

Program overview- entomology research on IPM

- For more than a decade we have conducted research on integrated pest management strategies for almond pests in the Southern San Joaquin Valley. This has included work on navel orangeworm, spider mites, leaffooted bug and ants.
- Our most recent work has focused on the implementation of mating disruption for navel orangeworm and the maximization of biological control for Pacific spider mite.

Mating disruption products for NOW available in 2019

Trade Name	Manu- facturer	Dispensers per acre	Type	Pheromone Release	Org- anic
Puffer NOW		2	Aerosol	Active	No
Isomate NOW		1	Aerosol	Active	No
Semios NOW Extra		1	Aerosol	Active	No
Semios NOW Eco		1	Aerosol	Active	Yes
Cidetrak NOW Meso		20	Meso	Passive	Yes
CheckMate NOW-F		n/a	Flowable (Sprayed)	Passive	No

NOW Mating Disruption 2017-8 Review of Results

- 2017- We evaluated four mating disruption systems
 - Puffer NOW, Isomate NOW, Semios NOW, Cidetak NOW Meso
 - Plot size was 40 acres with three replications in Wasco, Maricopa and Buttonwillow
 - All four products disrupted the ability of male moths to find traps by >90%.
 - All four products reduced kernel damage by an average of 46% .
- 2017-18 we conducted six side-by-side demonstrations of grower standard practices compared to those practices utilizing mating disruption
 - This project was funded by CDPR and has support from the Almond Board
 - Plot size was 60-100 acres with six sites in the San Joaquin Valley
 - Mating disruption reduced pheromone trap captures by 90-99%
 - Mating disruption reduced damage by ~50-70% across all sites across both years
 - Across all sites and years, increased crop value offset costs of mating disruption

Table 1. Reductions in trap captures (%)

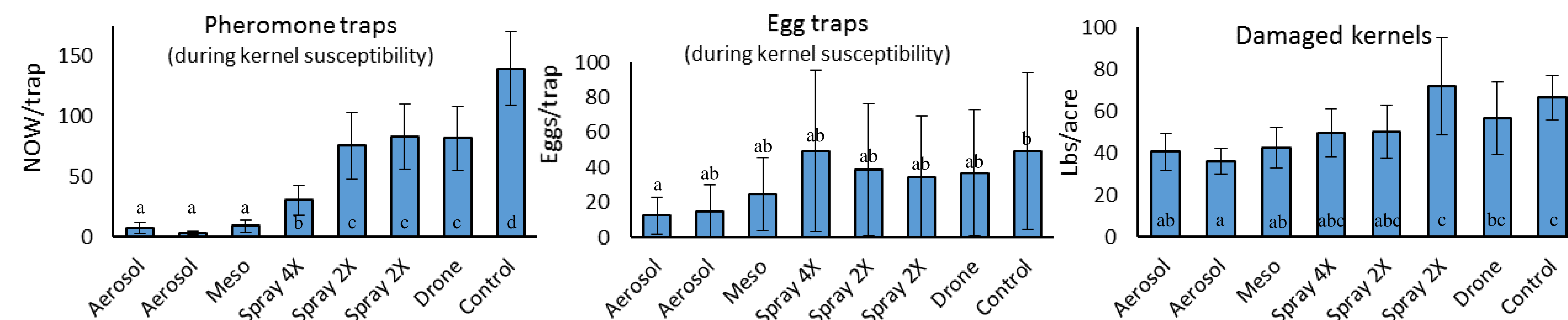
Southern SJV			Northern SJV	
2017	2018		2018	2018
89	97	100	95	100
95	93	97	97	98
91	94	99	83	97

Table 2. Reductions in kernel damage (%)

Southern SJV			Northern SJV	
2017	2018		2017	2018
62	84	50	57	46
45	5	50	70	73
20	73	42	-	53

NOW Mating Disruption 2019 Study

- We evaluated four methods to apply pheromone on 40-acre plots replicated 4 orchards in Kern County
 - Aerosol emitters (Isomate NOW + Experimental), Meso emitter (Cidetrak NOW Meso), Flowable microencapsulated (sprayable) pheromones (CheckMate NOW-F + Experimental), and a foam applied by drone (Experimental)
 - There were three treatments of sprayable products. 1) Experimental product 4X from April to Aug, 2) Checkmate NOW-F 2X at hull split and one month later, 3) Experimental product 2X at the same timings.



2019 Results

2019 Summary

- Aerosols- Shut down pheromone traps (male captures down by 95-98%), reduced eggs by 69-75% (NS), and damage by 39-46%.
 - Meso- Shut down pheromone traps (males down by 94%), reduced eggs by 50% (NS), and damage by 36%.
 - Sprayable 4X- Did not shut down pheromone trapes. Pheromone trap captures reduced by 78%, eggs by 0% (NS), and damage by 25% (NS)
 - Sprayable 2X- Did not shut down pheromone traps. Pheromone trap captures reduced by 40-46%, eggs by 21-29% (NS), and damage by 0-24% (NS)
 - Drone- Did not shut down pheromone traps. Male captures reduced by 42%, eggs by 25% (NS), and damage by 14% (NS)
- Growers who want to use mating disruption should have confidence in 3 years of data showing consistent trap shutdown and damage reductions with aerosol-based and meso emitters.
 - Sprayable pheromones are not effective at the use rates and application intervals currently being recommended to growers. However, due to the relative infancy of sprayable products, potential still exists for research that determines use patterns that allow them to be effective.

Biological Control of Spider Mites using Sixspotted Thrips

- During 2019 we collected data on spider mite density, sixspotted thrips density, and the relationship between pest/prey relationships and future increases or decreases in mite density. 2019 data are still being processed.
- Our cumulative research has shown that yellow sticky traps are a very effective way to monitor for thrips.
 - In April/May, if you catch a thrips there is no need to treat
 - In June/July, if you have 3 thrips/trap/week = static mites
 - In June/July, if you have 6 thrips/trap/week = walk away
 - 72.2% chance mites will decrease in 7 days
 - 96.6% chance mites will decrease in 14 days



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Disclaimer: The Department of Pesticide Regulation (DPR) provided partial or full funding for this project but does not necessarily agree with any opinion expressed, nor endorse any commercial product or trade name mentioned