NOW Control in Almonds

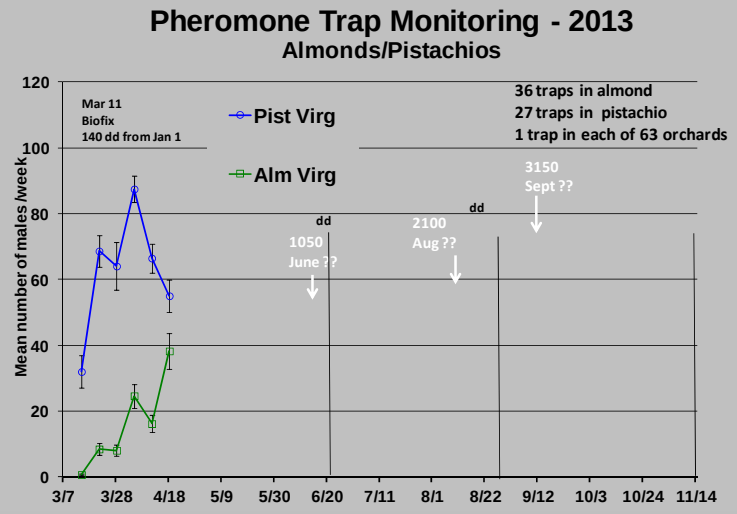
Brad Higbee
bradh@paramountfarming.com
Paramount Farming Co.
Bakersfield, CA, 93306

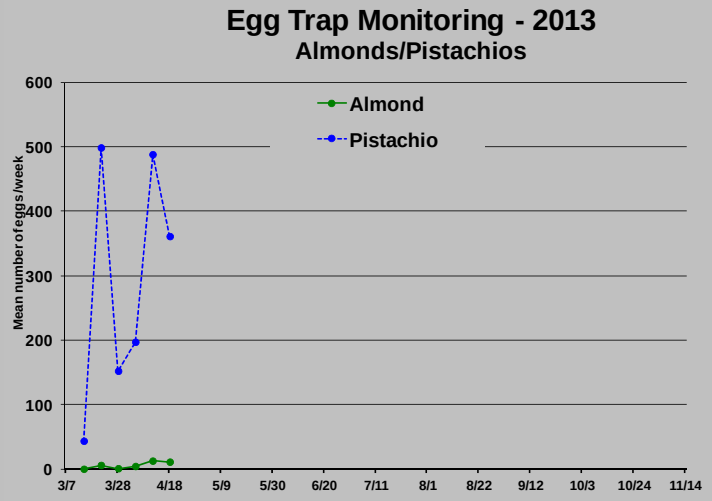
PARAMOUNT
FARMING COMPANY

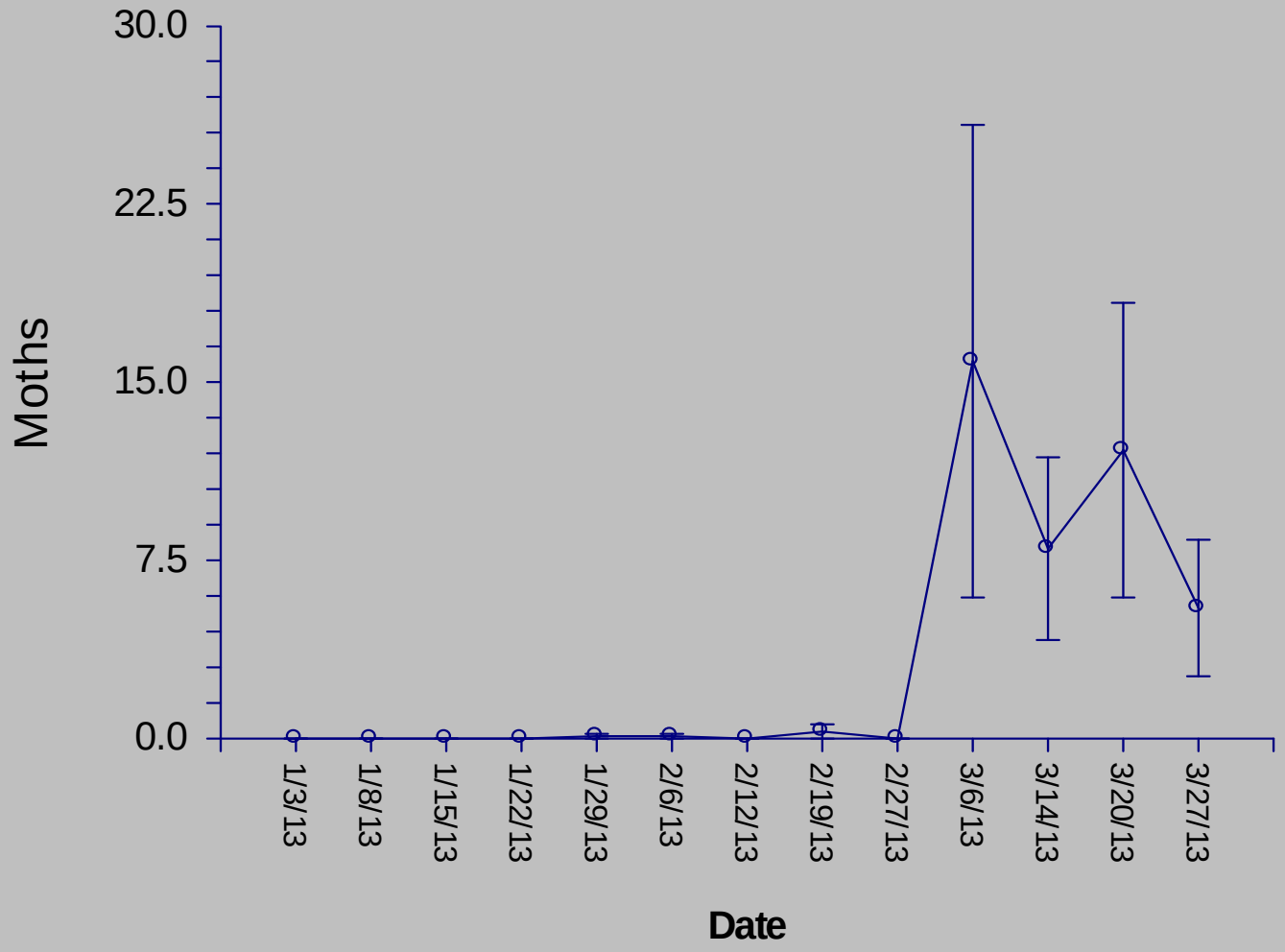
What is our Biofix for NOW in 2013??

Based on UCIPM guidelines using egg traps, in many almond orchards, a biofix (50% of egg traps with eggs) may not have occurred yet!

2013 biofix = March 11







Lost Hills CMIS
2/25 – 75 dd
3/4 – 121 dd
3/11 – 140 dd
3/18 – 204 dd

2/25 – 3/11
65 dd difference

3/11 – 3/18
64 dd difference

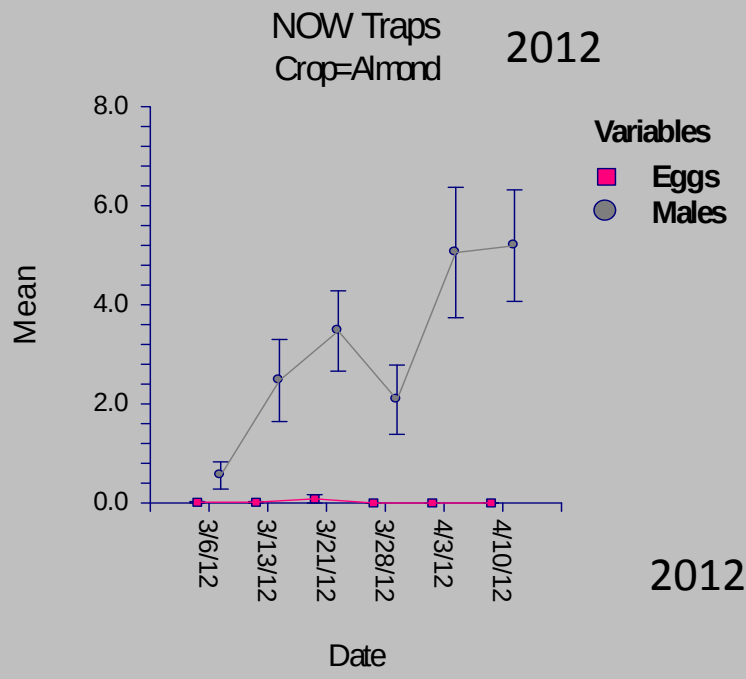
Biofix for NOW??

If using egg traps, go with pistachio data.

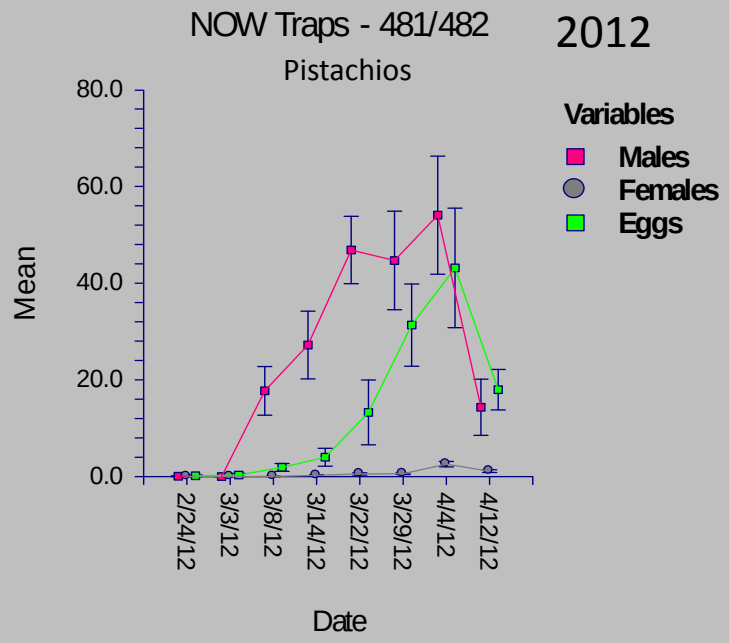
If using pheromone traps, either crop should work.

Using 150-160 dd after Jan 1 is a good estimate.

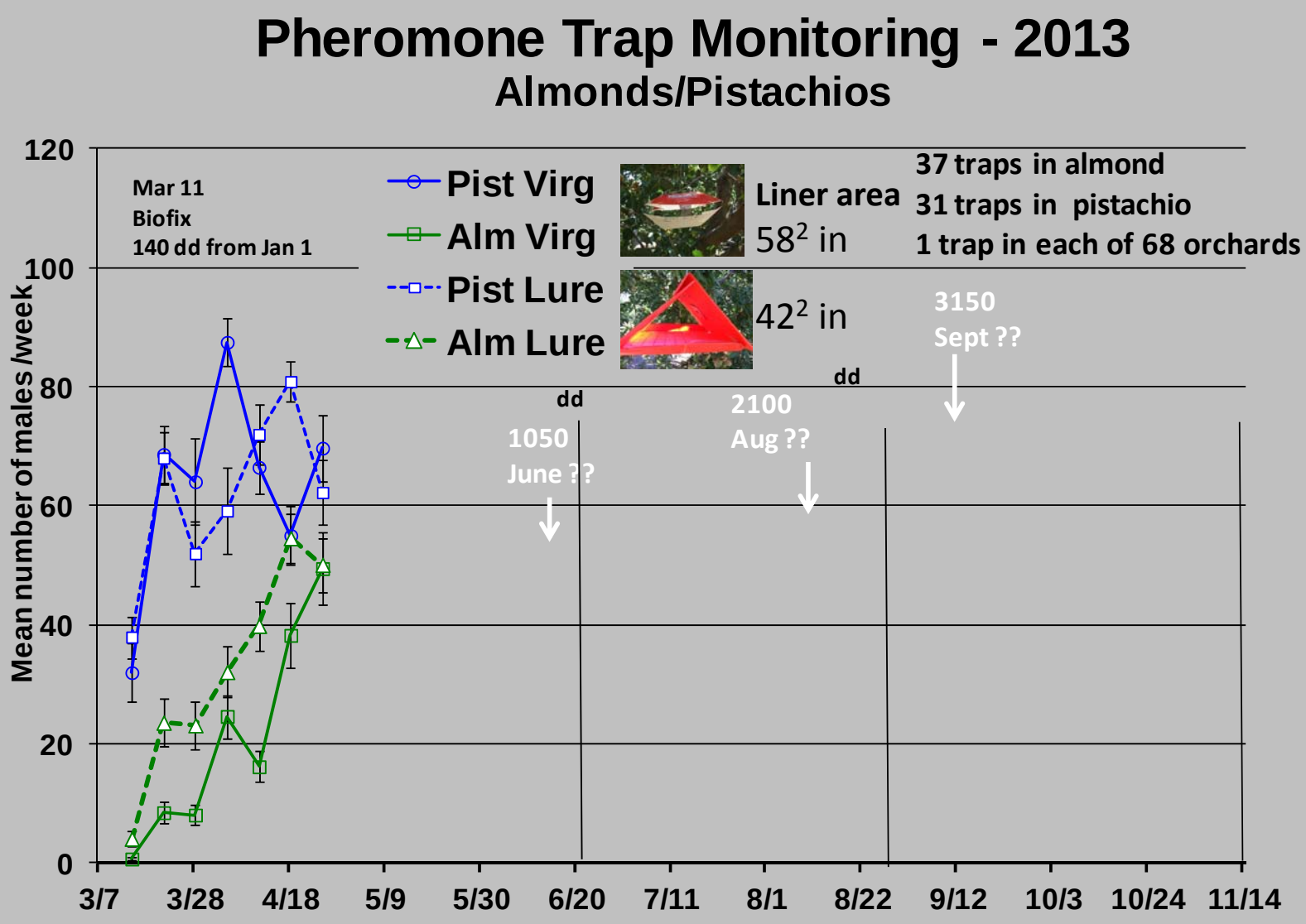
Pheromone traps are usually a week or two ahead of egg traps. I use this along with egg traps to establish biofix, basically the very beginning of sustained egg activity in pistachios or pheromone traps in almonds.



2012 biofix = 3/7



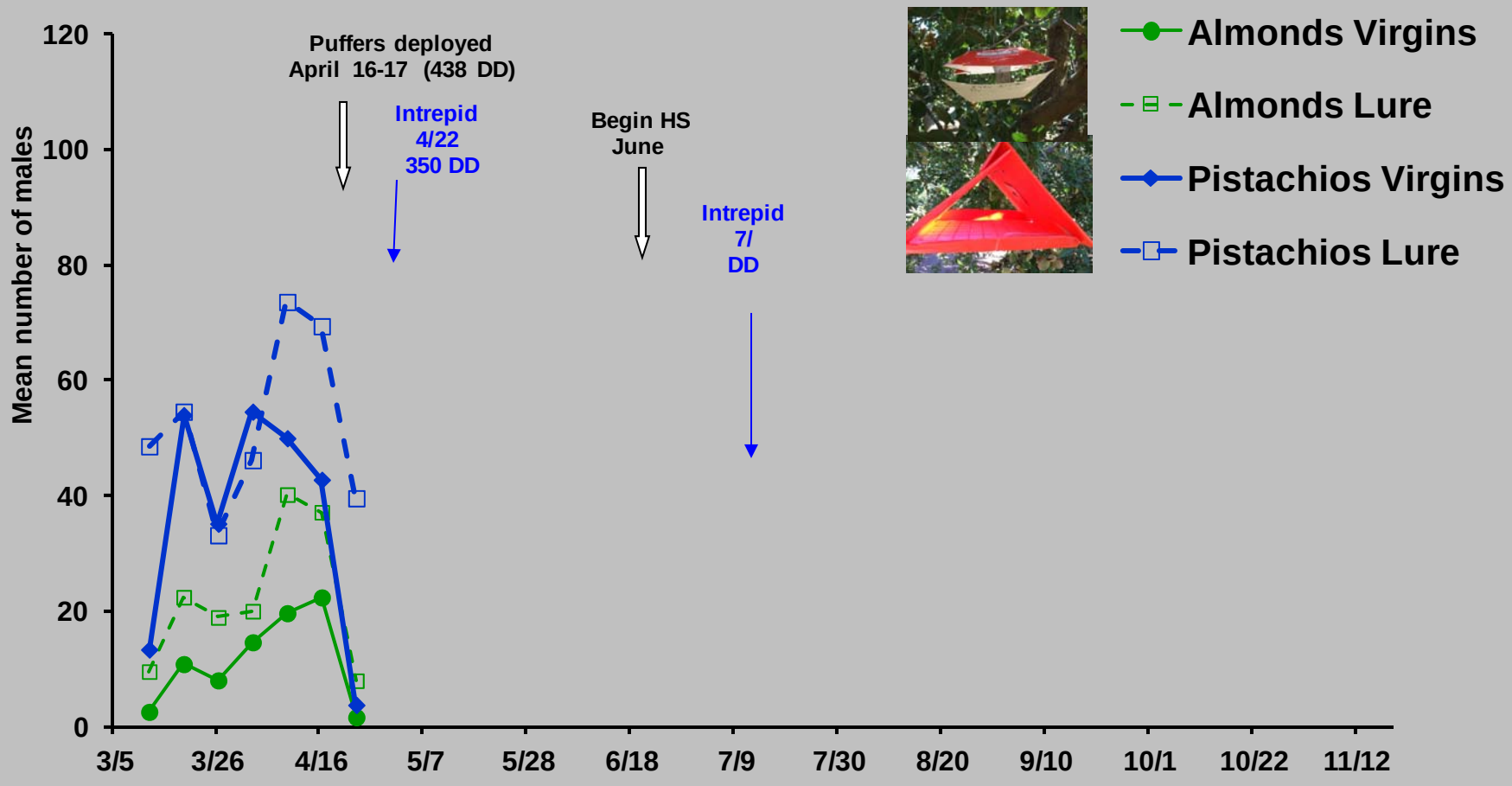
How does the NOW Pheromone lure compare?



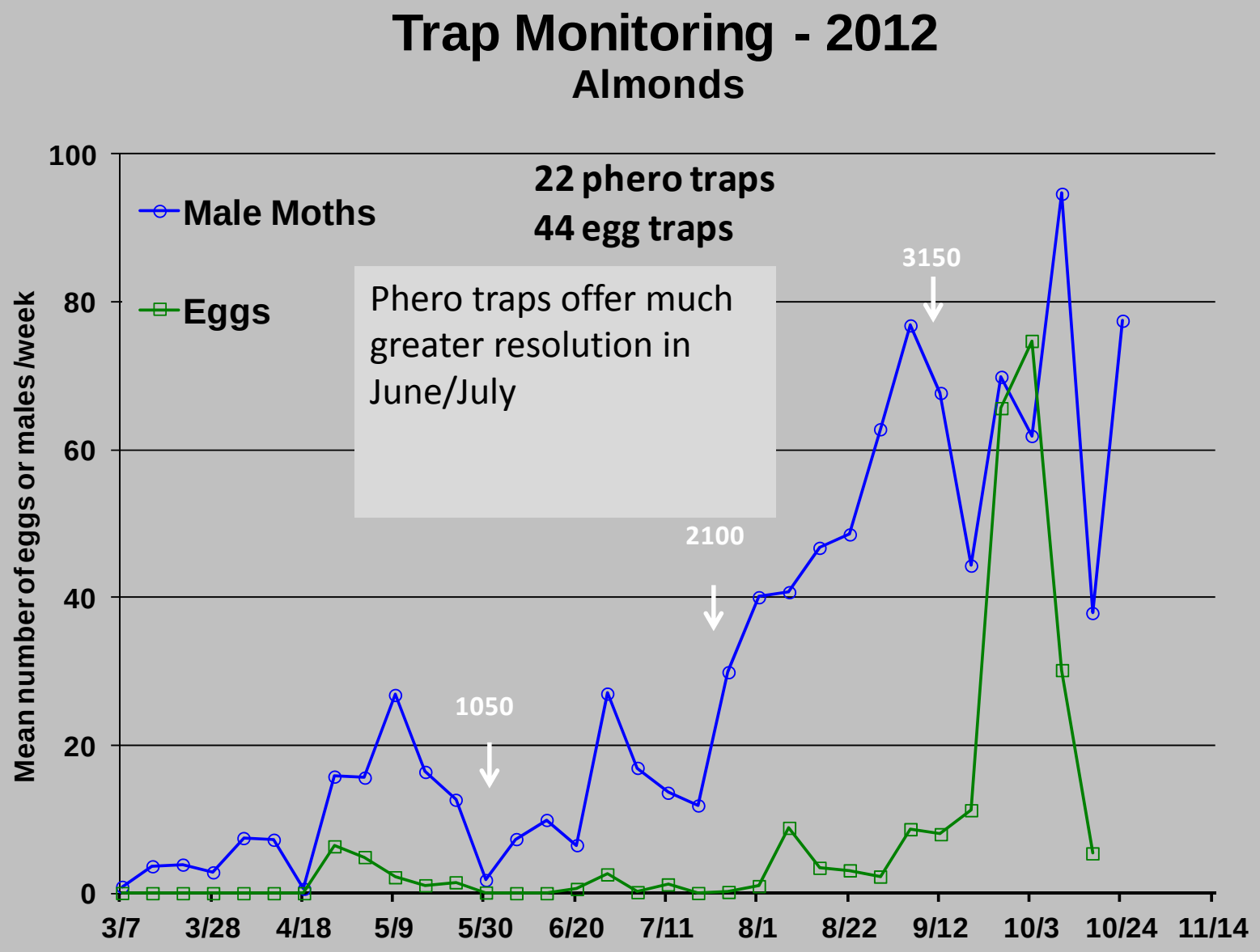
60 Traps of each type

Lost Hills NOW AW Project

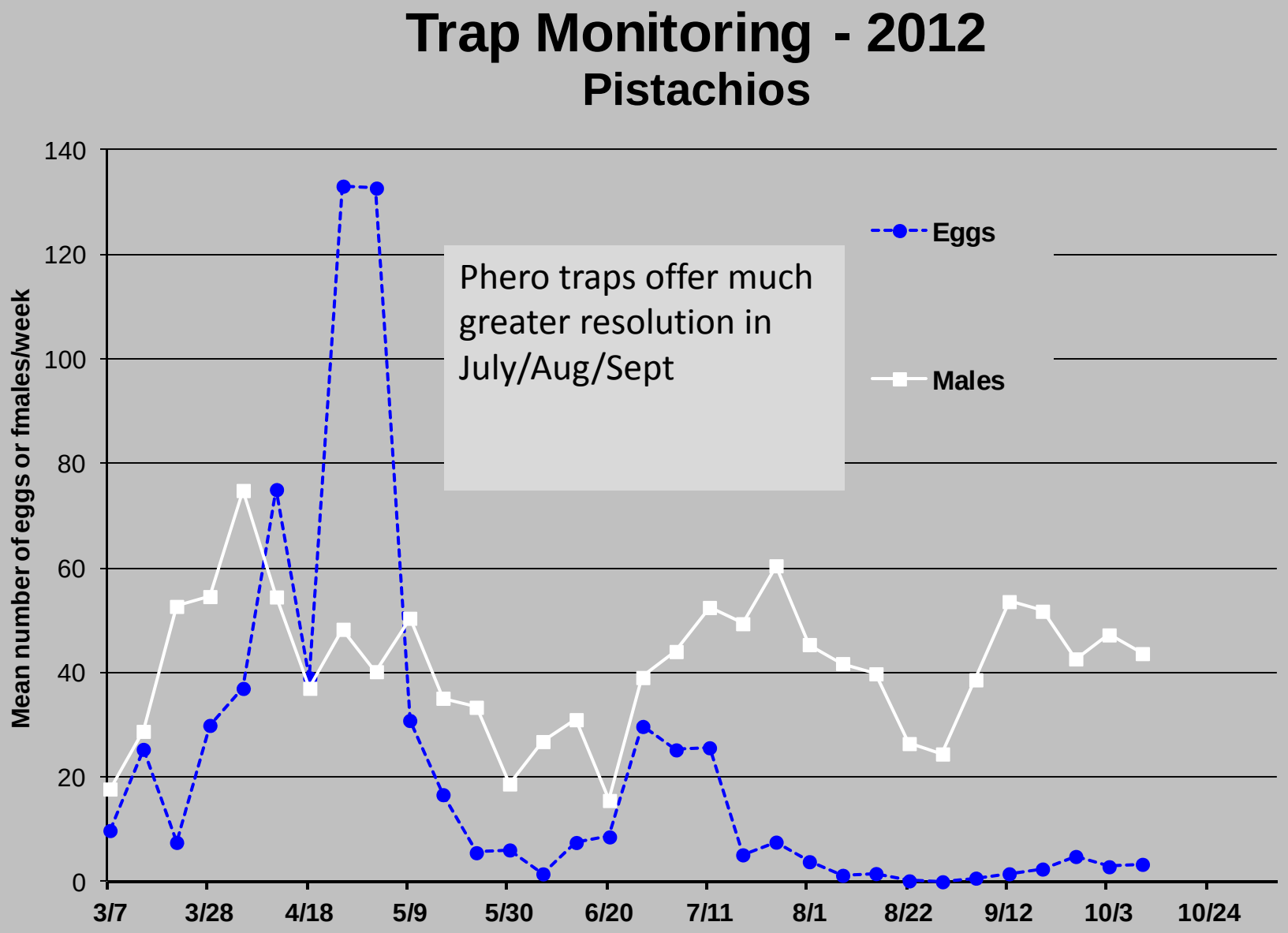
Pheromone Traps in Almond and Pistachio - 2013



Virgin pheromone traps vs egg traps

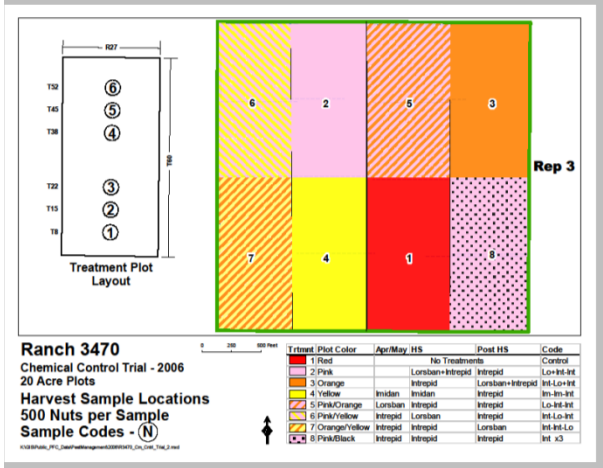


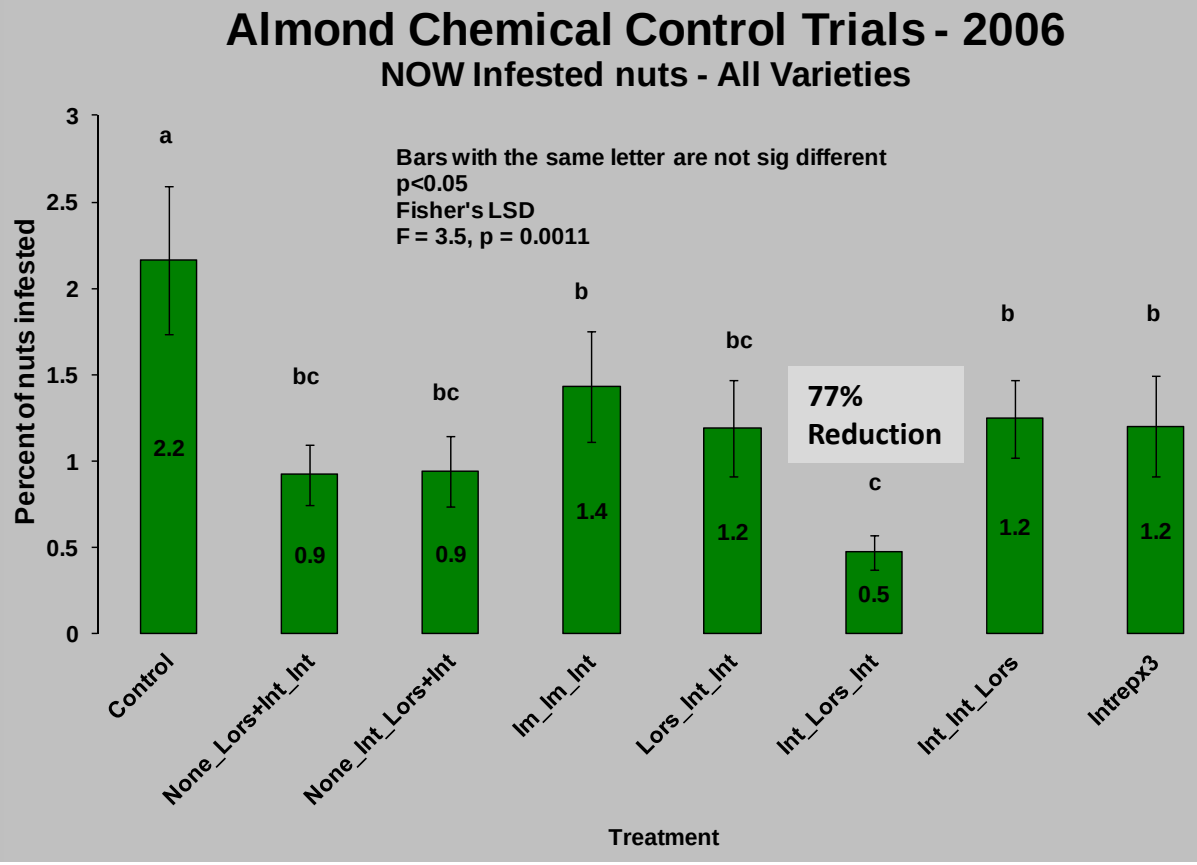
Virgin pheromone traps vs egg traps



NOW Insecticide Trials in Almond – Programs tested in 2006

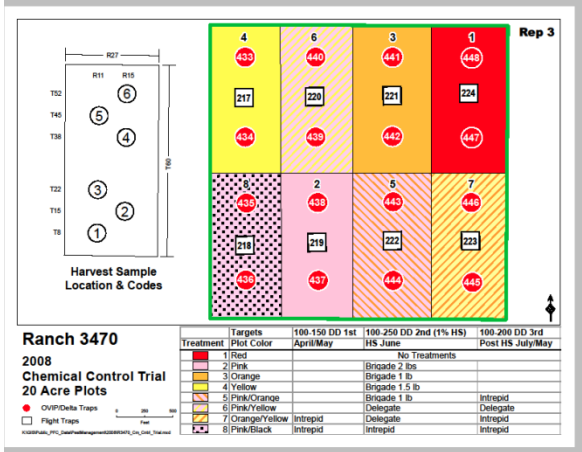
NOW Chemical control trial - Almond - 2006			
	Timing		
Targets	100-150 DD 1st	100-250 DD 2nd (1% HS)	100-200 DD 3rd
Trtmnt	April/May	HS	Post HS *
1	No Treatments		
2		Lorsban+Intrepid	Intrepid
3		Intrepid	Lorsban+Intrepid
4	Imidan	Imidan	Intrepid
5	Lorsban	Intrepid	Intrepid
6	Intrepid	Lorsban	Intrepid
7	Intrepid	Intrepid	Lorsban
8	Intrepid	Intrepid	Intrepid

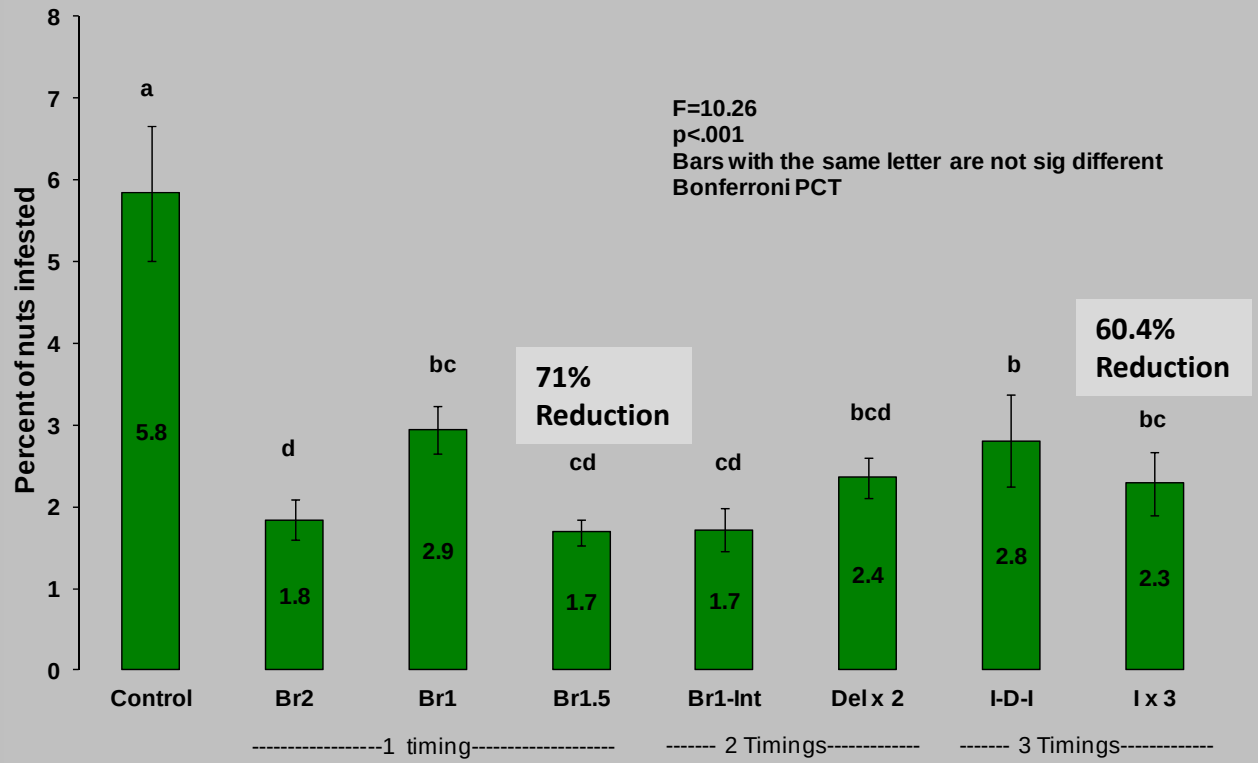




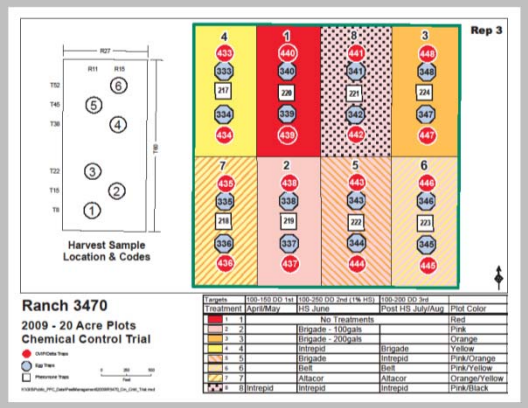
NOW Insecticide Trials in Almond – looking at bifenthrin performance

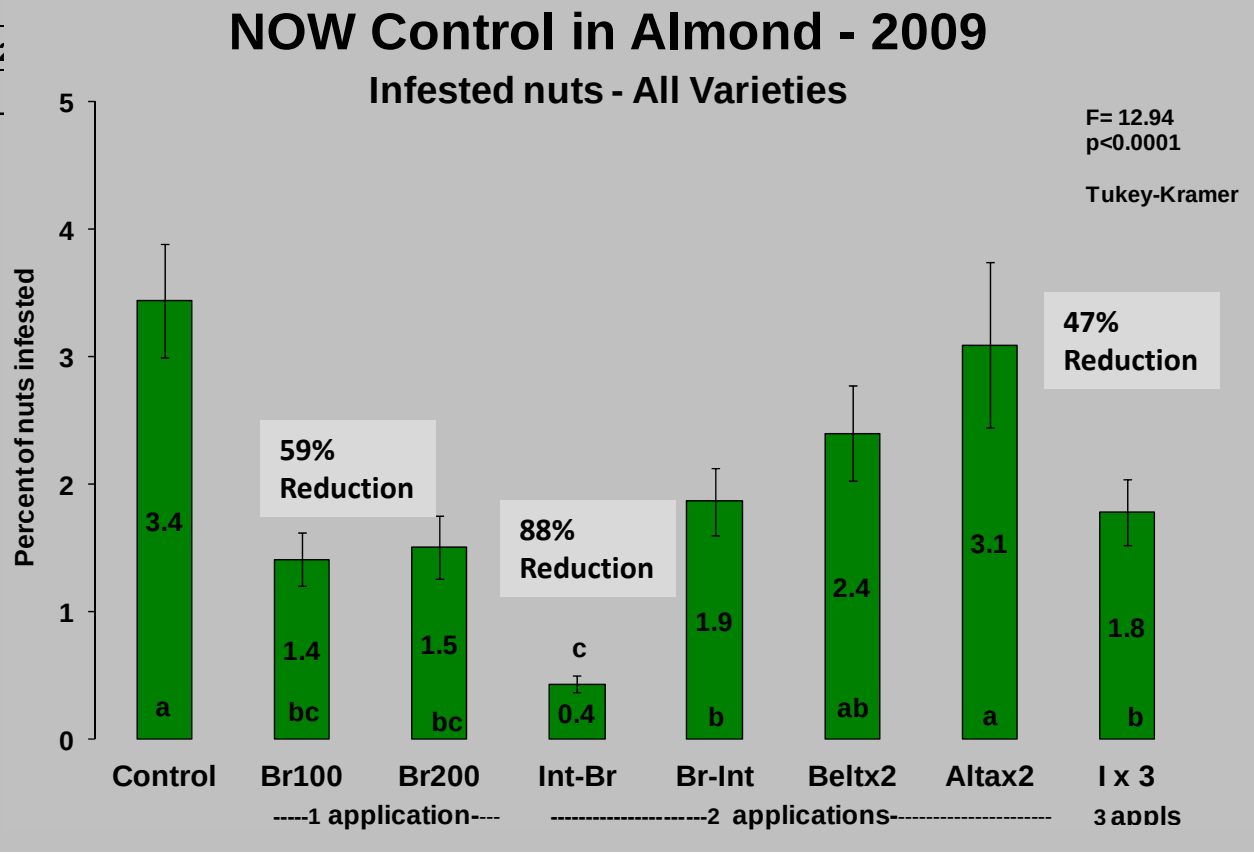
NOW Insecticide control trial - Almond - 2008			
	Timing		
Targets	100-150 DD 1st	100-250 DD 2nd (1% HS)	100-200 DD 3rd
Trtmnt	April/May	HS June	Post HS July/Aug
1	No Treatments		
2		Brigade 2 lbs	
3		Brigade 1 lb	
4		Brigade 1.5 lb	
5		Brigade 1 lb	Intrepid
6		Delegate	Delegate
7	Intrepid	Delegate	Intrepid
8	Intrepid	Intrepid	Intrepid
Estimated date	Mar 18- Apr 14	June 7 - July 3	July 25 - Aug 8
Actual date	April 28	June 30	July 25
Deg days	1st flight 294	2nd flight 300	2nd flight 950
Biofix	15-Mar	1359 dd	2004 dd



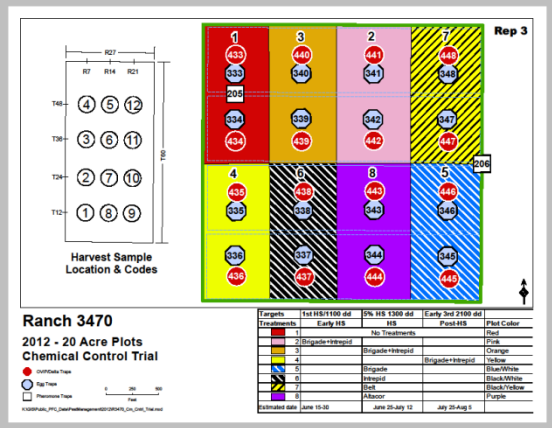


NOW Insecticide control trial - Almond - 2009			
	Timing		
Targets	100-150 DD 1st	100-250 DD 2nd (1% HS)	100-200 DD 3rd
Trtmnt	April/May	HS June	Post HS July/Aug
1	No Treatments		
2		Brigade - 100gals/ac	
3		Brigade - 200gals/ac	
4		Intrepid	Brigade
5		Brigade	Intrepid
6		Belt	Belt
7		Altacor	Altacor
8	Intrepid	Intrepid	Intrepid
Estimated date	Mar 18- Apr 14	June 7 - July 3	July 25 - Aug 8
Actual date	4/10	7/3	
Deg days	160	152	
Biofix	15-Mar		



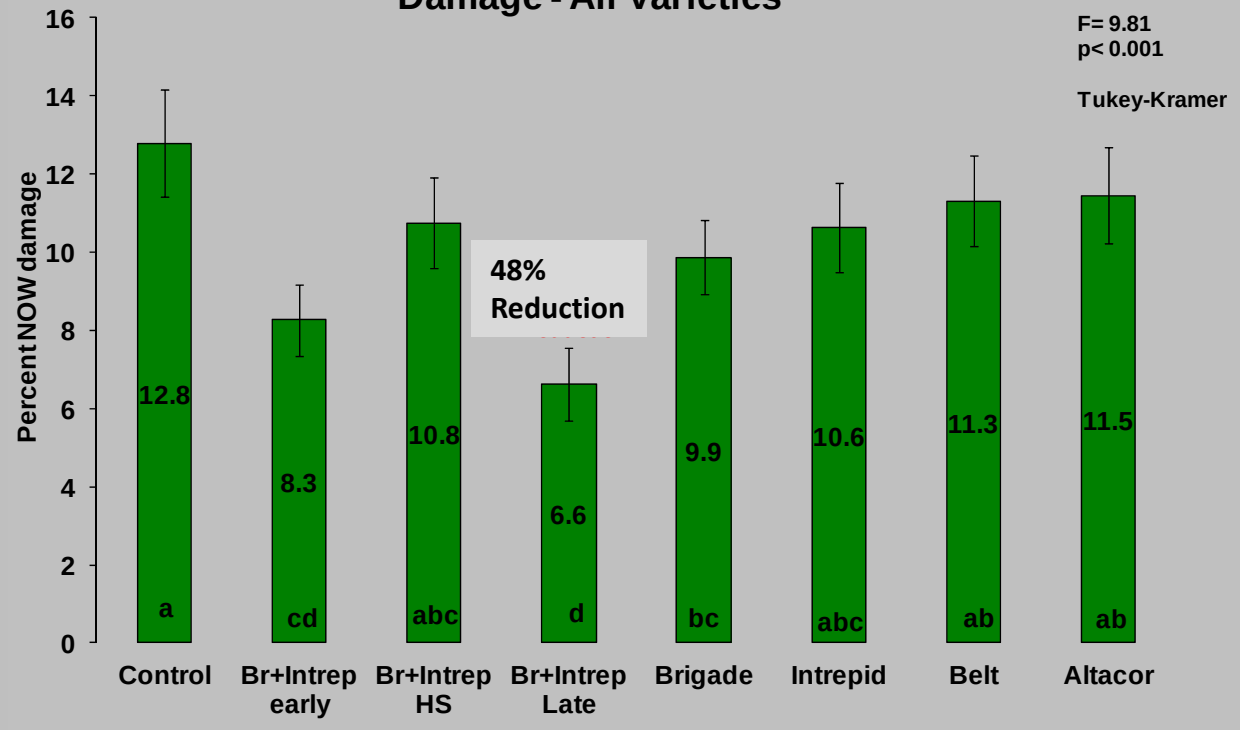


NOW Insecticide control trial 1 - Almond - 2012			R3400, 3410, 3470
	Timing		
Targets	1st HS/1100 dd	1-5% HS 1350 dd	10%+HS 2100 dd
Treatments	Early HS	HS	Late-HS
1	No Treatments		
2	Brigade+Intrepid		
3		Brigade+Intrepid	
4			Brigade+Intrepid
5		Brigade	
6		Intrepid	
7		Belt	
8		Altacor	
Estimated date	June 10 - 25	June 25 - July 15	July 25 - Aug 8
Actual date	June 23	July 7	July 31
Deg days	1230	1500	2075
Biofix	7-Mar		
2.0 mph			



NOW Control in Almond 1- 2012

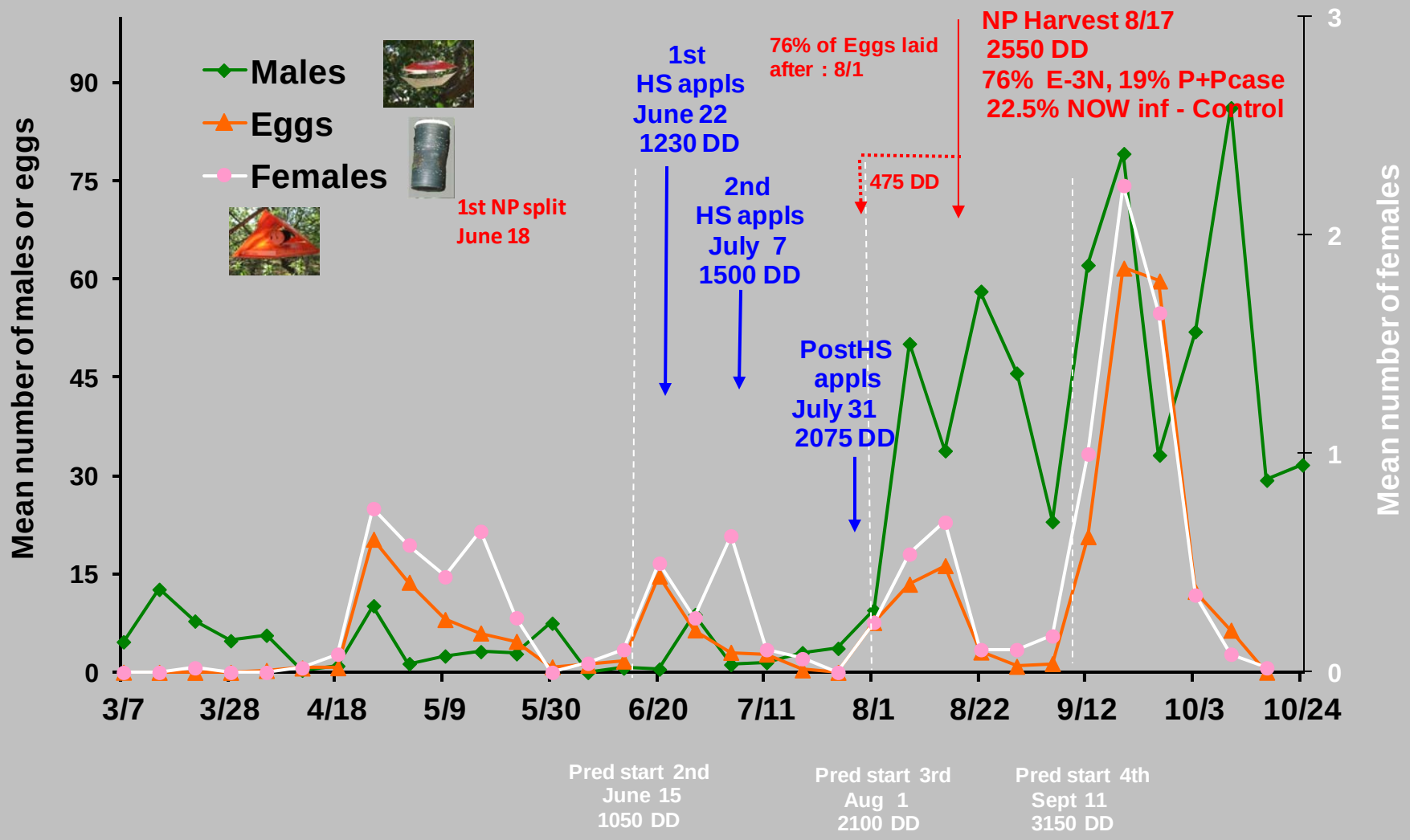
Damage - All Varieties



B. Higbee, PFC

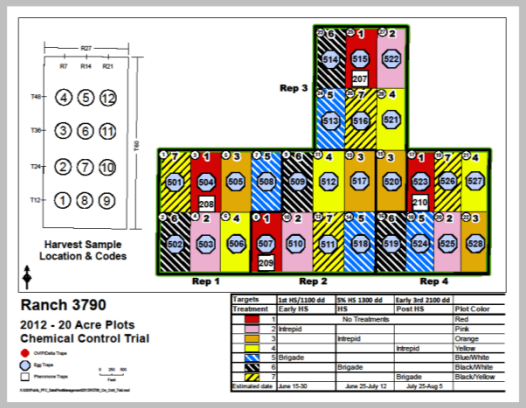
NOW Insecticide Trial 1 - Almond

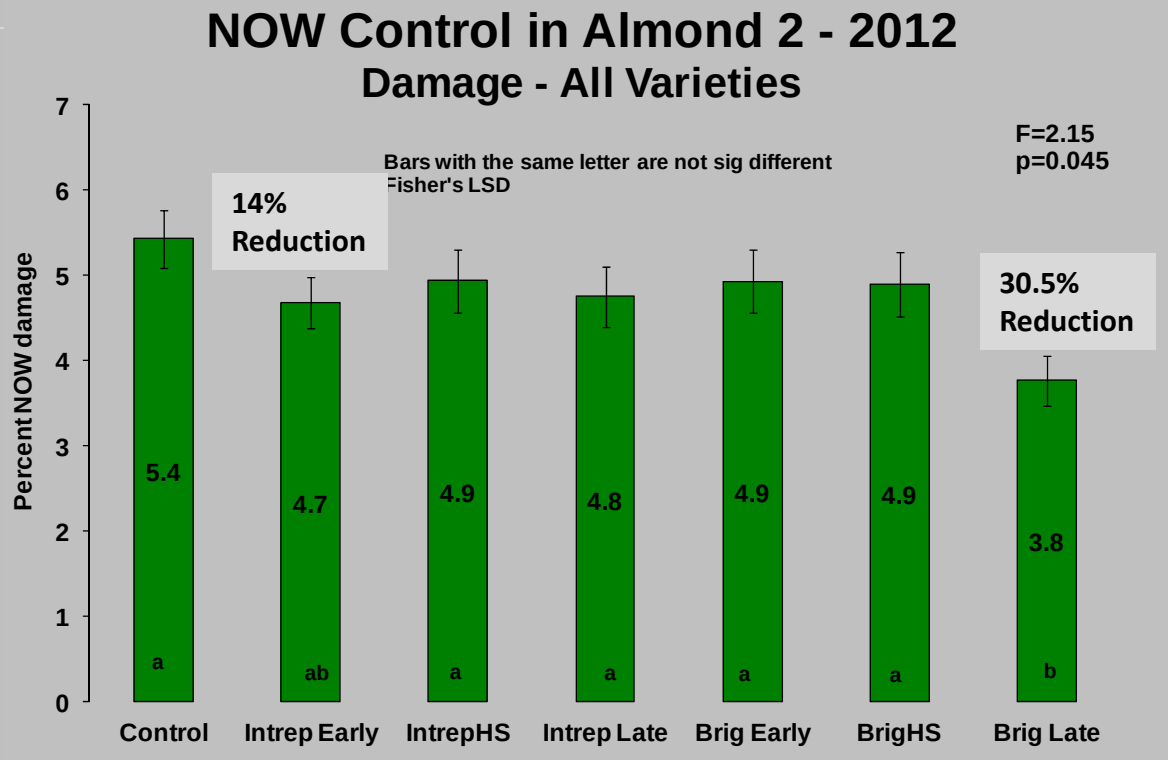
Pheromone and Oviposition attractant traps - 2012



B. Higbee, PFC

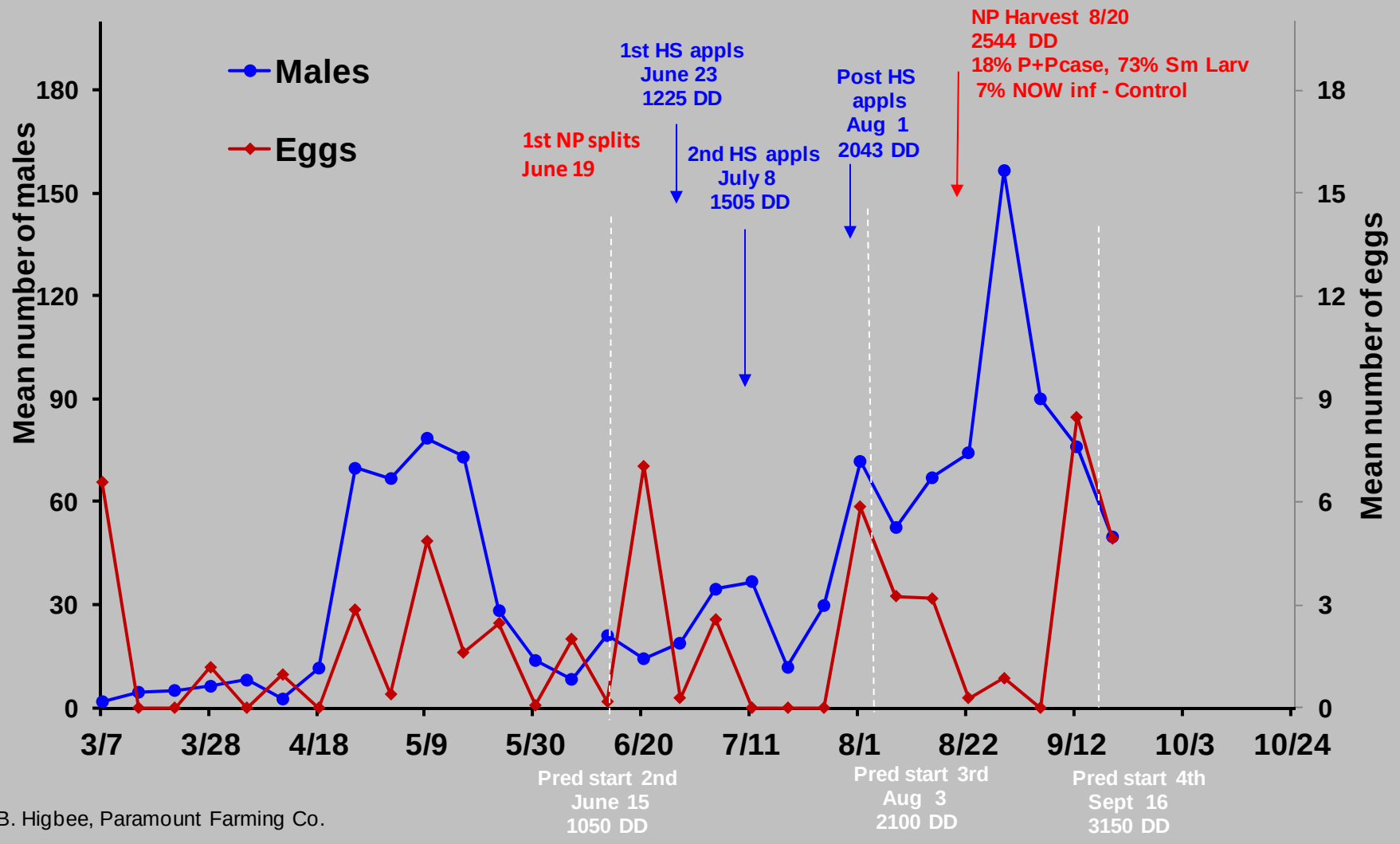
NOW Insecticide control trial 2- Almond - 2012			**R3790**
	Timing		
Targets	1st HS/1100 dd	5-10% HS 1350 dd	10%+HS 2100 dd
Trtmnt	Early HS	HS	Post HS
1	No Treatments		
2	Intrepid		
3		Intrepid	
4			Intrepid
5	Brigade		
6		Brigade	
7			Brigade
Estimated date	June 15-30	June 25-July 12	July 20 - Aug 10
Actual date	June 23	July 7	Aug 1
Deg days	1225	1500	2050
Biofix 3/7			





NOW Insecticide Trial II - Almond

Pheromone and Egg traps - 2012

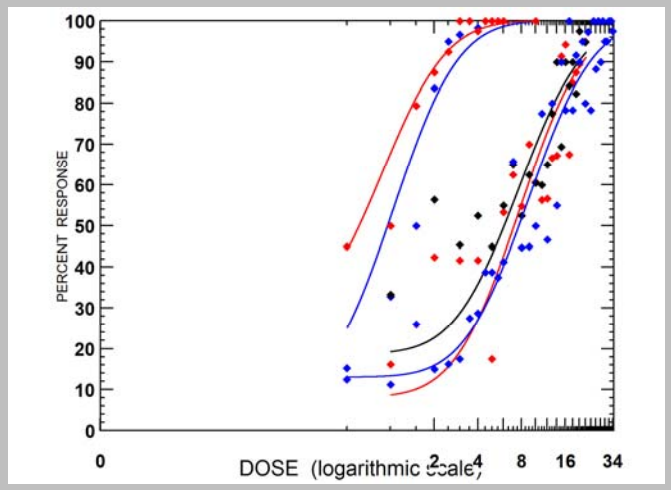


B. Higbee, Paramount Farming Co.

What is the Problem(s)?

- Possibilities:
  - Pyrethroid Resistance
  - Coverage challenge for ovi-larvicides

Resistance assays



RF=Resistance factor = LC_{50} of field strain/LC_{50} of USDA strain

48 hr mortality tables

Low or no bifenthrin

	LC50		RF	
Year	Male	Female	Male	Female
2009	0.7	0.5	1.3	0.8
2010	2.1	2.1	2	2
2011	1	1.1	0.7	0.75
2012	1.8	2.35	2.4	3.5
2013	5.4/5.3	6.6/6.1	4.0/3.9	4.8/4.5

High bifenthrin

	LC50		RF	
Year	Male	Female	Male	Female
2009	0.3	0.5	0.6	0.8
2010	1.35	1.8	1.3	1.65
2011	1.7	2.1	1.2	1.5
2012	2.4	2.5	3.1	3.8
2013	7.9	8.8	5.8	6.5

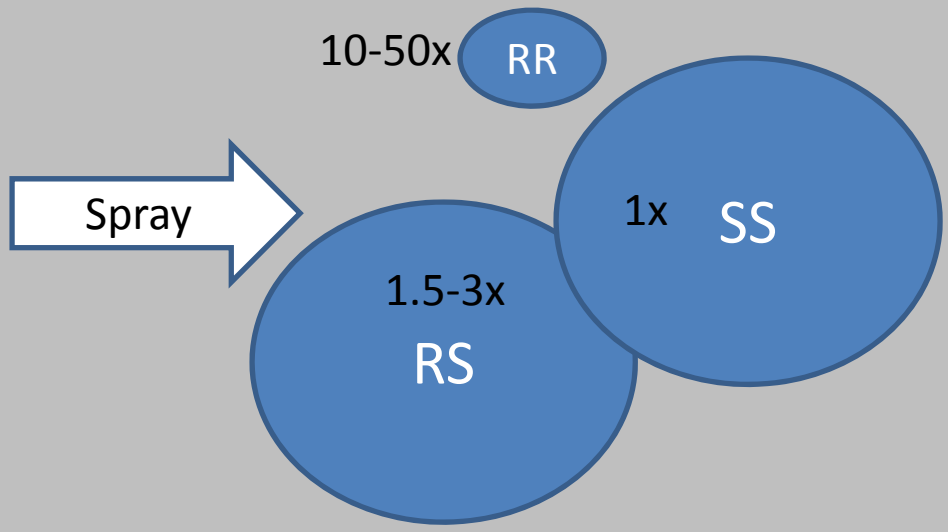
Pyrethroid Resistance Management

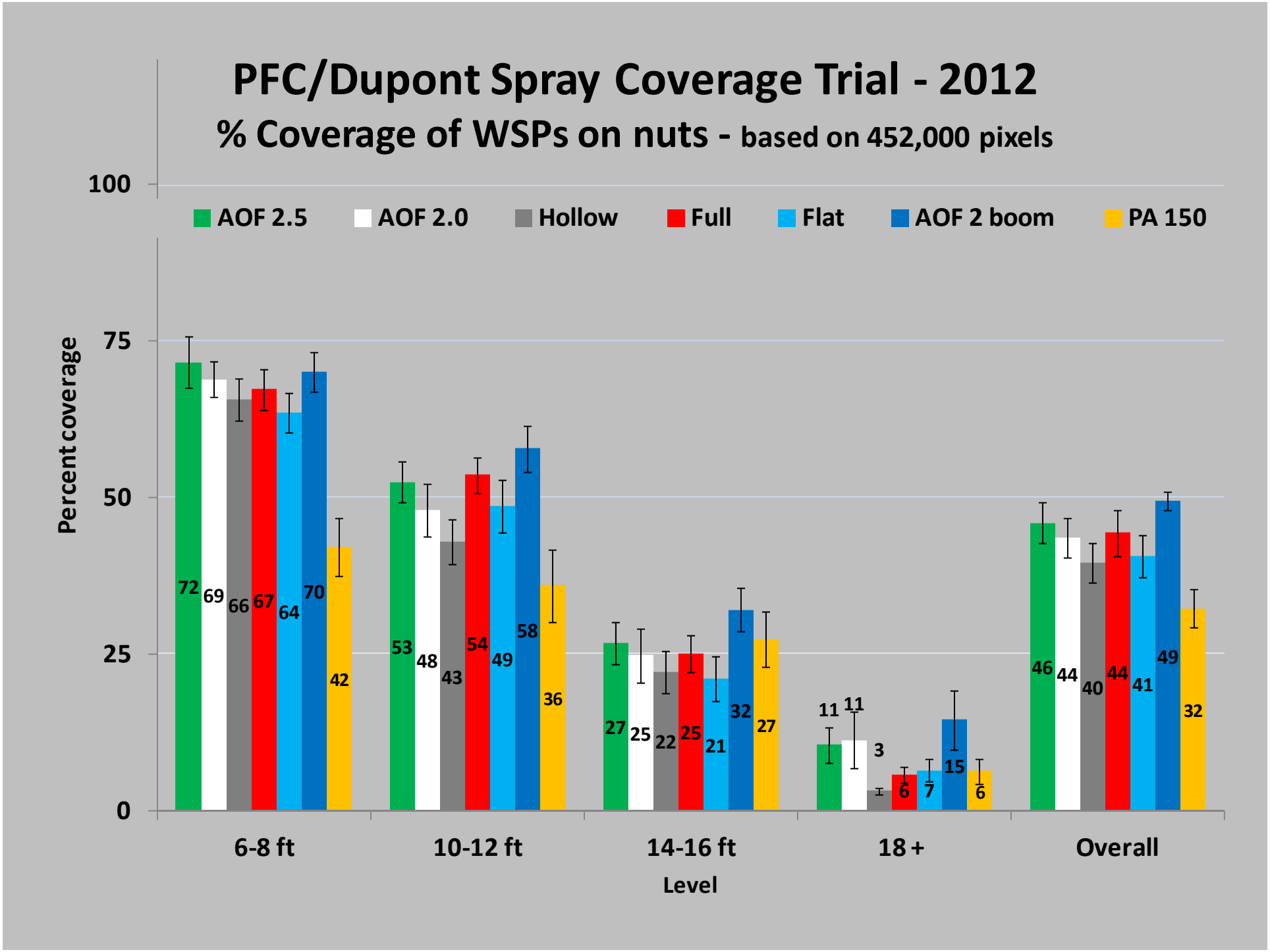
- Is it too late to stop resistance development?
- If we continue with 3-5+ appls/yr the trend will continue
- what about neighbors?
- We need to work in different MOAs and alternatives to pyrethroids for Plant bugs. Belay, Lorsban, others?

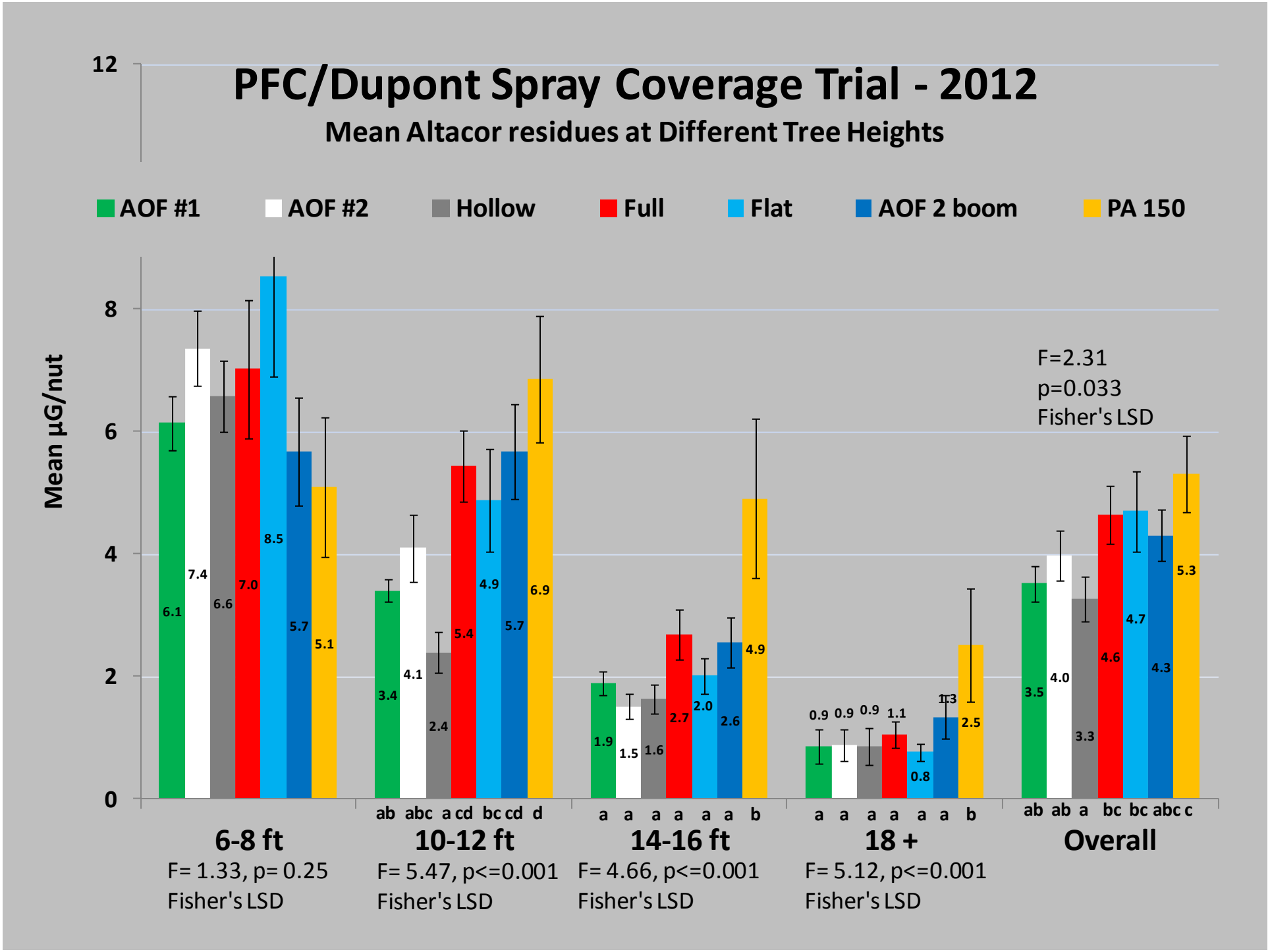
- Don't used reduced rates
- **Kill all Heterozygotes!!**

High Dose Resistance Management

Lessons learned from GMO - Based on 2 Loci Detox systems

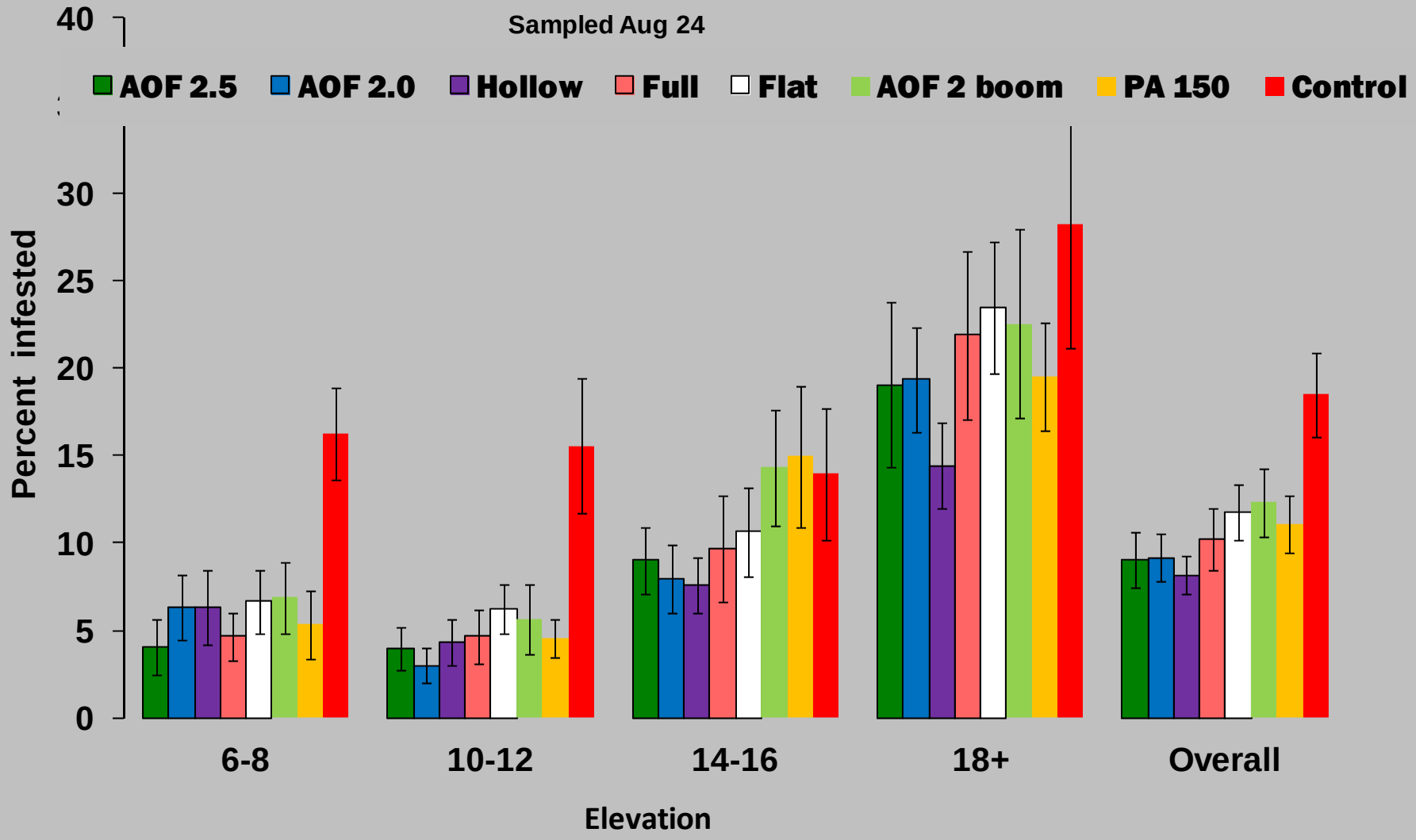



PFC/Dupont Spray Coverage Trial - 2012
% Coverage of WSPs on nuts - based on 452,000 pixels
100
75
50
25
0
Percent coverage
AOF 2.5
AOF 2.0
Hollow
Full
Flat
AOF 2 boom
PA 150
72
69
66
67
64
70
42
53
48
43
54
49
58
36
27
25
22
25
21
32
27
11
11
3
6
7
15
6
46
44
40
44
41
49
32
6-8 ft
10-12 ft
14-16 ft
18 +
Overall
Level


PFC/Dupont Spray Coverage Trial - 2012
Mean Altacor residues at Different Tree Heights
AOF #1
AOF #2
Hollow
Full
Flat
AOF 2 boom
PA 150
Mean µG/nut
12
8
6
4
2
0
F=2.31
p=0.033
Fisher's LSD
6.1
7.4
6.6
7.0
8.5
5.7
5.1
3.4
4.1
2.4
5.4
4.9
5.7
6.9
1.9
1.5
1.6
2.7
2.0
2.6
4.9
0.9
0.9
0.9
1.1
0.8
1.3
2.5
3.5
4.0
3.3
4.6
4.7
4.3
5.3
ab abc a cd bc cd d
a a a a a a b
a a a a a a b
ab ab a bc bc abc c
6-8 ft
F= 1.33, p= 0.25
Fisher's LSD
10-12 ft
F= 5.47, p<=0.001
Fisher's LSD
14-16 ft
F= 4.66, p<=0.001
Fisher's LSD
18 +
F= 5.12, p<=0.001
Fisher's LSD
Overall

Almond Spray Coverage Trial- 2012

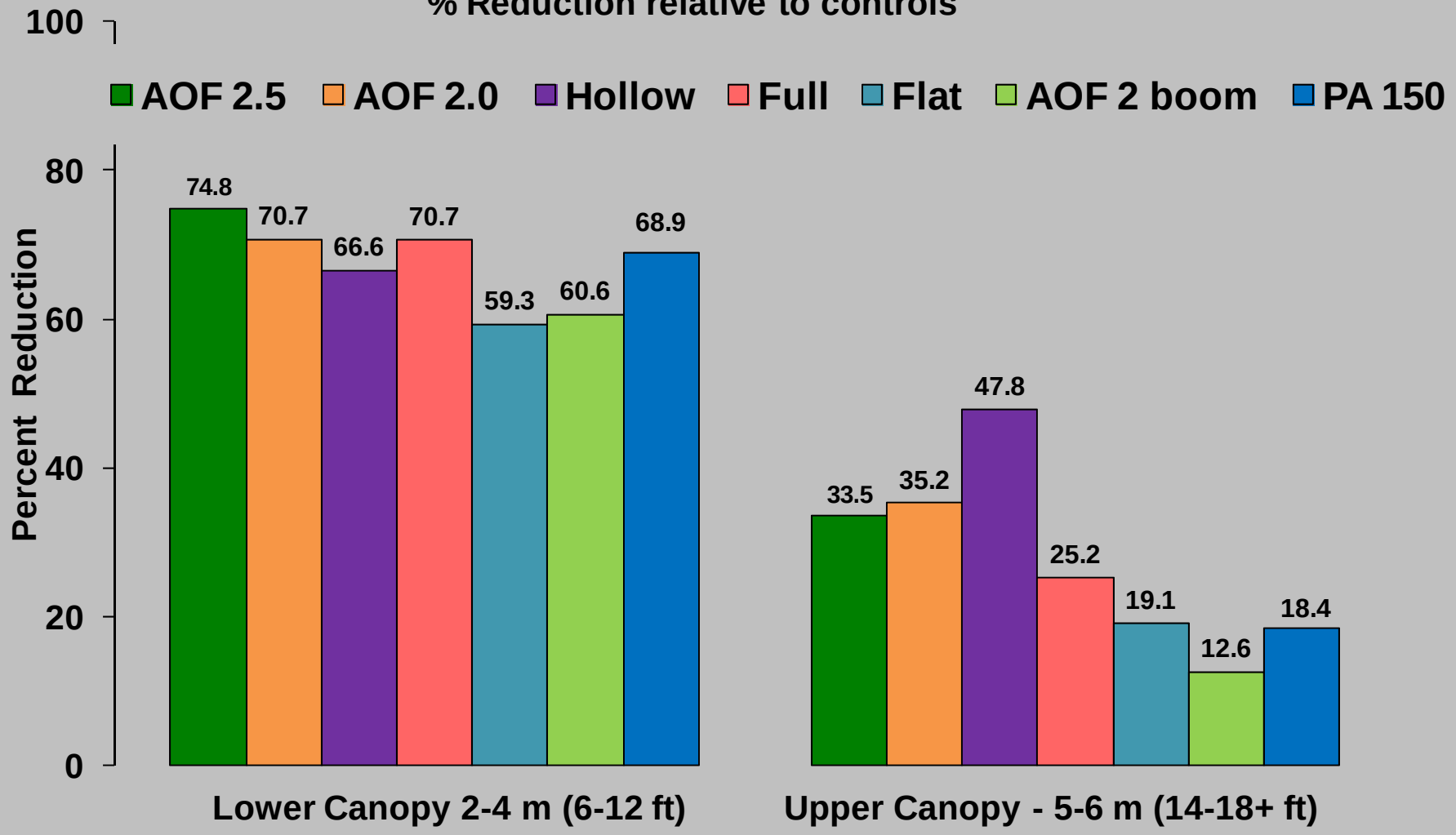
NOW Infested nuts from Tree/level samples - NP



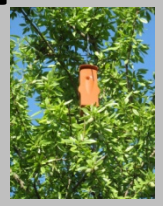
Almond Spray Coverage Trial- 2012

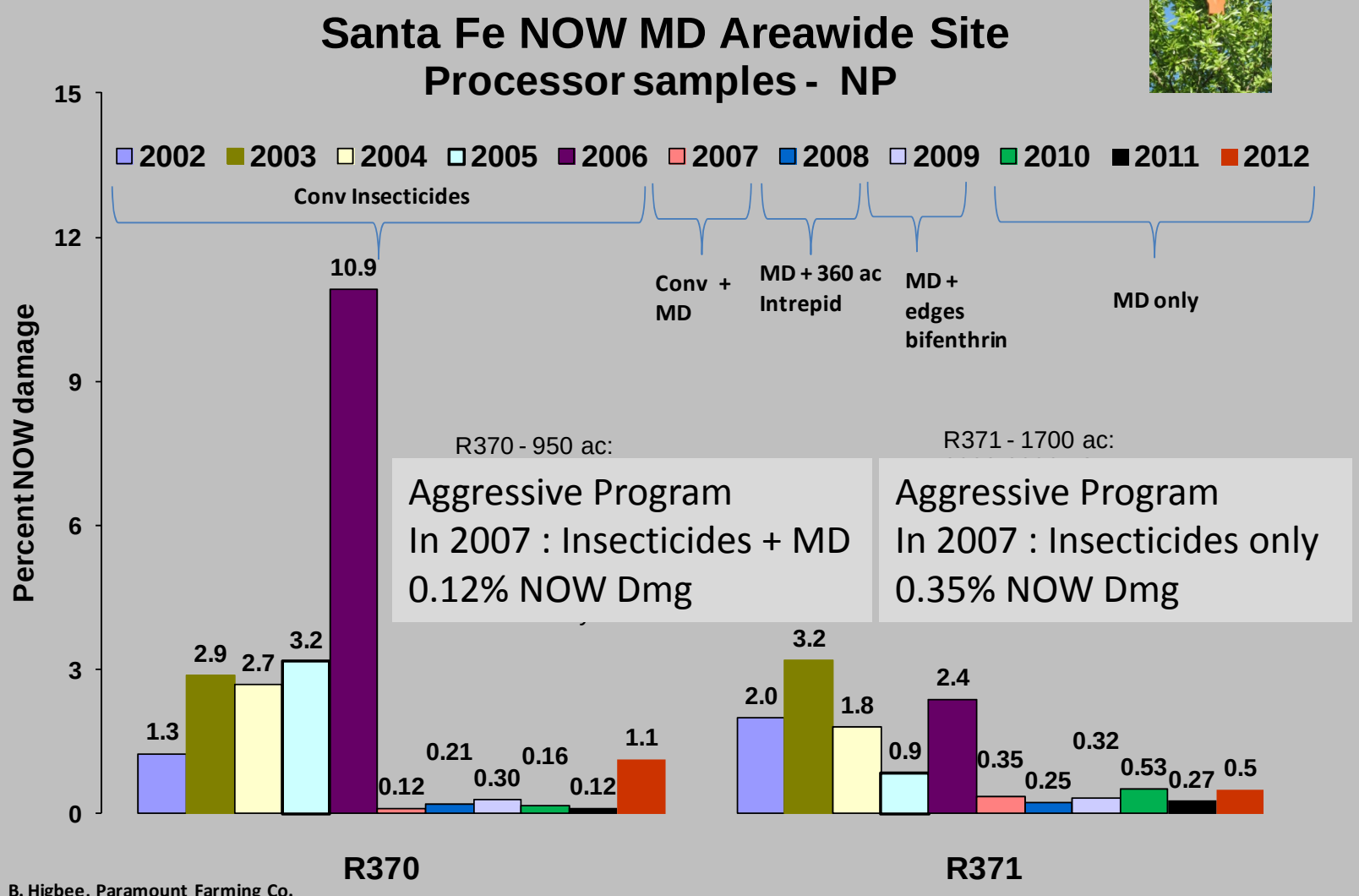
NOW Infested nuts from Tree/level samples - NP

% Reduction relative to controls



So What about Mating Disruption?





R370 - 950 ac:

Aggressive Program
In 2007 : Insecticides + MD
0.12% NOW Dmg

R371 - 1700 ac:

Aggressive Program
In 2007 : Insecticides only
0.35% NOW Dmg

PFC NOW MD

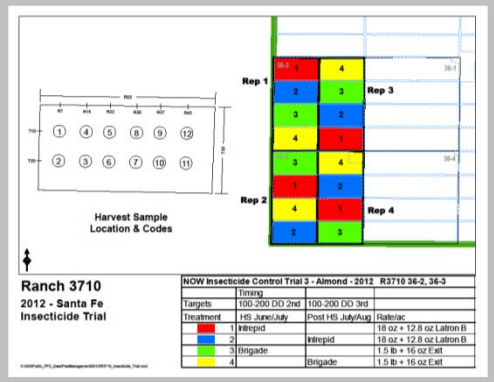
	Alm HS Appls	**2012**	
	Acres treated	Total acres MD	% Ac Treated
ESn	251	598	**42.0**
ESs	295	943	**31.3**
DR	1191	1969	**60.5**
WV	2465	4068	**60.6**
BR	0	896	**0.0**
Total	4202	8474	**49.6**

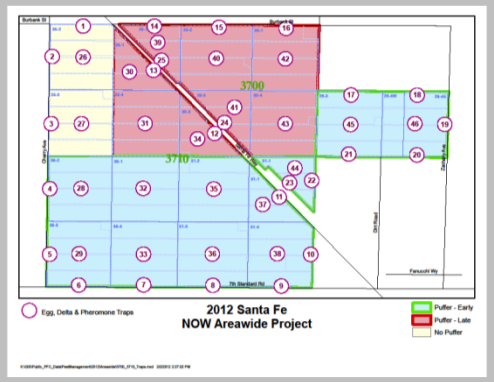
PFC Field Huller samples – all Varieties

Treatment	Mean	SE
Conv	1.2	0.05
MD	1.1	0.04
MD+Conv	0.8	0.06

NOW Insecticide Trials in Almond -3

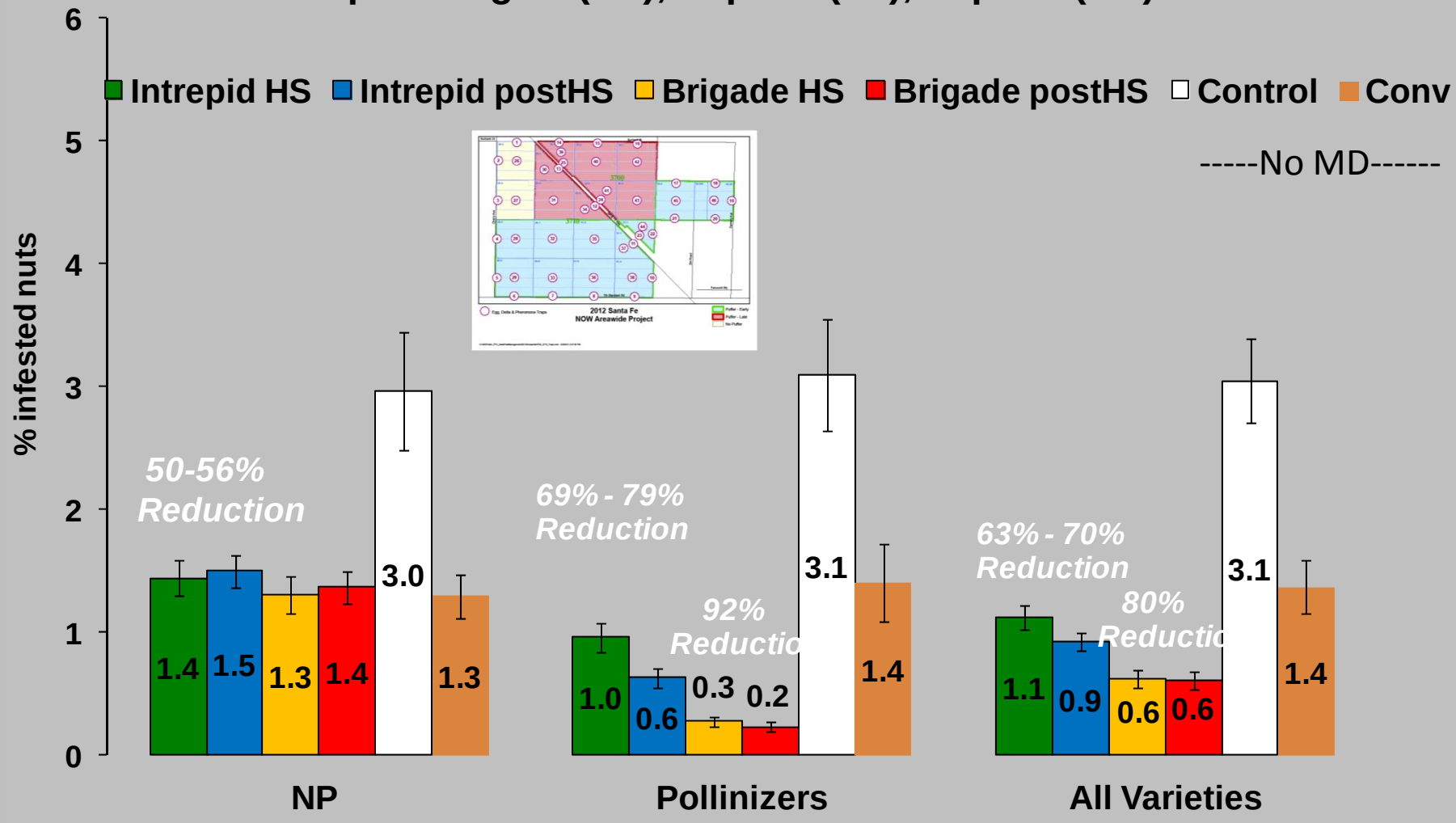
NOW Insecticide control trial 3 - Almond - 2012			
R3710 36-2, 36-3	Timing		
Targets	1500-1700 DD 2nd	2000-2200 DD 3rd	
Trtmnt	HS June/July	Post HS July/Aug	Rate/ac
1	Intrepid		18 oz + 12.8 oz Latron B
2		Intrepid	18 oz + 12.8 oz Latron B
3	Brigade		1.5 lb + 16 oz Exit
4		Brigade	1.5 lb + 16 oz Exit
Estimated date	June 25-July 8	July 25 - Aug 8	
Actual date	17-Jul	4-Aug	
Deg days	1727	2134	
Biofix	7-Mar		





NOW Control in Almonds under MD 2012

Sampled Aug 28 (NP), Sept 11 (Ca), Sept 25 (Mo)



B. Higbee, Paramount Farming Co.

Conclusions – Almonds – from Apr 2010

- Benefit of May spray
- Lorsban has been somewhat inconsistent
- Intrepid slightly outperforming Delegate, Altacor and Belt
- Brigade has the most impact of the tested compounds (up to 91% reduction relative to controls) – how long will it work?
- In 2009 control plots, about 70% of the NOW found in the NP were small larvae, suggesting most eggs hatched after post-HS appls, this is in contrast to 2007 when there were 30-35% small larvae.
- Multi application programs result in the lowest damage levels
- The best timing depends on the product (ai), the program (how many appls?) and NOW dynamics

What is Extreme NOW Control in Almonds?

- Sanitation: $\leq$ 0.2 /tree in the tree and $\leq$ 4-6 on the ground
- MD @ 2 puffers/ac + insecticide sprays as needed, and/or
- 3-4 insecticide sprays – 1 or 2 in Apr/May + 1 at HS and 1 post-HS
- Bifenthrin/Lamda cy best positioned at HS or post-HS