

California Strawberry Industry Pest Management Update

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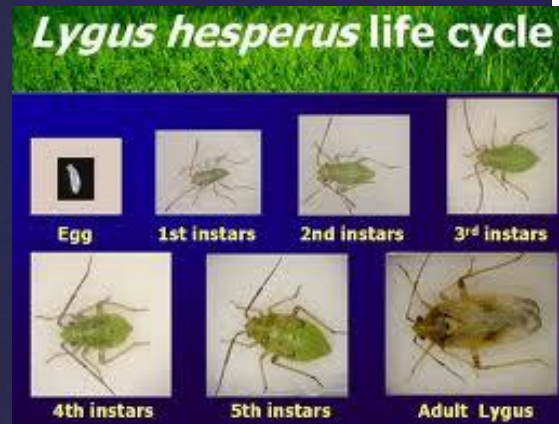
LYGUS BUG MANAGEMENT PROGRAM

- Year 1 (2011):

Degree day model
implementation

- Year 2 (2012):

- ✓ Farm-level monitoring
training program
- ✓ Spray trial, resistance
bioassays, surveys



2011-12 PROGRAM FINDINGS

- Tools not well adapted to production setting
- Gaps in industry-wide detection & monitoring
- Resistance to OPs, pyrethroids
- Industry behavior responds well to farm-level outreach

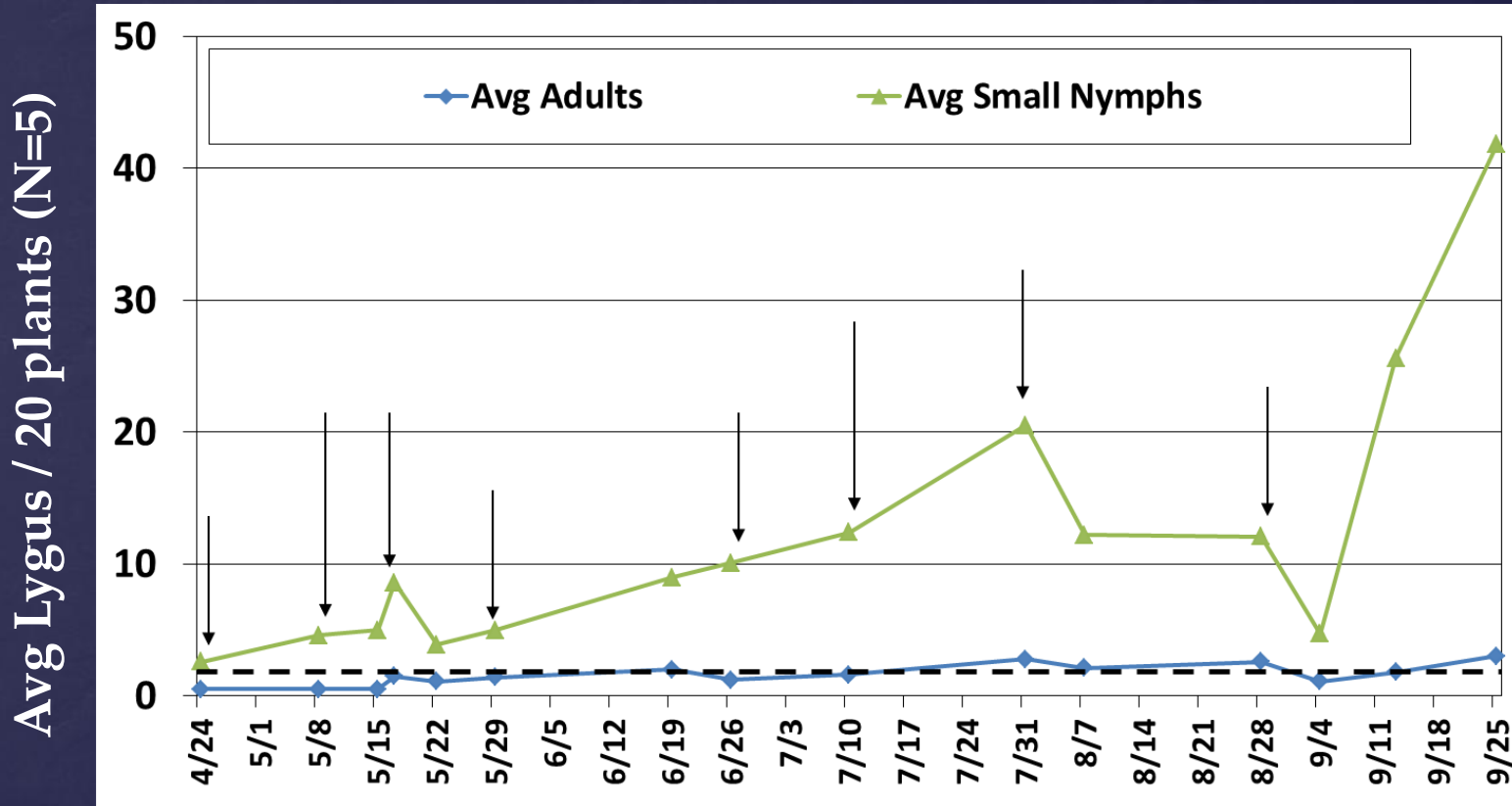


Lygus monitoring

2012 findings...

- Low insecticide efficacy
- Field monitoring suggested second year fields a source of Lygus
- Monitoring data sets also influenced by vacuums

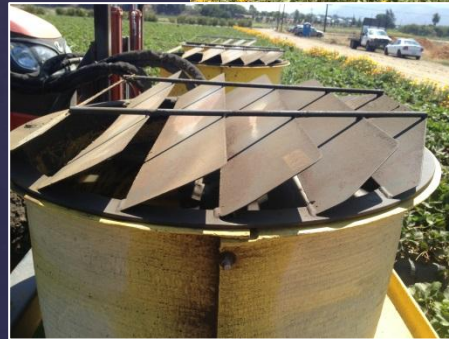
2012 Vacuum findings...



- None of the participating fields in Santa Maria vacuumed; 20% use vacuums elsewhere
- 50% of the participating fields in Watsonville/Salinas were vacuumed; 75% used vacuums elsewhere

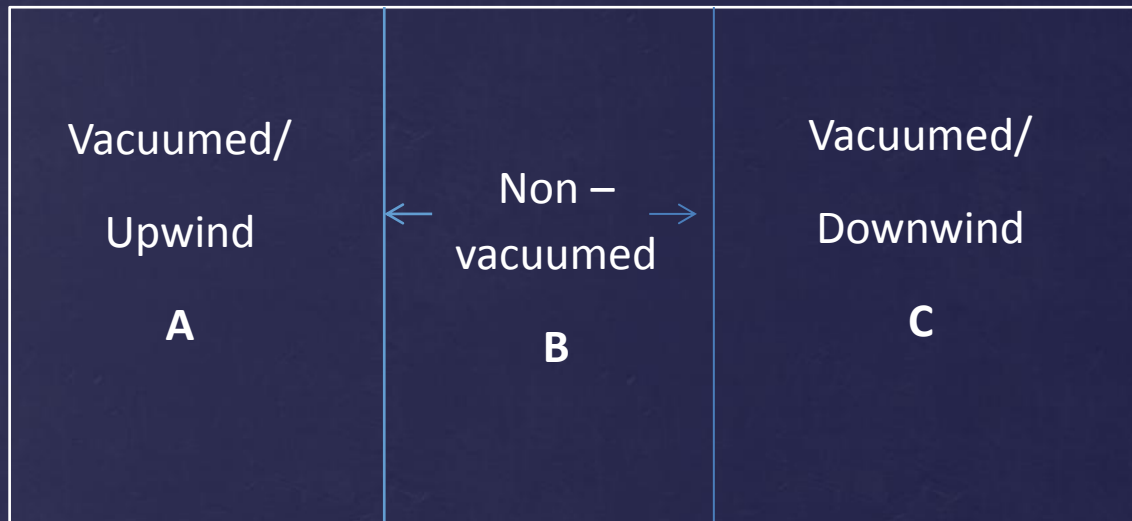
2013 Lygus program

- Vacuum exclusion experiments in first and second year berries
- Vacuum efficacy assessments
- Lygus threshold evaluation



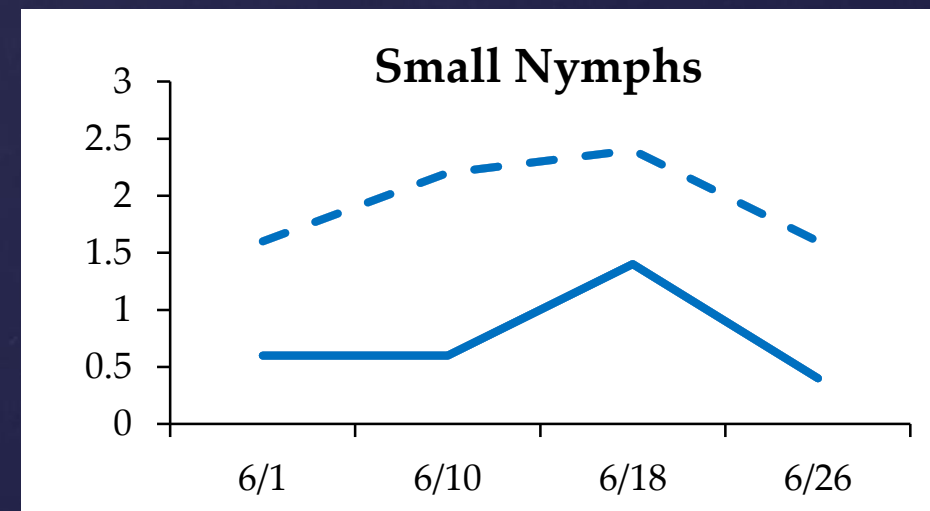
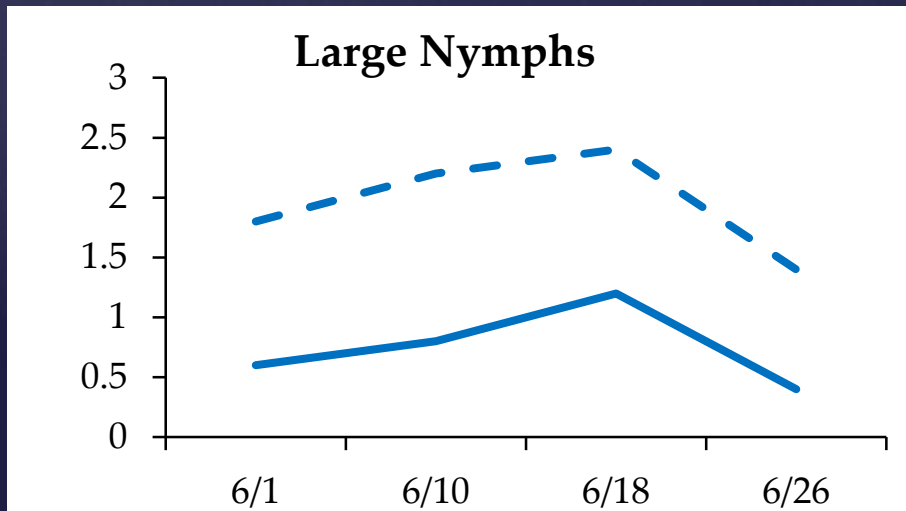
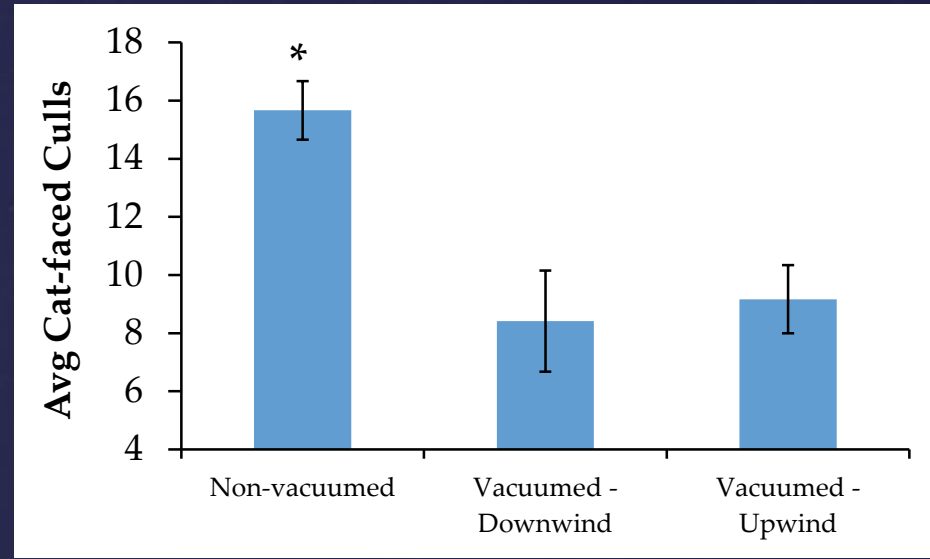
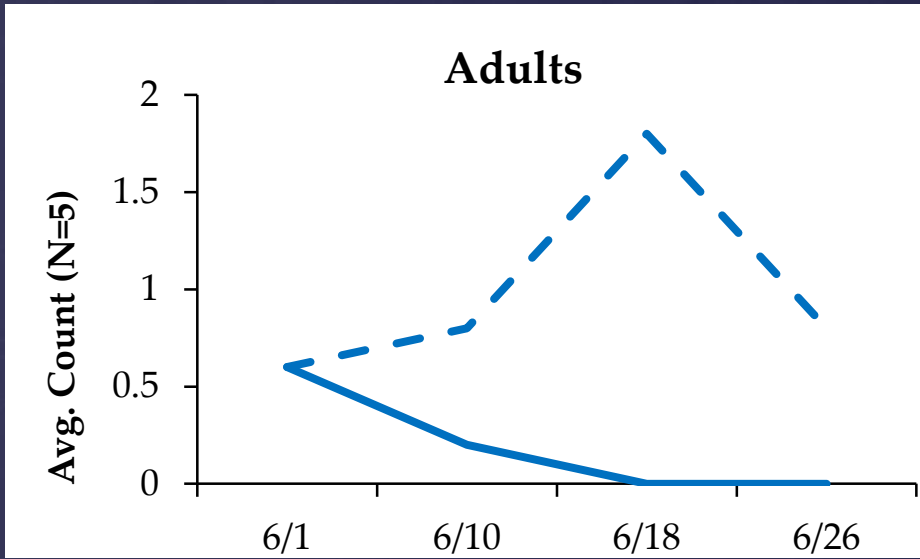
Vacuum exclusion experiments

15 fields total in Santa Maria & Watsonville-Salinas



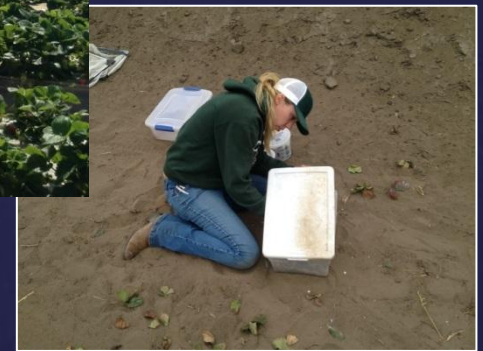
- Five 20-plant samples/week in each section
- Efficacy and fruit evaluations at 6-8 weeks minimum

2nd year Vacuum exclusion trial



Vacuum assessments

- Screen & Fan samples
- Identification of Lygus & beneficial insects
- Parameter characterization: windspeed, height above canopy...



Vacuum assessments - parameters

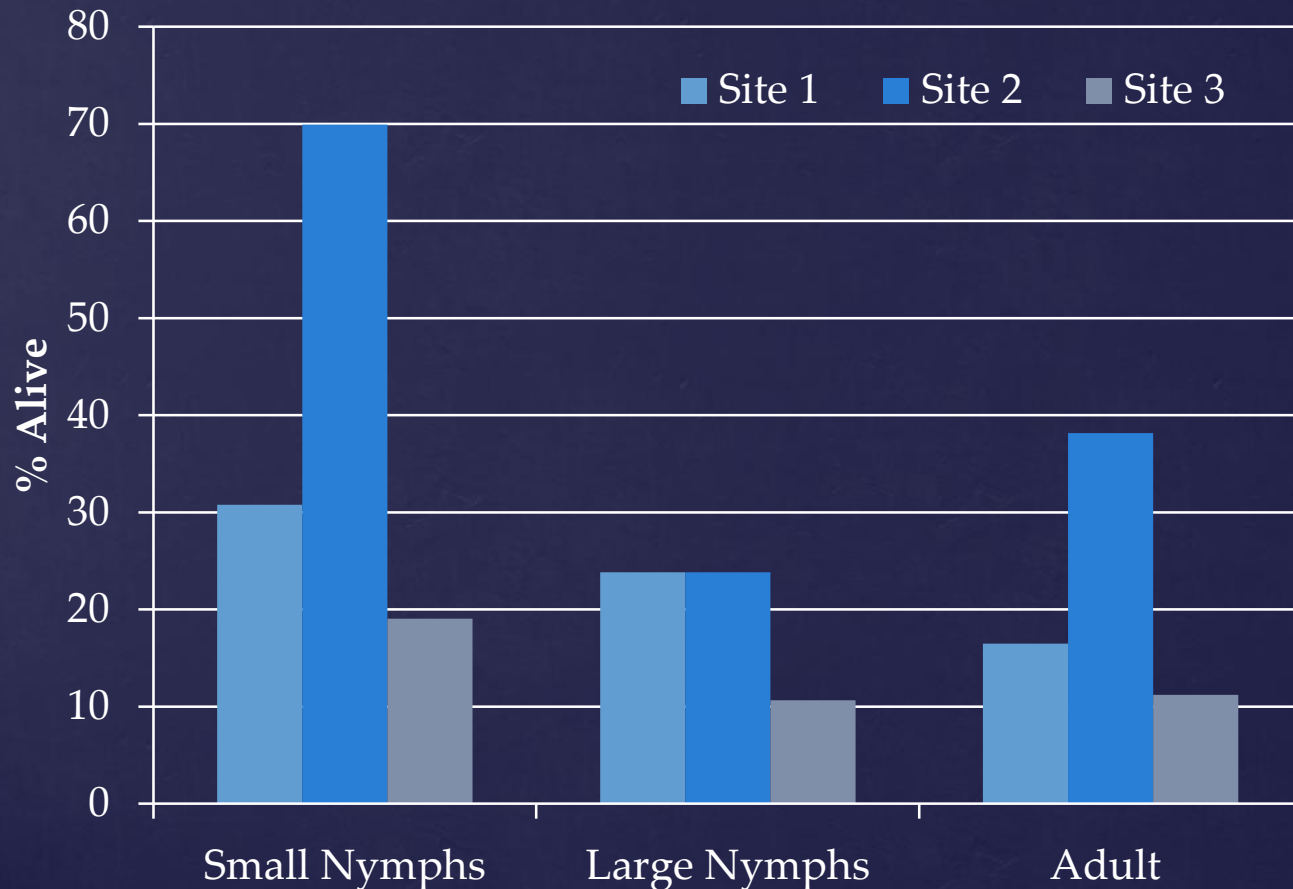
- Avg. windspeed at fan: 29 mph (N=15)
- Avg. windspeed at canopy: 15.52 mph
- 11-15 mph loss in windspeed between fan and canopy
- Avg. height above canopy (HAC): 3"
- **Most are running at target windspeed, but HAC may affect efficacy**

Vacuum assessments – Insects

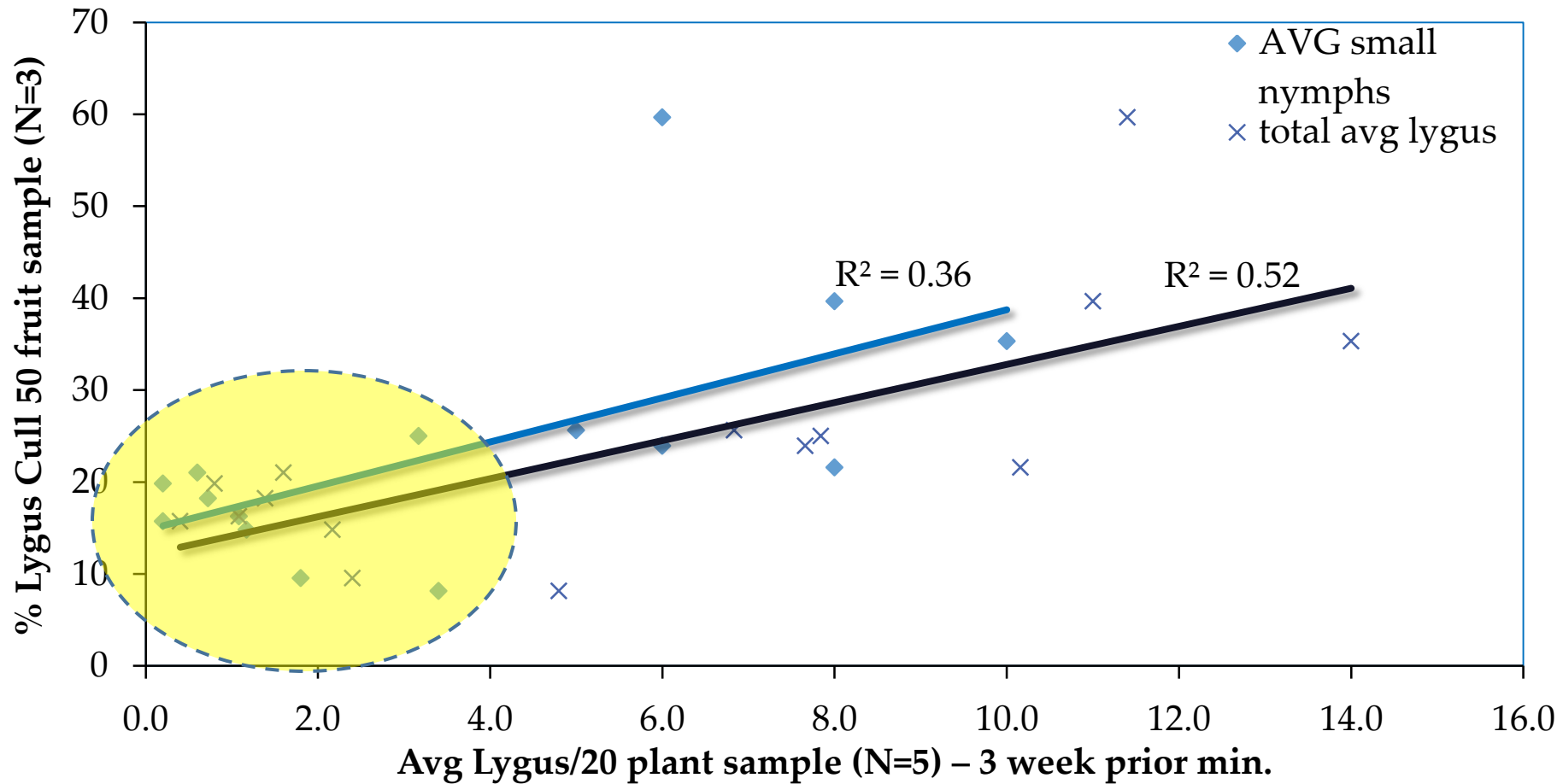
- Small lygus nymphs, Drosophila, thrips and beneficial insects were common in the samples
- Many beneficials (spiders, Orius, parasitoids, Nabis) survived
- **55% of small nymphs, 28% of large nymphs and 20% of adults remain viable after exiting fan blade**

Vacuum assessments - efficacy

Avg. 25% small nymphs, 17% large nymphs, 58% adults in each sample



Economic loss due to Lygus

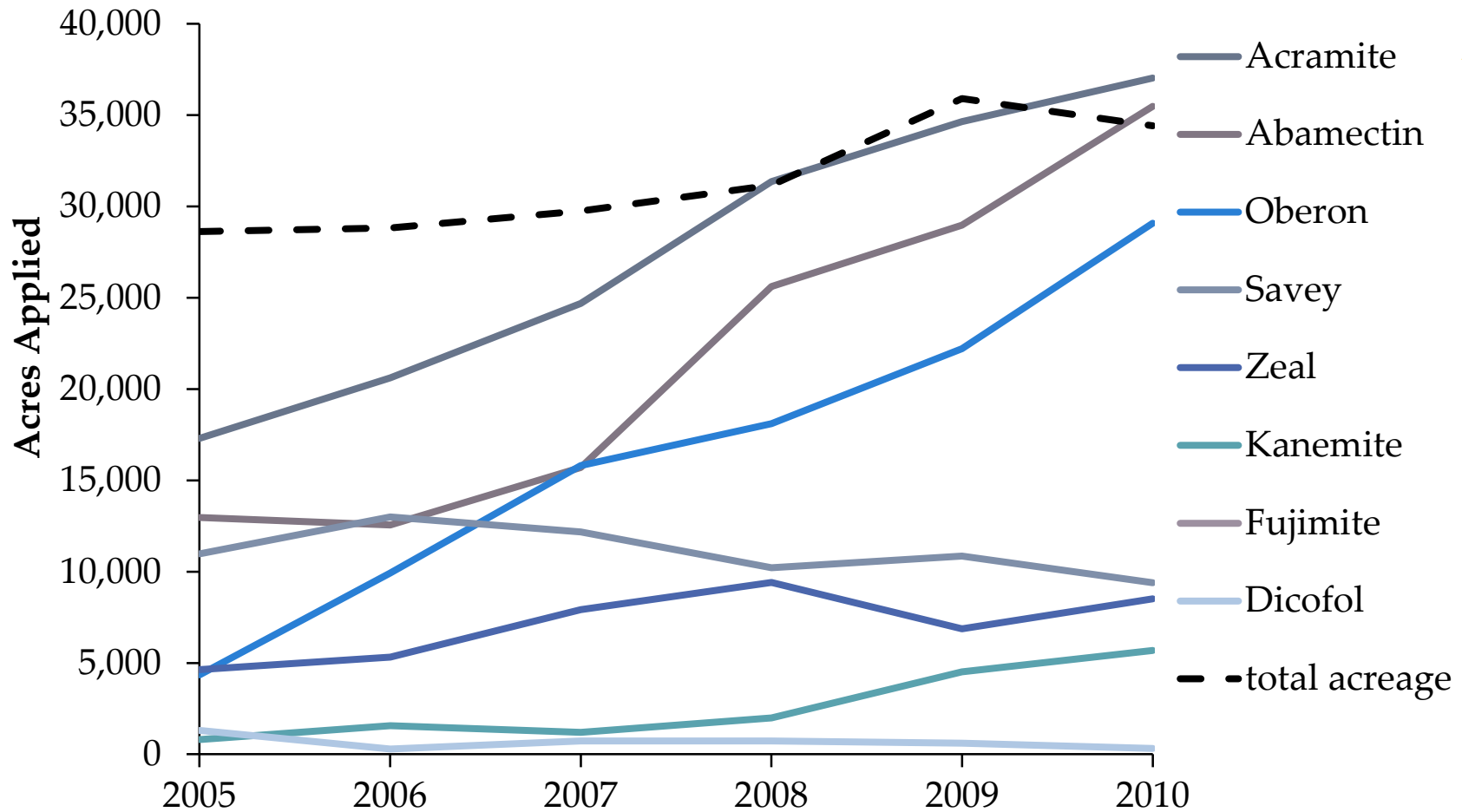


spider mite management

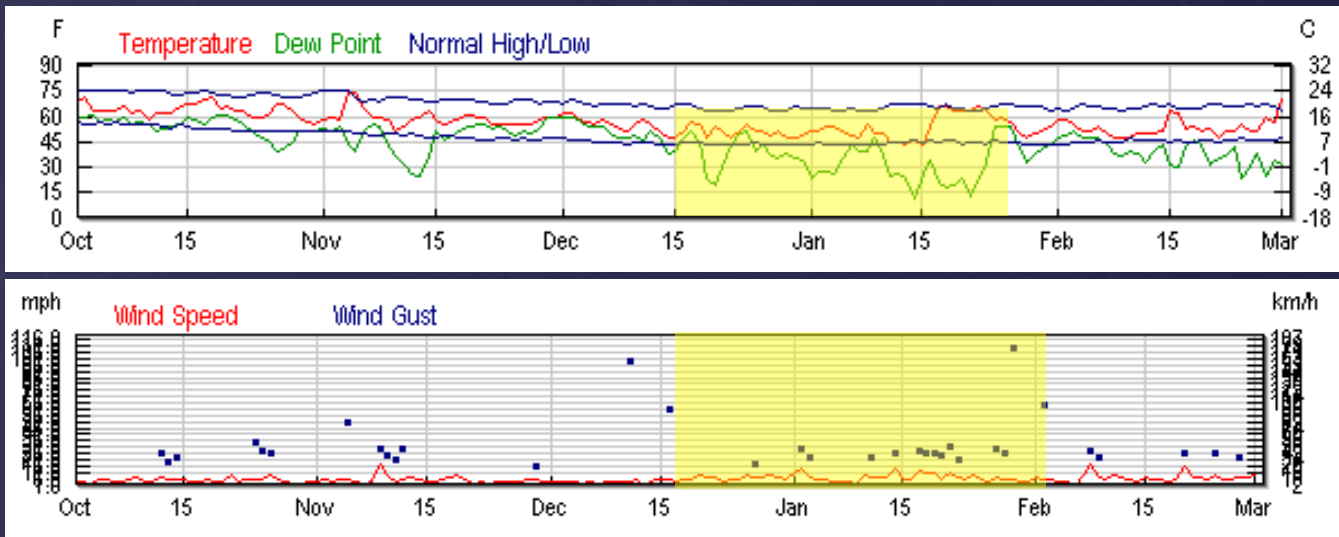
- 2012 grower survey
- Mites were ranked the second most important pest - 2.3/5.0 (N=19)
- 95% of surveyed growers released predatory mites; consider it highly effective (4.78) and essential to their mite management programs (4.63)
- Visual scouting conducted by PCAs most common reported monitoring method



Miticide Use is Increasing



2013 Oxnard mite outbreaks



- Dry, cold, & windy winter conditions created the perfect storm
- PCAs and growers reported releases of 60,000-90,000 predatory mites/acre

2013 CSC Program

- Track pest and predatory mite **population dynamics** for each district (Oxnard/Ventura, Santa Maria/Guadalupe, Watsonville/Salinas)
- **Surveys** of grower and PCA practices
- Miticide resistance **bioassays** for each district

2013 Mite Survey findings...

- Mites are the most important pest in Oxnard; Lygus in Watsonville/Salinas; Split in Santa Maria
- Watsonville-Salinas low activity in fall; Oxnard primarily Fall-Winter
- Monitoring is self-reported as most important but using ambiguous thresholds; growers treat when PCA decides
- PCAs emphasize persimilis use over sprays

Virus Decline in Strawberry



- Whitefly focus group Fall-Winter 2012-13
- Field collapse observed in May 2013
- Confirmation of strawberry virus in the region
- Samples in processing
- Area-wide management underway

California Strawberry pest management conclusions

- Most growers are using many IPM methods
- Growers rely on PCAs for their pest management decisions
- Pesticide resistance
- Implementation of current practices can be improved
- **Proper integration of IPM methods would improve farm-level and regional management**
- **Serious need for farm-level education and training to create effective pest management programs**

