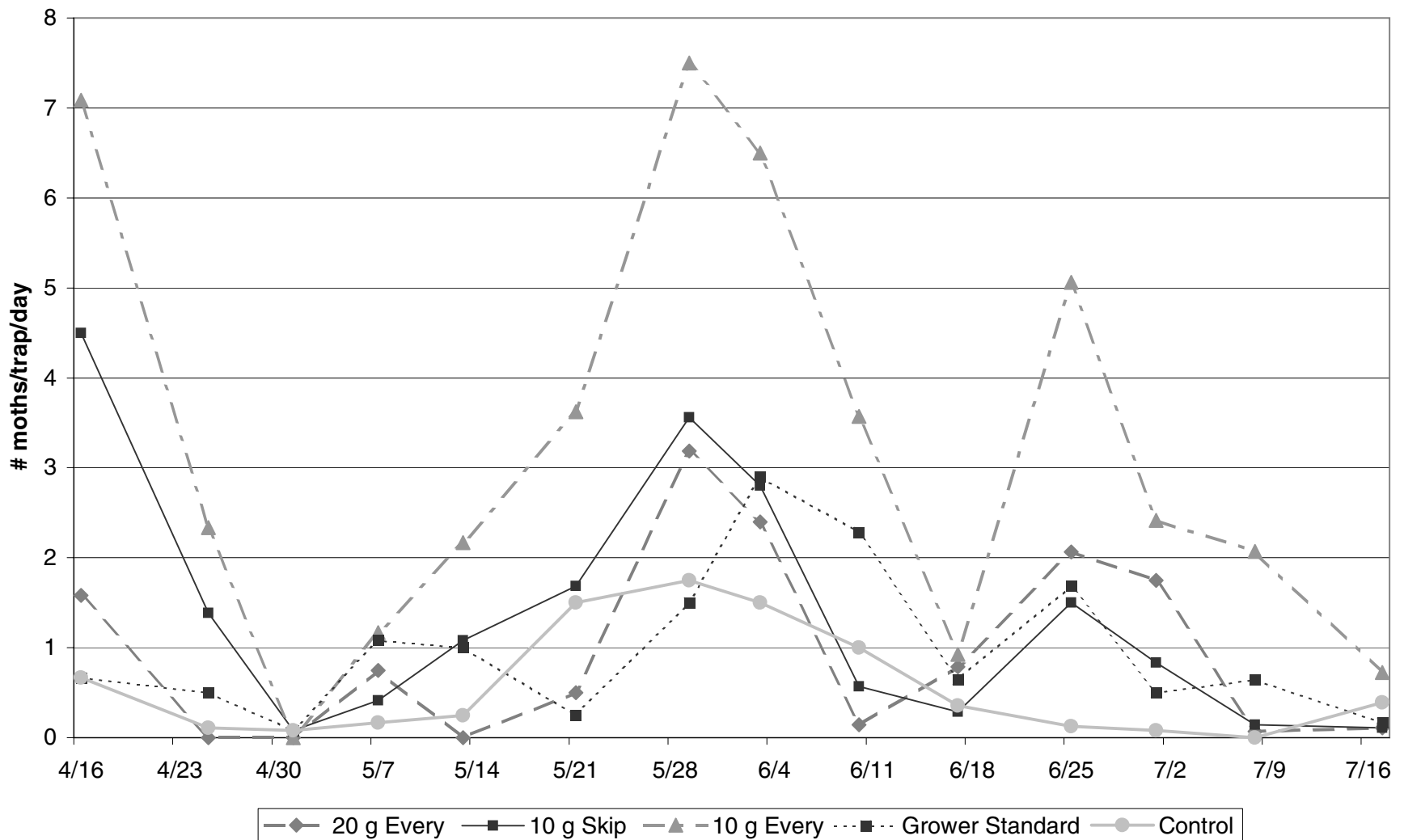


Figure 3 - Male Codling moth trap catches with traps baited with 10 mg pheromone lures in three different treatments in the Ukiah 1 orchard.

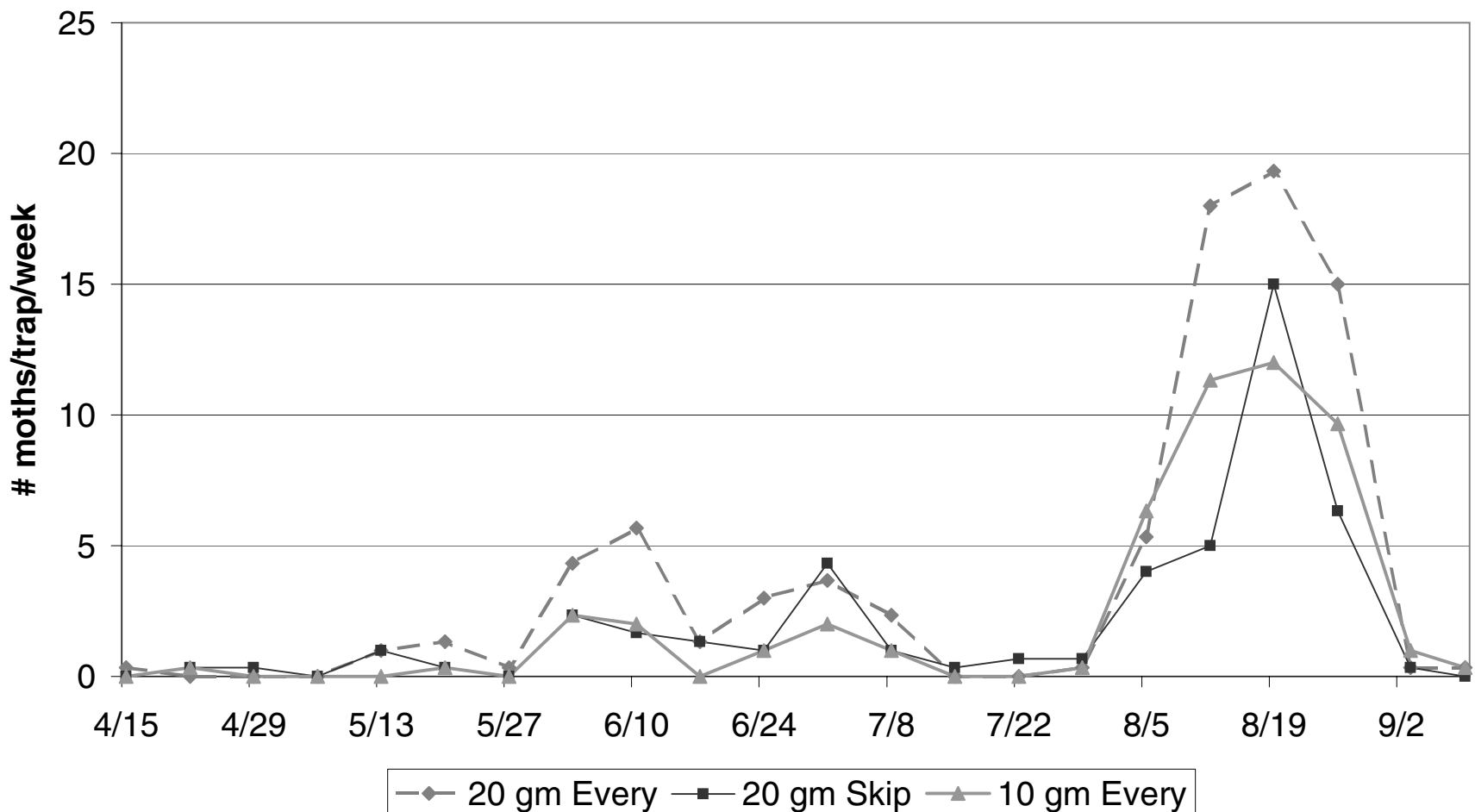


Figure 4 - Male Codling moth trap catches with traps baited with 10 mg pheromone lures in five different treatments in the Fairfield orchard.

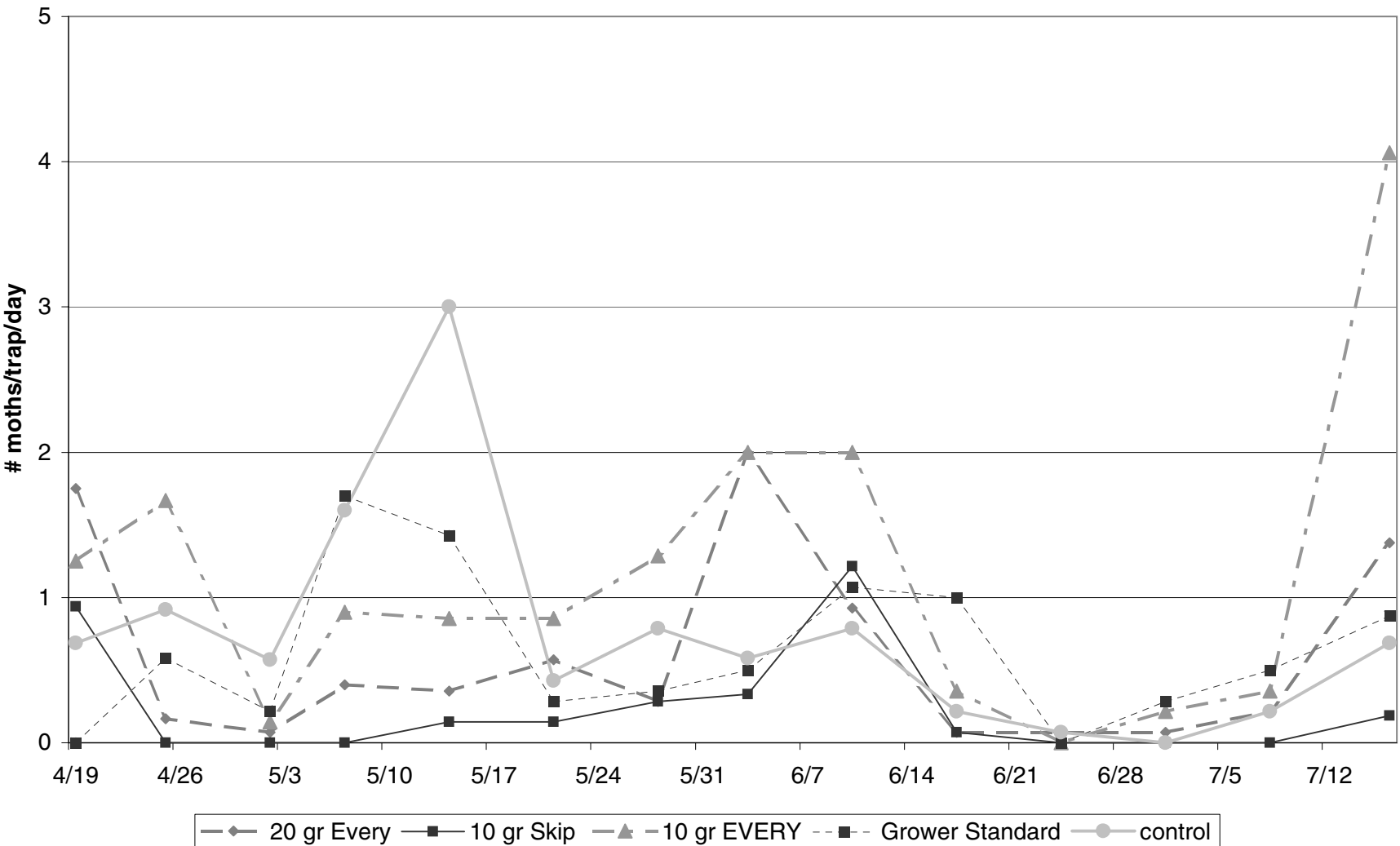


Figure 5 - Male Codling moth trap catches with traps baited with 10 mg pheromone lures in five different treatments in the Delta S orchard.

