Rice Arthropod Update
2017 Rice Grower Meetings

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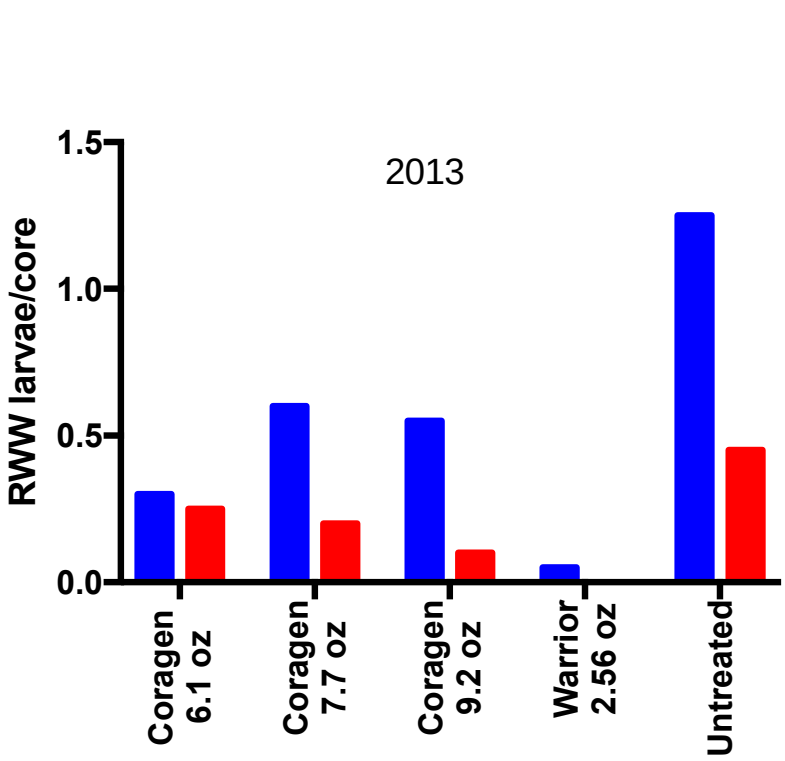
Contents

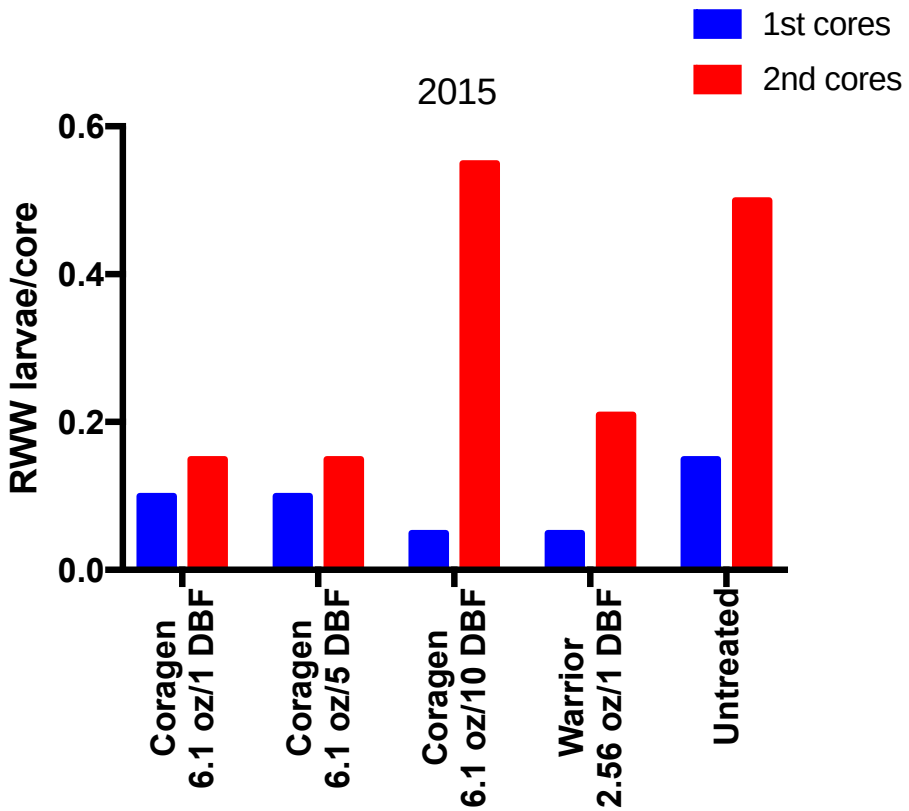
- Coragen insecticide for rice water weevil control
- Armyworms
- Tadpole shrimp (TPS)

Coragen Insecticide

- Rice water weevil control
- Active ingredient: chlorantraniliprole
- Group: diamide
- Use:
  - Pre-flood application, up to 5 days before flooding
  - 14 day water holding period

Coragen Efficacy

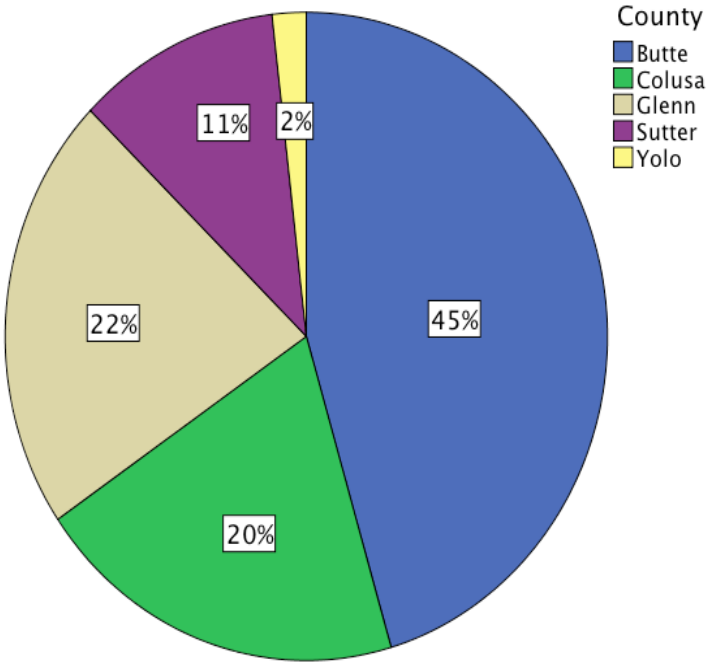


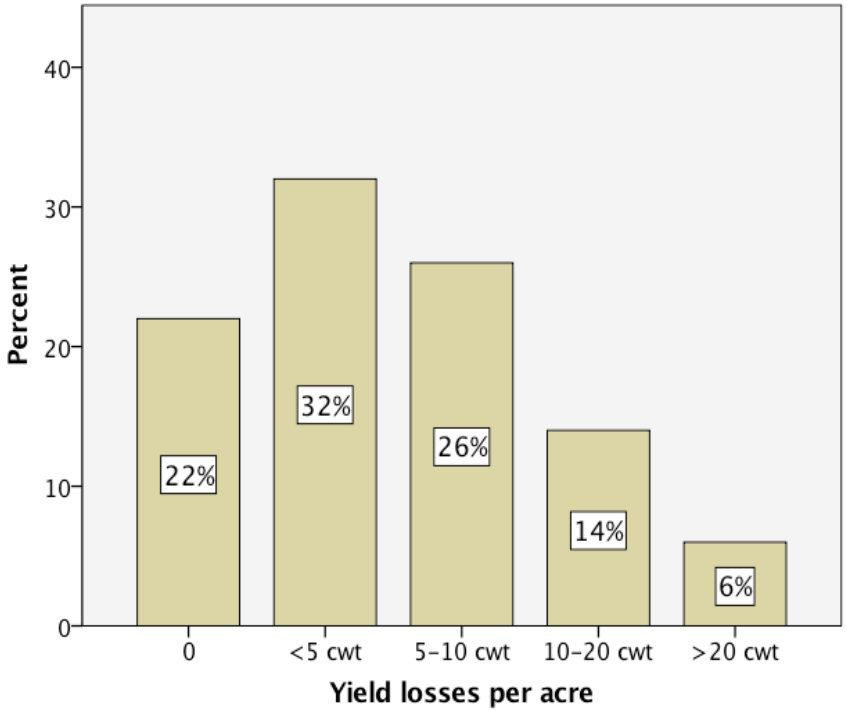


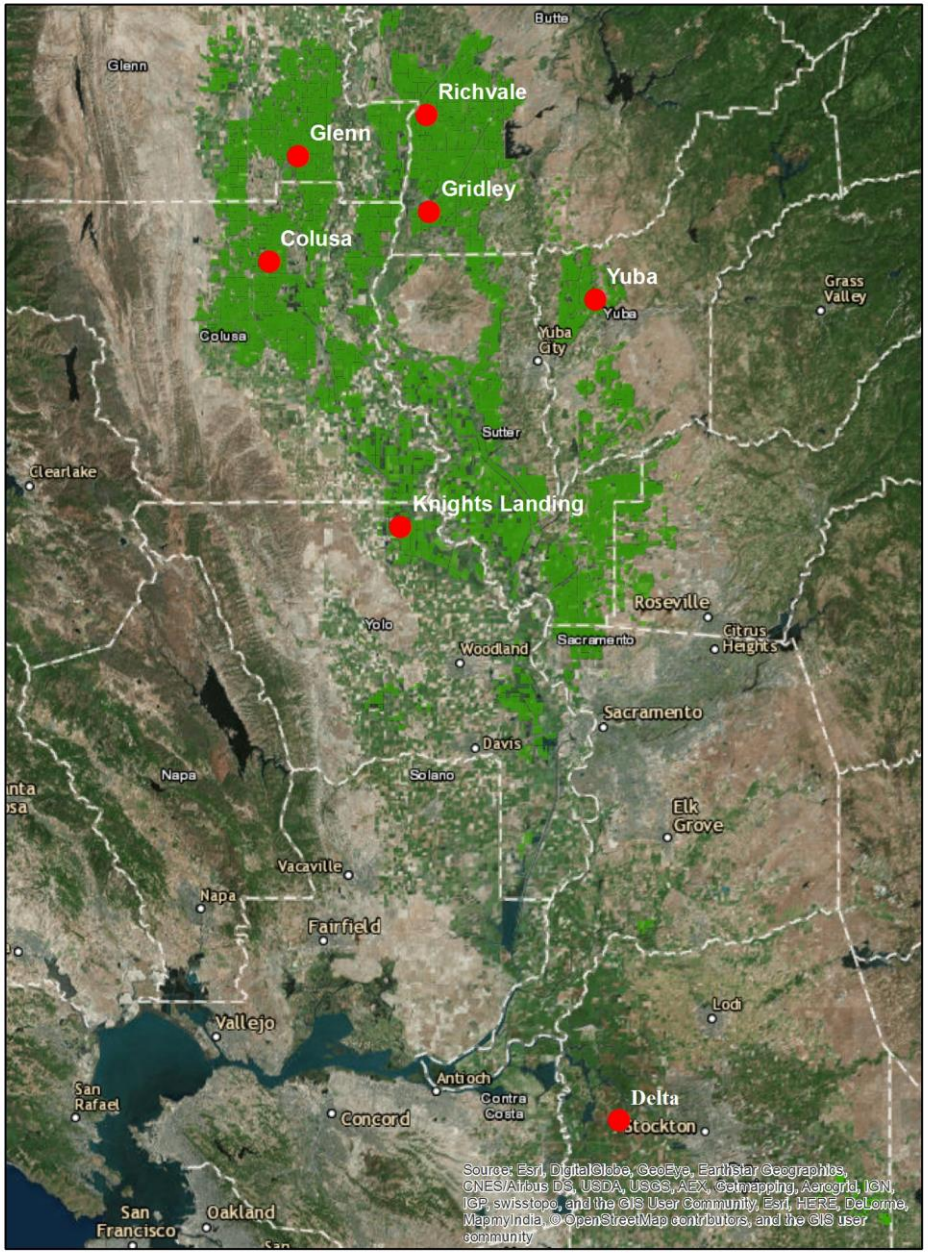
Armyworm Update

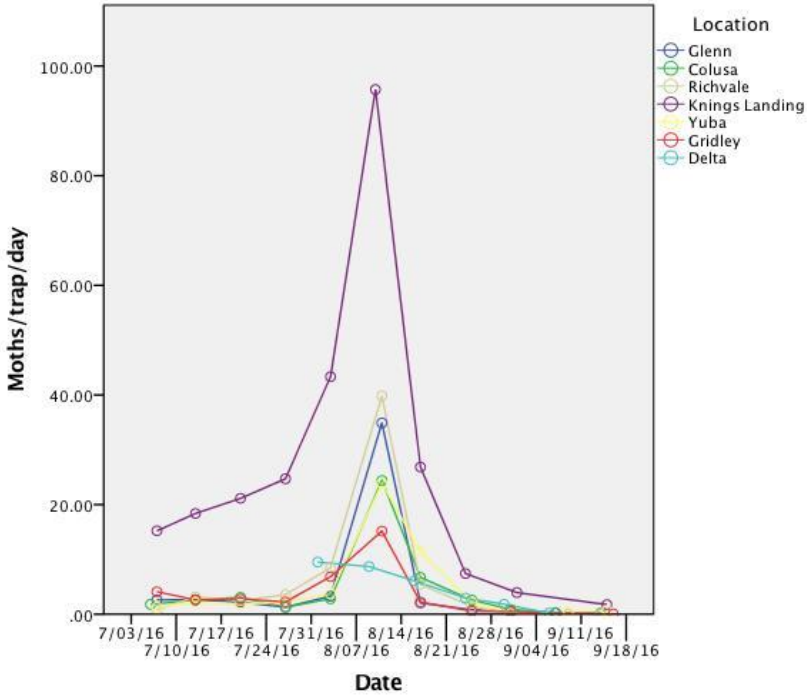
- 2016: low pressure
- Intrepid use
  - 2015: 850 acres
  - 2016: 16,000 acres
- Intrepid in 2017?

2015 Armyworm Damage Survey

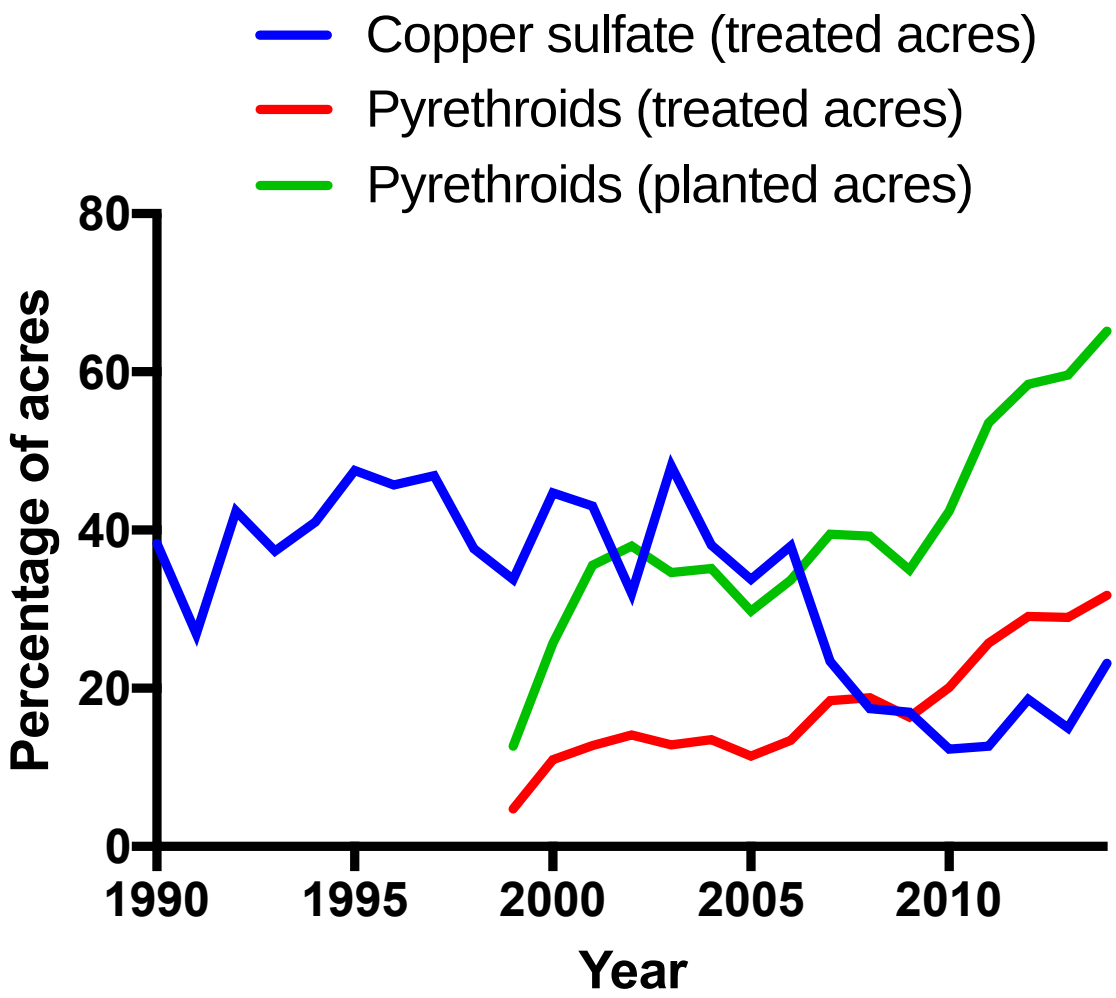





Butte
Glenn
Richvale
Glenn
Gridley
Colusa
Yuba
Yuba
Grass Valley
Colusa
Yuba City
Sutter
Clearlake
Knights Landing
Roseville
Yolo
Citrus Heights
Woodland
Sacramento
Sacramento
Davis
Napa
Solano
Elk Grove
Vacaville
Napa
Fairfield
Lodi
Vallejo
Antioch
San Rafael
Contra Costa
Delta
Concord
Stockton
San Francisco
Oakland
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community

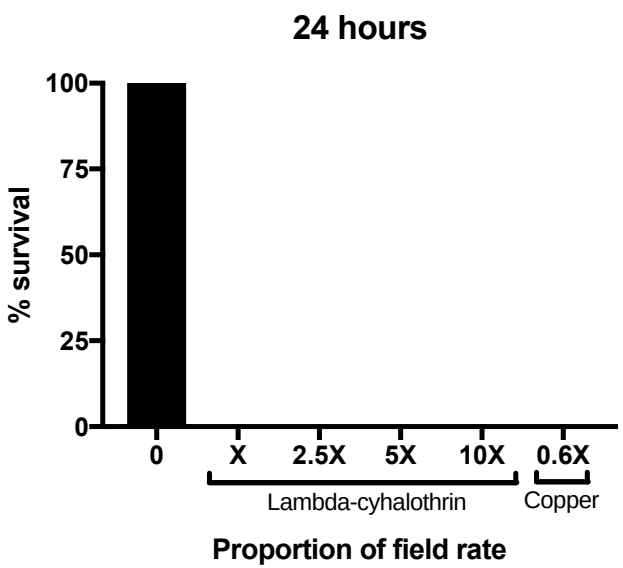

Location
Glenn
Colusa
Richvale
Knings Landing
Yuba
Gridley
Delta
100.00
80.00
60.00
40.00
20.00
.00
Moths/trap/day
7/03/16
7/10/16
7/17/16
7/24/16
7/31/16
8/07/16
8/14/16
8/21/16
8/28/16
9/04/16
9/11/16
9/18/16
Date

TPS

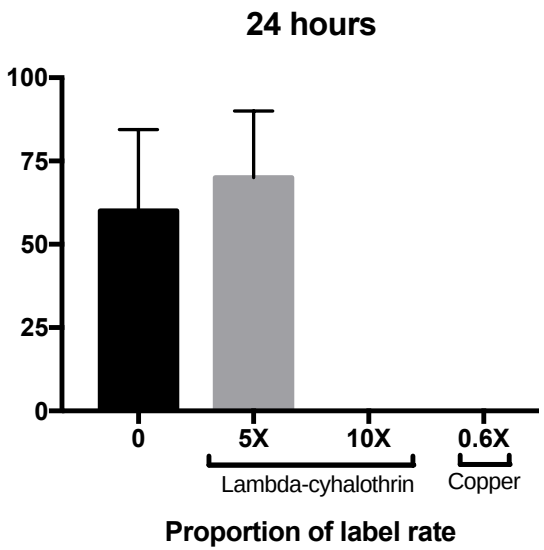

Copper sulfate (treated acres)
Pyrethroids (treated acres)
Pyrethroids (planted acres)
Percentage of acres
80
60
40
20
0
1990
1995
2000
2005
2010
Year

TPS Tolerance to Pyrethroids

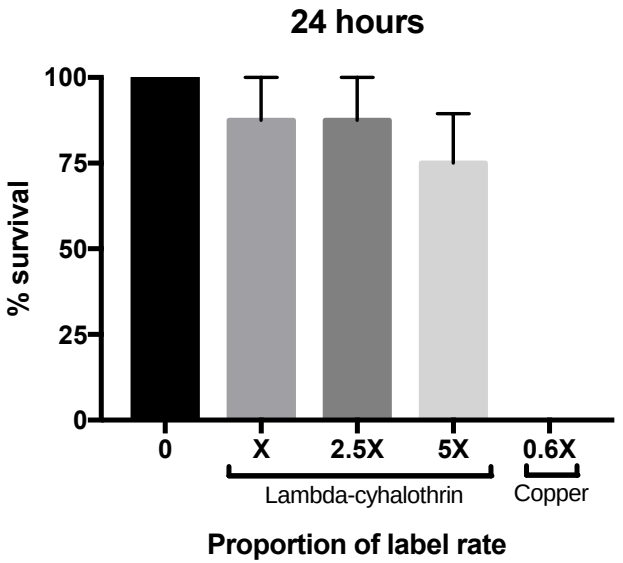
Susceptible (RES)

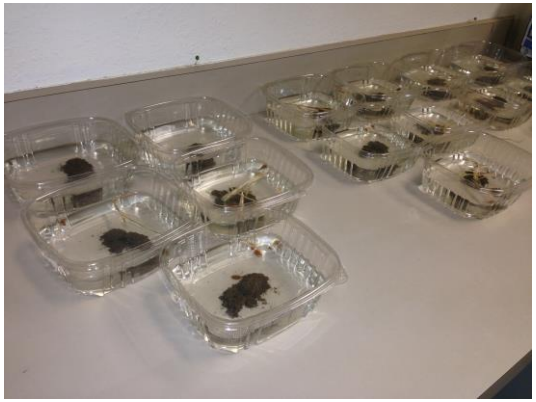


Field 1



Field 2





TPS

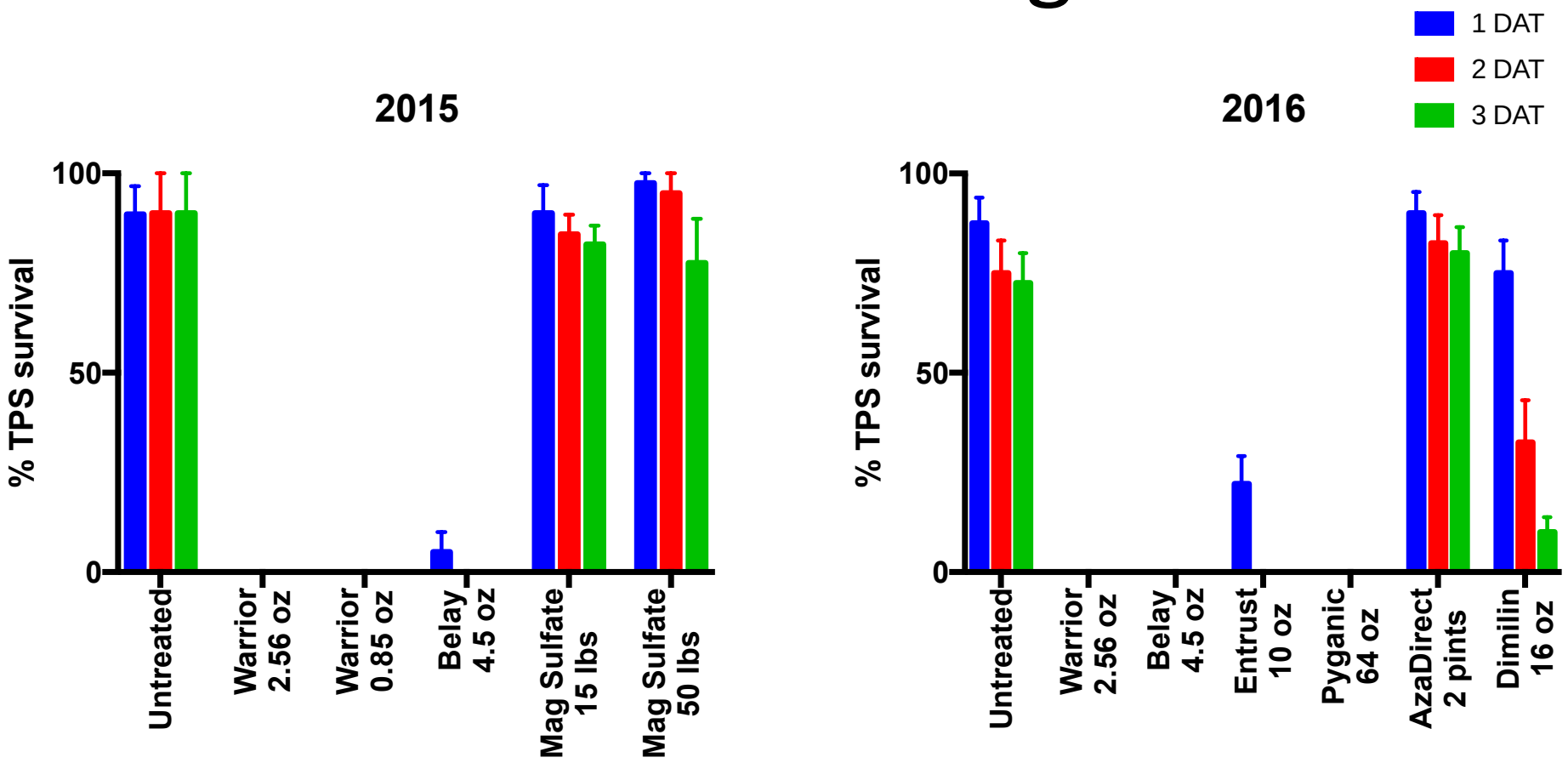
- Pesticide history
  - DDT
  - Organophosphates
  - Pyrethroids
  - Copper sulfate

TABLE 1. Mortality of field-collected tadpole shrimp treated with parathion*

Location	Year	Time after treatment	Percent mortality	
			Untreated	Treated
		hr		
Butte County	1964	18	0	100
Butte County	1978	19	6	81
Butte County	1982	18	0	65
Colusa County	1982	7	0	100
San Joaquin County	1982	18	0	10

* Application rate: 0.1 pound active ingredient per ½ acre-foot of water.

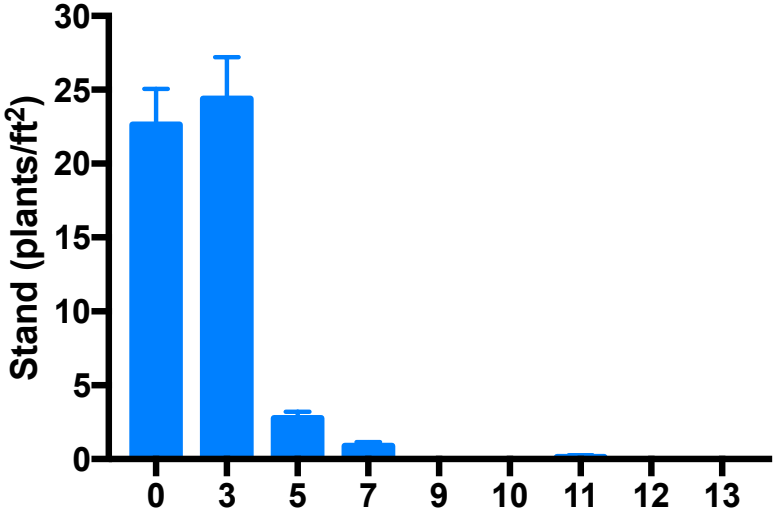
TPS Chemical Management

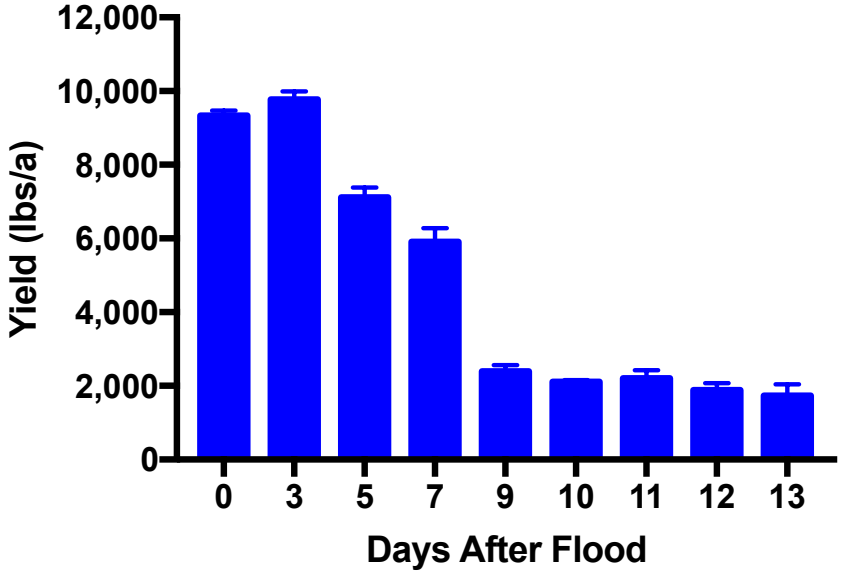


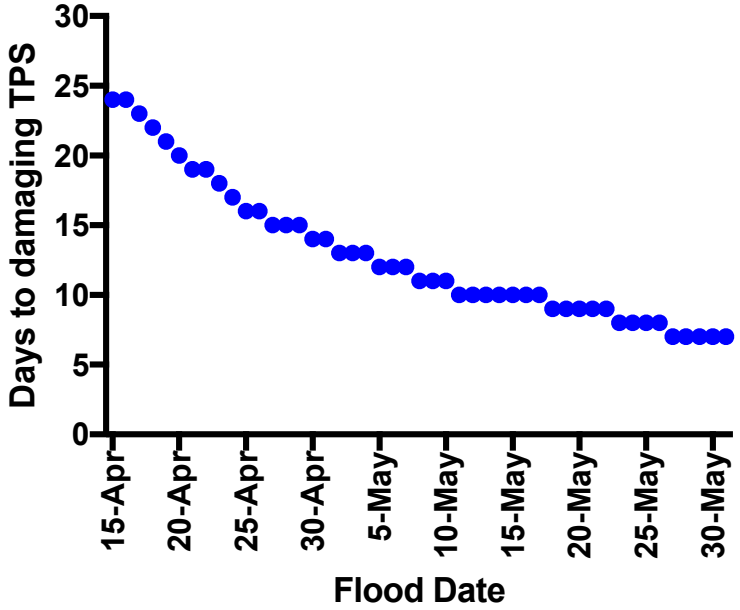
TPS Cultural Management

- Seeding dates:
  - 0, 3, 5, 7, 9, 10, 11, 12, 13 days after flood started

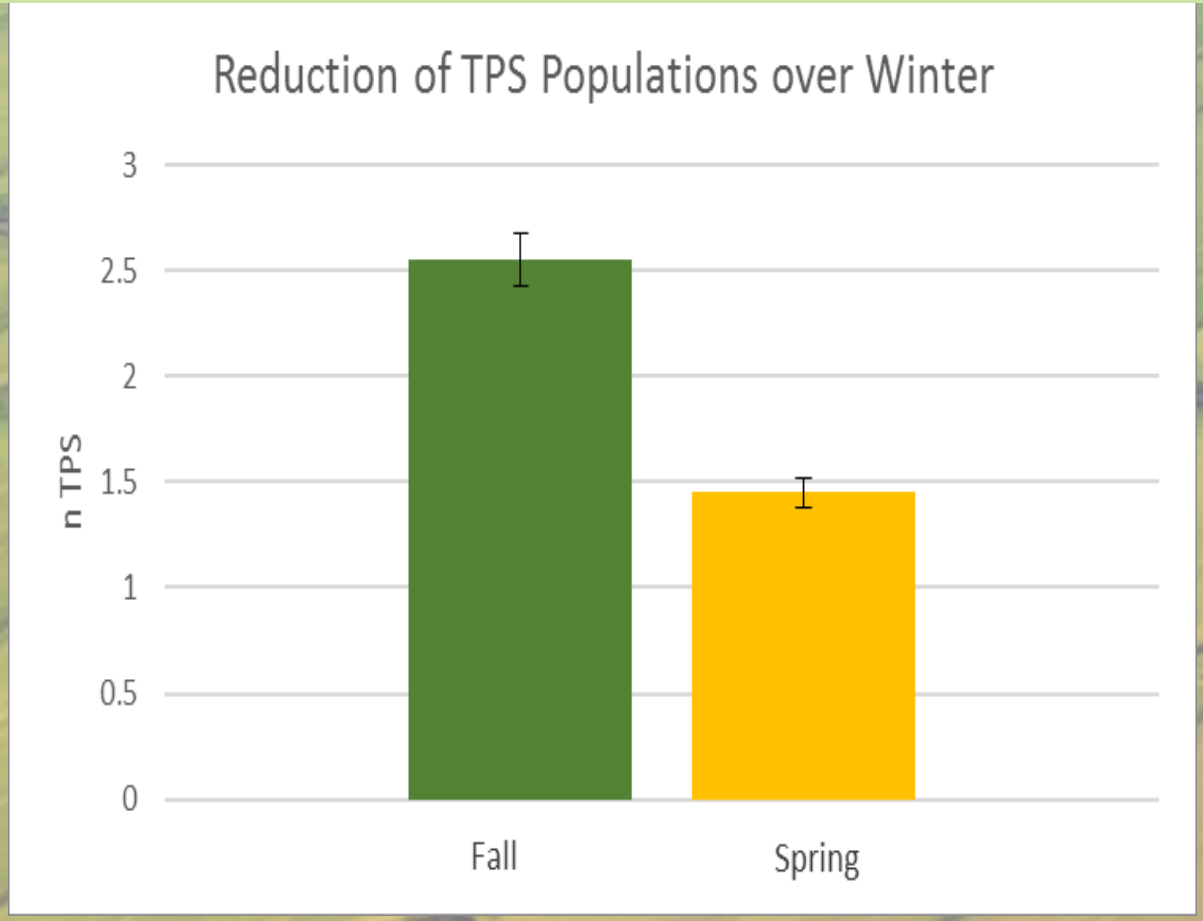
TPS Cultural Management







Winter's Effect on TPS Hatching Rate



So, what is causing TPS levels to decrease during the winter and why then are TPS still a problem for us?

What is usually happening during the winter?

- Tilling
- Chopping of straw
- Fallow, burn, or flood (or some

Hypotheses:

- TPS lay eggs on surface of soil and tilling buries more eggs than it brings up. Eggs below 0.5'' of soil don't hatch (Scott & Grigarick, 1979).

- The previous standard practice of burning fields killed TPS eggs in the soil and the Connelly-Areias-Chandler Rice Straw Burning Reduction Act of 1991 mandaing that rice straw burning in the Sacramento Valley be phased down to a maximum of 25% of total acreage burned by 2001 allowed TPS to proliferate.

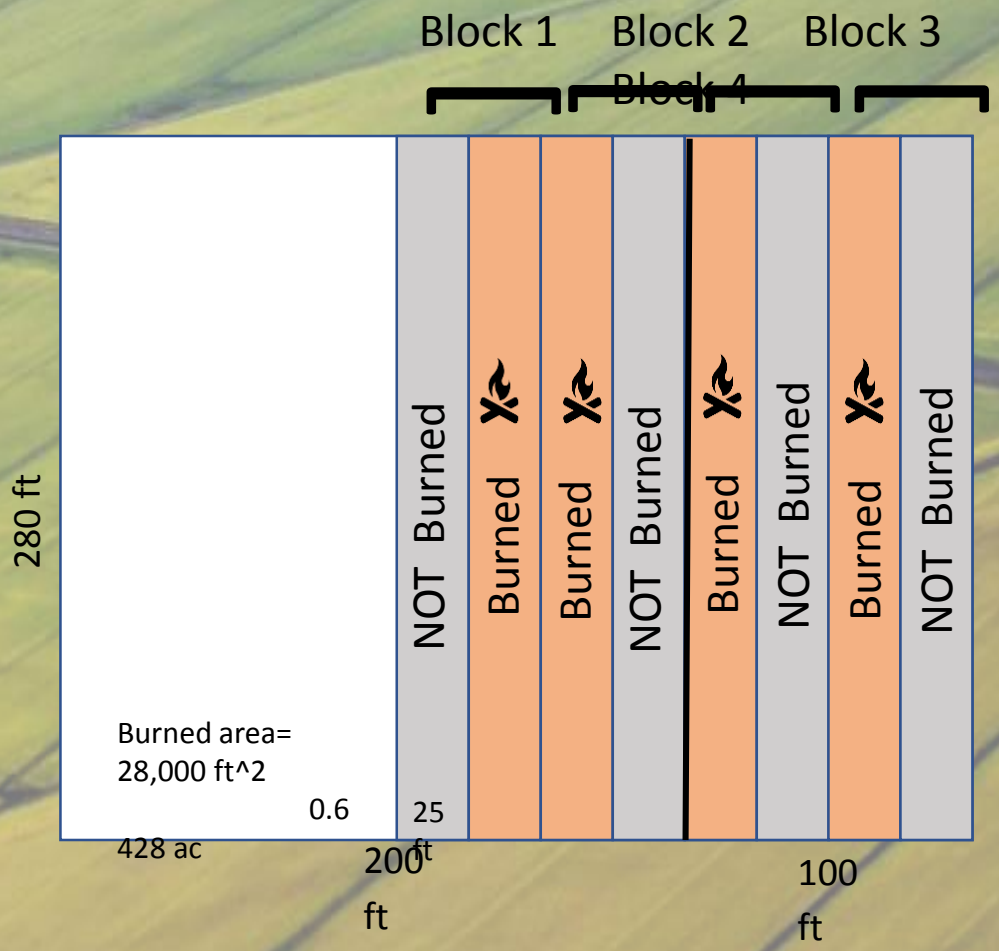
Study:

- Field burning study: designed to specifically examine effects of burning on TPS populations in field

- Mesocosm study: designed to compare TPS hatching rates among all three winter cultivation practices (Flood, Burn & Fallow).

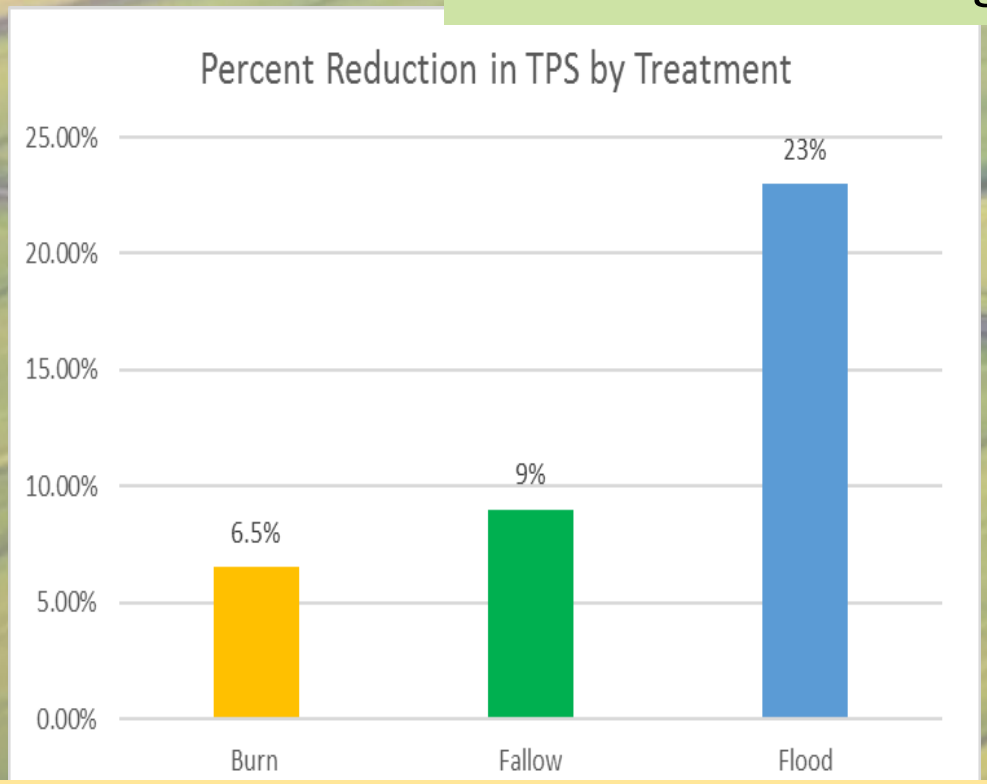
Field Burn Study

- Our preliminary data suggest no significant difference between those strips burned and those not burned (P= 0.444).
- Future: Examine effects of soil moisture on insulating eggs from effects of burning.



Mesocosm Study

Comparing Winter Management Strategies



Preliminary data suggests that flooding likely helps reduce TPS rates, similar to its effects on Rice Water Weevil.

Raises more questions like:

- How long do fields need to be flooded to significantly affect TPS populations?
- Why does flooding affect TPS populations?

Conclusions

- Reductions in burning is likely not the main reason for TPS emerging as a sig. pest.
- Flooding is likely to help reduce TPS populations in field.
- Tilling could be looked at more closely, but regardless of its impact on TPS, tilling is a necessary practice for rice.

<u>So why are TPS still a problem?</u>

- Possible other management changes in rice field (e.g. weed management practices).
- Changes in climate
  - Is TPS a bigger problem during drought years?

Future Objectives

- Independently examine tilling.
  - Does it bury more eggs than it brings up?

- Continue to examine the effects of flooding.
  - What percent of TPS eggs are affected by flooding?
  - How long do fields need to be flooded to impact TPS?

- Continue to examine the correlation between water temp and TPS growth rate.
  - Lab trial examining incremental temp increases and growth rate of TPS.
  - Gather more historical data for afterbay water temps for regression analysis.