

Comparing trap design and location for corn earworm monitoring in strawberry

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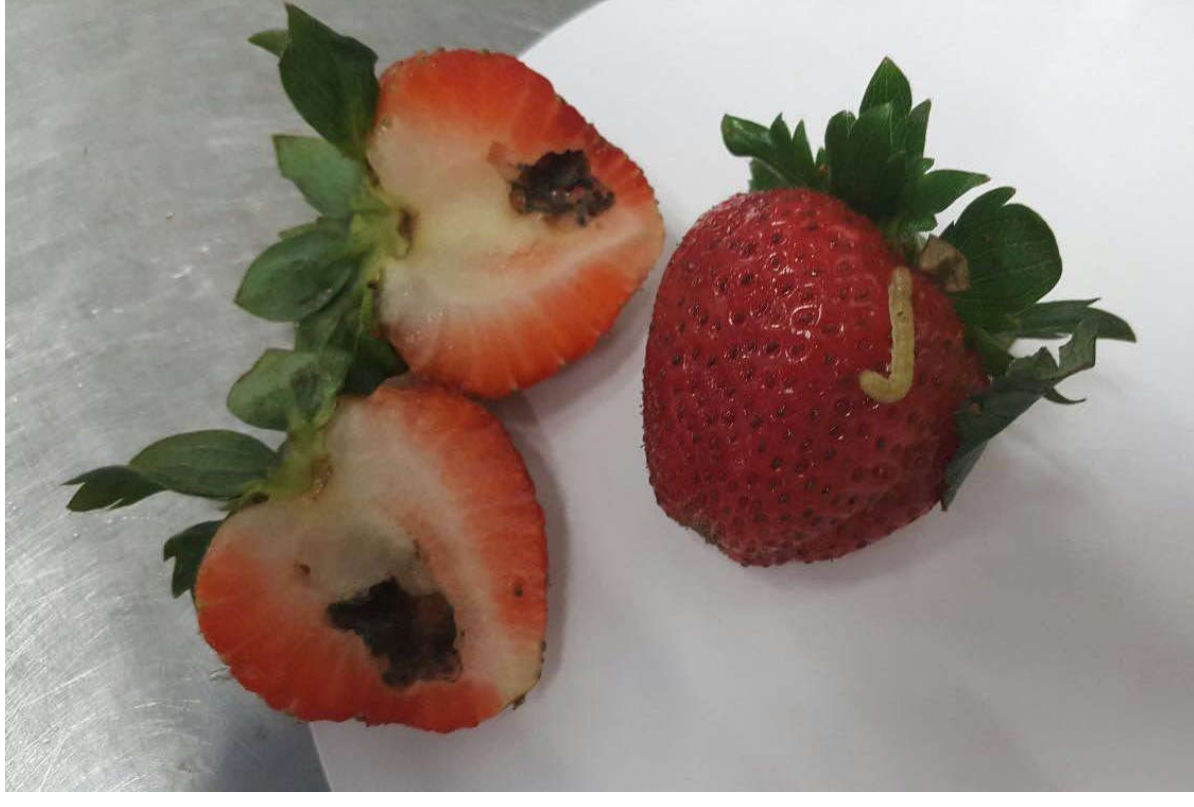
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Annual Santa Maria Strawberry Field Day

May 10, 2016

Corn Earworm

- Serious pest of strawberries
- Adults lay eggs under strawberry calyx, eggs emerge and larvae begin to bore into fruit – may feed on foliage
- Highest # in Mid-March to June and in fall (mid-Aug to November)
 - During this time, growers spray every 3-4 wks in low pressure and every 2 wks in high pressure
- Fazing out Lorsban
- CEW usually come with Santa Ana's
- Parents write letters



Driscoll's CEW monitoring

- 4-5 yrs ago got hit hard on frozen fruit: started trapping and reporting counts to growers
- Look at spray records and materials available
- Working with growers 1 on 1
- 3 warnings for rejected fruit, then strip or juice fruit, treat with 3 day PHI product (e.g., Assail, Actara)



UTCrops

Traps for adult moths in green containers with pheromone and insecticidal strip

Chemical options

Organic sprays:

Bt (with every tank mix, e.g., Javelin), spinosad (Entrust), oils

Gemstar: Heliothis virus causes worms to stop feeding after 2 days

Conventional sprays:

0 day PHI: bifenthrin (Brigade)

1 day PHI: spinetoram (Radiant), acetamiprid (Assail), chlorantraniliprole (Coragen)

2 day PHI: fenpropathrin (Danitol)

3 day PHI: malathion, methoxyfenozide (Intrepid)

Does Coragen kill CEW in fruit? No, only on foliage !

(A) Leaves

Treatment	Rate (kg ai/ha)	% dead or moribund larvae placed on leaves					
		4 DAT	7 DAT	14 DAT	22 DAT	53 DAT	66 DAT
Untreated	-	3.1 b	18.8 b	18.8 b	10.1 b	18.8 b	25.0 a
Chlorantraniliprole	0.074	87.5 a	70.3 a	92.2 a	70.3 a	96.9 a	72.0 a
Chlorantraniliprole	0.112	95.3 a	87.5 a	96.9 a	75.0 a	79.7 a	59.4 a

(B) Blossoms and fruit (at 22 DAT)

Treatment	Rate (kg ai/ha)	% dead or moribund larvae on		% of fruit with feeding scars	% of fruit with larval tunnels
		Blossoms	Fruit		
Untreated	-	6.3 b	16.7 b	70.0 a	86.7 a
Chlorantraniliprole	0.074	62.5 a	20.0 b	93.3 a	86.7 a
Chlorantraniliprole	0.112	68.8 a	10.0 b	76.7 a	96.7 a

Note: .074 kg ai/ha is equivalent to 5ozs per acre
.112 kg ai/ha is equivalent to 7.5ozs per acre

Kuhar, T. P., Walgenbach, J. F., and Doughty, H. B. 2010. Control of *Helicoverpa zea* in tomatoes with chlorantraniliprole applied through drip chemigation. Online. Plant Health Progress doi:10.1094/PHP-2009-0407-01-RS.

Tough to find infested fruit

- Cut fruit
- Larvae can be very small
- At what stage does it enter fruit?
 - Entering green fruit



Literature Cited

- Overwinter survival is south of 40th parallel (Blanchard 1942)
- In Davis, adults emerged 4 April – 1 June (Velez 1970)
- Moon phase did not influence male capture (Hoffman et al 91 UC DAVIS paper)
- Higher trap catches in full moon – they changed traps more frequently (Hartstack et al 1978)
 - 5% of moths captured were *H. phloxiphaga*
 - Smaller size, different color patterns than *H. zea*
- Negative relationship between trap catch and wind velocity, but positive between trap catch and temp and trap catch and moon illumination – also trapped frequently (Parajulee et al 1998)

What's the deal with the moon? Fall Captures 2015

2015 Season: Corn Earworm (CEW) Adult Moth & Drosophilla FruitFly Trapping Station Counts
 (Approximately 7-day count intervals)

	Farm A	Farm B	Farm C	Farm D	Farm E	Farm F	Farm G	Farm H	Farm I	Farm J

W.E.	CEW	FruitFly	CEW	FruitFly	CEW	FruitFly	CEW	FruitFly	CEW	FruitFly	CEW	FruitFly	CEW	FruitFly	CEW	FruitFly	CEW	FruitFly	CEW	FruitFly
8/15/15	0		0		0		0		0		0		0		n/a		n/a		n/a	
8/22/15	0		0		0		0		0		0		0		n/a		n/a		n/a	
8/29/15	0		1		0		1		0		0		1		n/a		n/a		n/a	
9/5/15	2		1		0		0		0		1		1		n/a		n/a		n/a	
9/12/15	0		1		1		1		1		2		1		n/a		n/a		n/a	
9/19/15	0		1		1		0		1		1		1		n/a		n/a		n/a	
9/26/15	0		0		3		8		0		1		0		n/a		n/a		n/a	
10/3/15	0		2		1		7		1		1		0		n/a		n/a		n/a	
10/10/15	0		0		0		5		0		0		0		30		0		0	
10/17/15	0		0		100		10		0		0		0		15		0		0	
10/24/15	0		0		30		2		0		0		0		40		0		0	
10/31/15	0		0		15		2		0		0		0		45		0		0	

* TBR = to be reported later

Updated: 10/31/15 Saturday

○ Full moons: 8/29, 9/27, 10/27

What's the deal with the moon? Spring 2016

		Corn Earworm (CEW) Adult Moth & Drosophila FruitFly Trapping Station Counts (Approximately 7-day count intervals)																			
		Farm A		Farm B		Farm C		Farm D		Farm E		Farm F		Farm G		Farm H		Farm I		Farm J	
W.E.		CEW	FruitFly	CEW	FruitFly	CEW	FruitFly	CEW	FruitFly	CEW	FruitFly	CEW	FruitFly	CEW	FruitFly	CEW	FruitFly	CEW	FruitFly	CEW	FruitFly
3/12/16		3.75		27		26		28		40		19		1		0		1		29	
3/19/16		1.50		45		47		14		42		20		1		0		3		54	
3/26/16		6.00		120		25		106		110		31		1		0		2		150	
4/2/16		15.00	0	205	0	120	40	150	0	225	0	170	2	5	20	0	0	12	0	210	0
4/9/16		15.00	0	190	3	65	10	85	7	120	8	80	2	2	12	3	13	12	10	150	5
4/16/16		4.00	0	95	5	20	15	47	5	91	2	30	2	5	3	6	4	5	3	80	1
4/23/16		TBR	TBR	130	4	15	6	30	2	60	7	50	5	5	8	6	6	5	2	80	3
4/30/16		TBR	TBR	85	3	51	12	79	5	75	6	74	3	0	8	6	5	12	4	91	7

* TBR = to be reported later / n/a = not applicable

Updated: 4/30/16 Saturday

○ Full moons: 3/23, 4/22

Trap placement

- Keep out of way from tractor
- Pheromones replaced every 3 weeks in hot weather and 6 in cold weather
- With insecticide kill strip
- Place on north, east, south, west or center of field?





Pherocon 1 C WINGED sticky trap



Pherocon funnel BUCKET



Scentry HELIOTHIS trap



Pherocon DELTA sticky trap

Experimental Design

Trial 1: Trap Testing

- 2 field sites
- 4 or 5 traps with CEW pheromone (maybe no Texas trap)
- 5 reps of each trap per site

Trial 2: Lure testing

- 2 field sites
- 4 lures in best trap from trial 1
- 5 reps

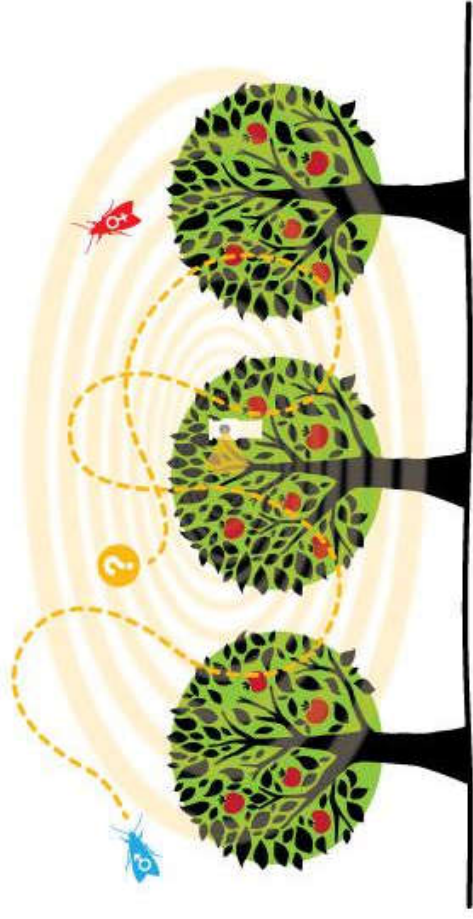


What do trap numbers mean?

- Spray efficacy
- Spray frequency
- Do they correlate with damage?
- More counts in full moon?

Other control options

- Mating disruption
 - Plant volatiles synergize sex pheromones (Ochieng et al 2002)
- Attract and Kill
 - Heliothis attracted to synthetic plant volatiles and killed with small amount of toxicant (Del Socorro et al 2003)
- Smart Trap (Trapview)
 - Automated pest monitoring



Trapview

