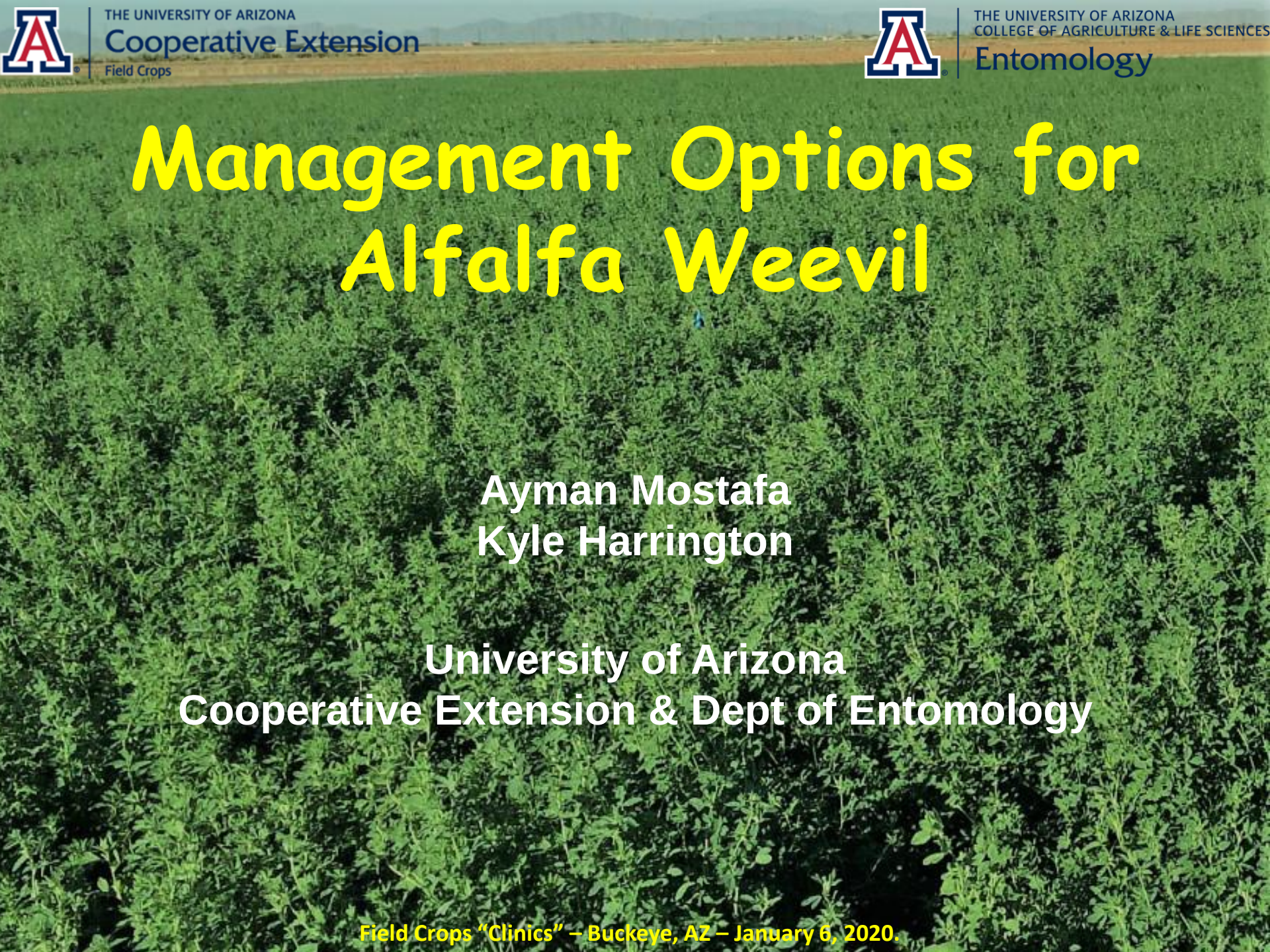
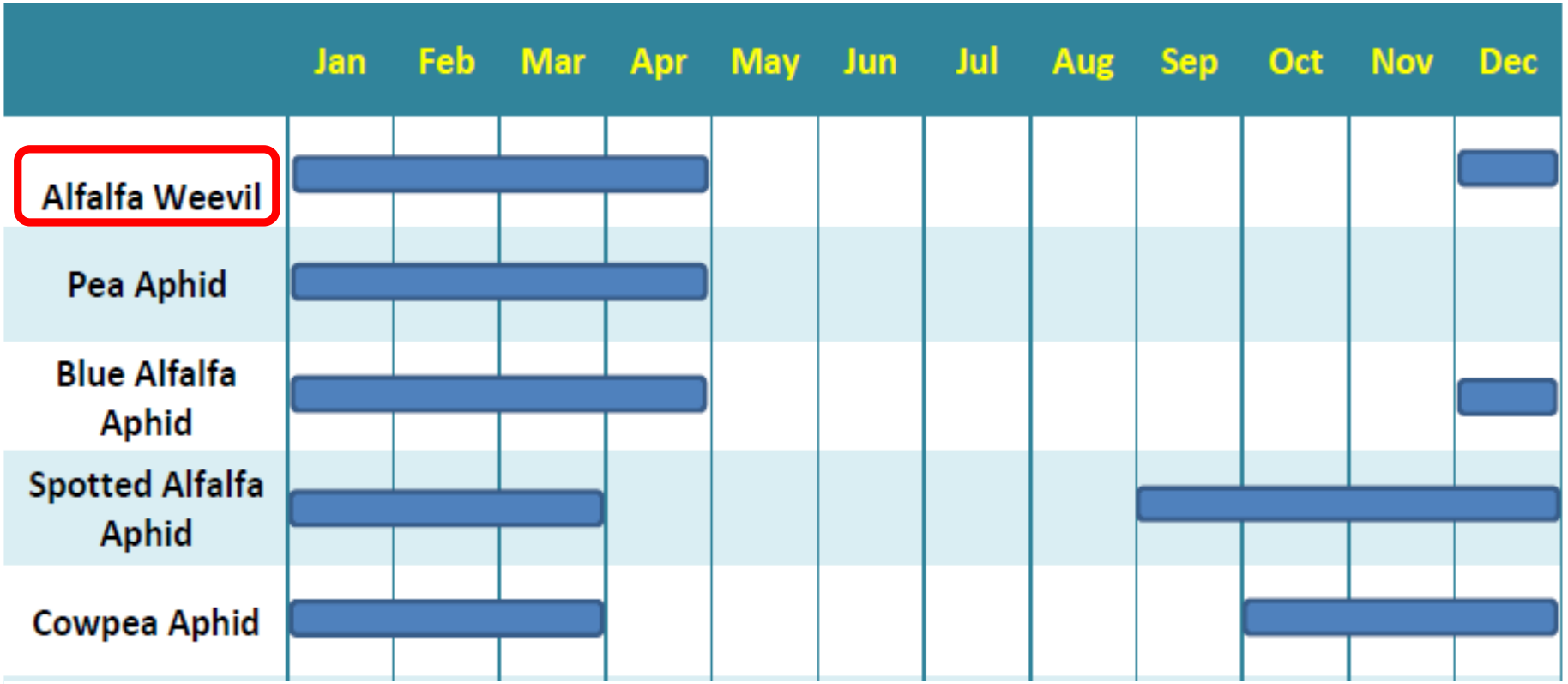

THE UNIVERSITY OF ARIZONA
Cooperative Extension
Field Crops
THE UNIVERSITY OF ARIZONA
COLLEGE OF AGRICULTURE & LIFE SCIENCES
Entomology
Management Options for Alfalfa Weevil
Ayman Mostafa
Kyle Harrington
University of Arizona
Cooperative Extension & Dept of Entomology
Field Crops "Clinics" – Buckeye, AZ – January 6, 2020.

Seasonal occurrence of Winter Insect Pests of Desert-Grown Alfalfa



Alfalfa Weevil

Begin activating and laying eggs at 42°F

4 instars

Spin web cocoon

Holometabolous metamorphosis

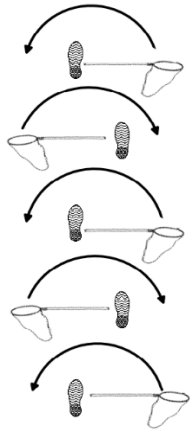
Adult

Damages of Alfalfa Weevil

Adult damage to stem and leaflet

Management of Alfalfa Weevil

- **Monitoring**
  - Sampling should begin after temperatures have dropped below 42° F (usually January)
  - Sweep net samples should be conducted in ≥ 4 areas in the field (5 sweeps / area)
  - Control measure taken when an average of 15-20 larvae / sweep are found



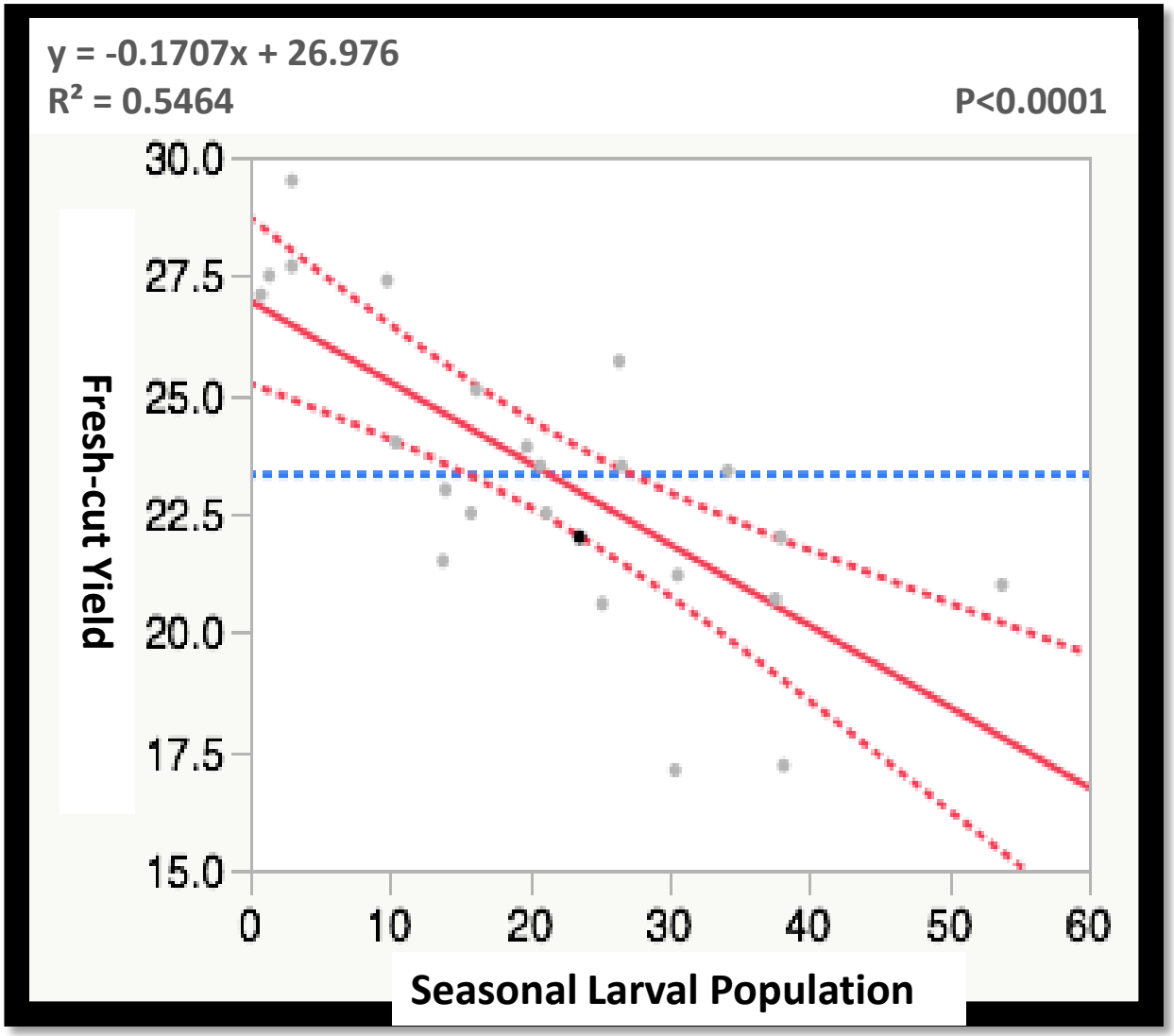
- *I can't wait to reach half that number.*
- *If I get that much weevils in my net, I'll end up with white alfalfa.*
- *I'm not in the business of selling alfalfa straw.*

Alfalfa Weevil Threshold Study

- Multi year trials conducted at Maricopa Ag Center in Maricopa
- Trial conducted under randomized complete block design with four replications and alleys between treatments
- Weekly samples
- 5 sweeps/plot
- Yield at harvest

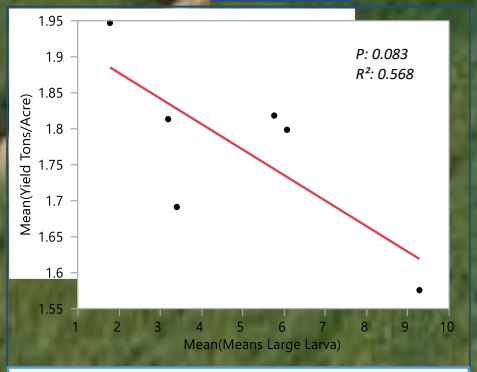
T5-1	T6-2	T2-3	T4-4
T2-1	T3-2	T6-3	T5-4
T1-1	T4-2	T5-3	T2-4
T3-1	T2-2	T4-3	T1-4
T6-1	T1-2	T3-3	T6-4
T4-1	T5-2	T1-3	T3-4

Relationship between Larval Population and Yield



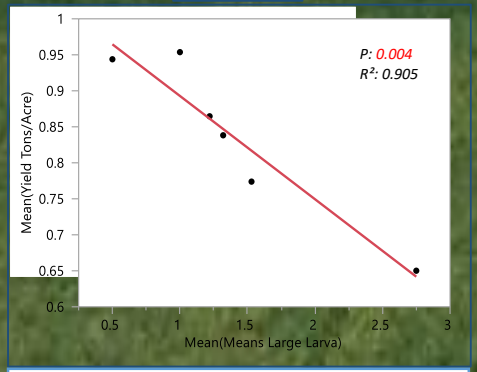
Weevil Threshold Trial Results

2014



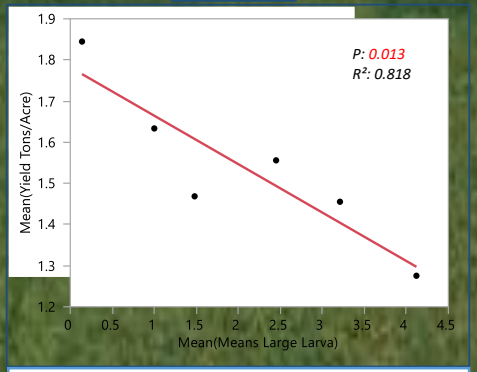
9 large larvae/ sweep resulted in 0.36 ton per acre loss equal to $72*

2015



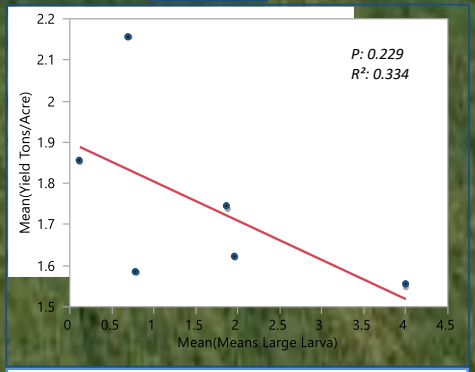
2.75 large larvae/ sweep resulted in 0.42 ton per acre loss equal to $84*

2017



4 large larvae/ sweep resulted in 0.48 ton per acre loss equal to $96*

2018



4 large larvae/ sweep resulted in 0.45 ton per acre loss equal to $90*

*Based on $200/ ton hay

“Large Larvae” vs “Small Larvae” & Other Insects in the sweep net

Action Threshold Scenarios

$/Ton	1 Large Larva per sweep (-0.06 slope)							
320	Y	N	N	N	N	N	N	N
310	Y	N	N	N	N	N	N	N
300	Y	N	N	N	N	N	N	N
290	Y	N	N	N	N	N	N	N
280	Y	N	N	N	N	N	N	N
270	Y	N	N	N	N	N	N	N
260	Y	N	N	N	N	N	N	N
250	Y	N	N	N	N	N	N	N
240	N	N	N	N	N	N	N	N
230	N	N	N	N	N	N	N	N
220	N	N	N	N	N	N	N	N
210	N	N	N	N	N	N	N	N
200	N	N	N	N	N	N	N	N
190	N	N	N	N	N	N	N	N
180	N	N	N	N	N	N	N	N
170	N	N	N	N	N	N	N	N
160	N	N	N	N	N	N	N	N
150	N	N	N	N	N	N	N	N
140	N	N	N	N	N	N	N	N
130	N	N	N	N	N	N	N	N
120	N	N	N	N	N	N	N	N
110	N	N	N	N	N	N	N	N
100	15	20	25	30	35	40	45	50
	Cost of Treatment in $							

$/Ton	2 Large Larvae per sweep (-0.12 slope)							
320	Y	Y	Y	Y	Y	N	N	N
310	Y	Y	Y	Y	Y	N	N	N
300	Y	Y	Y	Y	Y	N	N	N
290	Y	Y	Y	Y	N	N	N	N
280	Y	Y	Y	Y	N	N	N	N
270	Y	Y	Y	Y	N	N	N	N
260	Y	Y	Y	Y	N	N	N	N
250	Y	Y	Y	Y	N	N	N	N
240	Y	Y	Y	N	N	N	N	N
230	Y	Y	Y	N	N	N	N	N
220	Y	Y	Y	N	N	N	N	N
210	Y	Y	Y	N	N	N	N	N
200	Y	Y	N	N	N	N	N	N
190	Y	Y	N	N	N	N	N	N
180	Y	Y	N	N	N	N	N	N
170	Y	Y	N	N	N	N	N	N
160	Y	N	N	N	N	N	N	N
150	Y	N	N	N	N	N	N	N
140	Y	N	N	N	N	N	N	N
130	Y	N	N	N	N	N	N	N
120	N	N	N	N	N	N	N	N
110	N	N	N	N	N	N	N	N
100	15	20	25	30	35	40	45	50
	Cost of Treatment							

Action Threshold Scenarios – Cont…

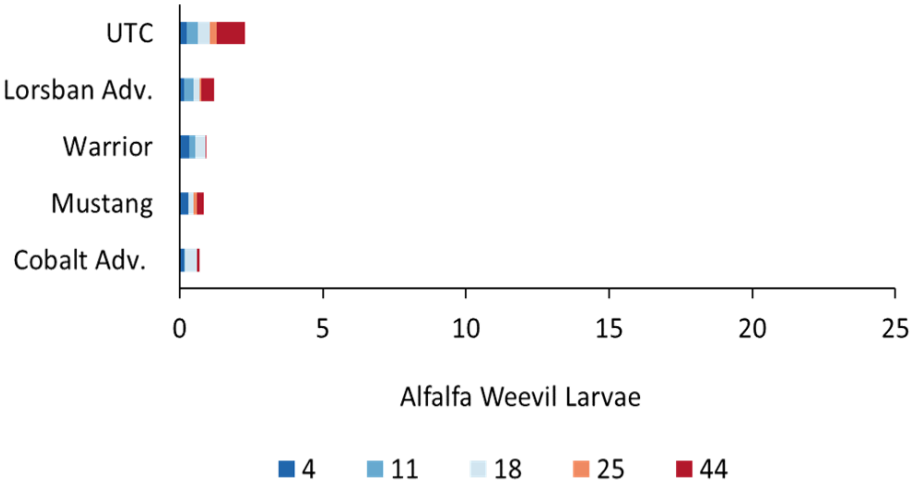
$/Ton	3 Large Larvae per sweep (-0.18 slope)							
320	Y	Y	Y	Y	Y	Y	Y	Y
310	Y	Y	Y	Y	Y	Y	Y	Y
300	Y	Y	Y	Y	Y	Y	Y	Y
290	Y	Y	Y	Y	Y	Y	Y	Y
280	Y	Y	Y	Y	Y	Y	Y	Y
270	Y	Y	Y	Y	Y	Y	Y	N
260	Y	Y	Y	Y	Y	Y	Y	N
250	Y	Y	Y	Y	Y	Y	Y	N
240	Y	Y	Y	Y	Y	Y	N	N
230	Y	Y	Y	Y	Y	Y	N	N
220	Y	Y	Y	Y	Y	N	N	N
210	Y	Y	Y	Y	Y	N	N	N
200	Y	Y	Y	Y	Y	N	N	N
190	Y	Y	Y	Y	N	N	N	N
180	Y	Y	Y	Y	N	N	N	N
170	Y	Y	Y	Y	N	N	N	N
160	Y	Y	Y	N	N	N	N	N
150	Y	Y	Y	N	N	N	N	N
140	Y	Y	Y	N	N	N	N	N
130	Y	Y	N	N	N	N	N	N
120	Y	Y	N	N	N	N	N	N
110	Y	N	N	N	N	N	N	N
100	15	20	25	30	35	40	45	50
	Cost of Treatment/Acre							

$/Ton	4 Large Larvae per sweep (-0.24 slope)							
320	Y	Y	Y	Y	Y	Y	Y	Y
310	Y	Y	Y	Y	Y	Y	Y	Y
300	Y	Y	Y	Y	Y	Y	Y	Y
290	Y	Y	Y	Y	Y	Y	Y	Y
280	Y	Y	Y	Y	Y	Y	Y	Y
270	Y	Y	Y	Y	Y	Y	Y	Y
260	Y	Y	Y	Y	Y	Y	Y	Y
250	Y	Y	Y	Y	Y	Y	Y	Y
240	Y	Y	Y	Y	Y	Y	Y	Y
230	Y	Y	Y	Y	Y	Y	Y	Y
220	Y	Y	Y	Y	Y	Y	Y	Y
210	Y	Y	Y	Y	Y	Y	Y	Y
200	Y	Y	Y	Y	Y	Y	Y	N
190	Y	Y	Y	Y	Y	Y	Y	N
180	Y	Y	Y	Y	Y	Y	N	N
170	Y	Y	Y	Y	Y	Y	N	N
160	Y	Y	Y	Y	Y	N	N	N
150	Y	Y	Y	Y	Y	N	N	N
140	Y	Y	Y	Y	N	N	N	N
130	Y	Y	Y	Y	N	N	N	N
120	Y	Y	Y	N	N	N	N	N
110	Y	Y	Y	N	N	N	N	N
100	15	20	25	30	35	40	45	50
	Cost of Treatment/Acre							

“Large Larvae” vs “Small Larvae” & Other Insects in the sweep net

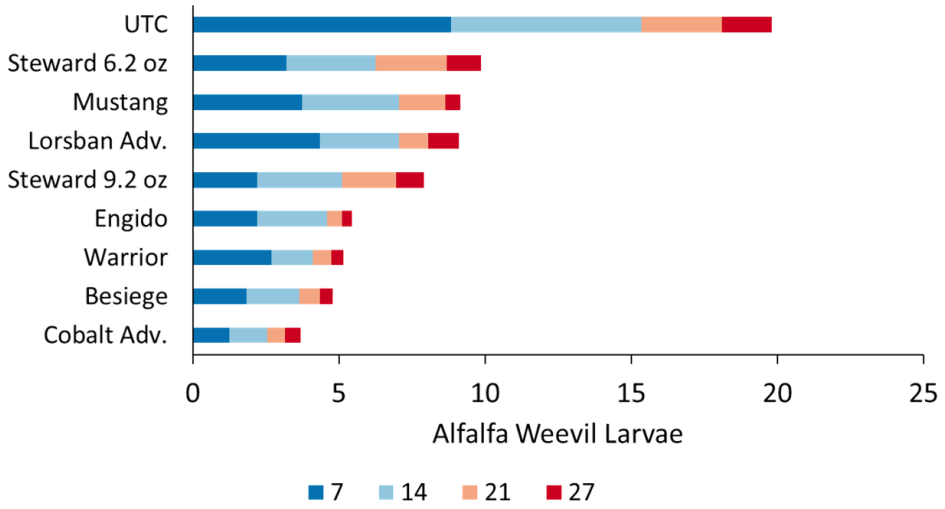
Early Season Insecticide Treatment

December 17th, 2018



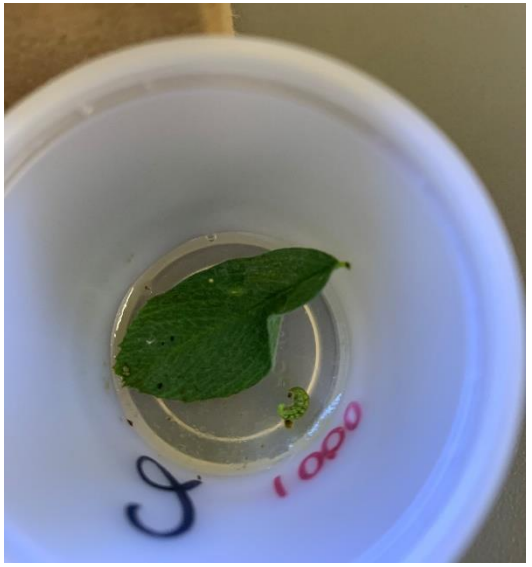
Late Season Insecticide Treatment

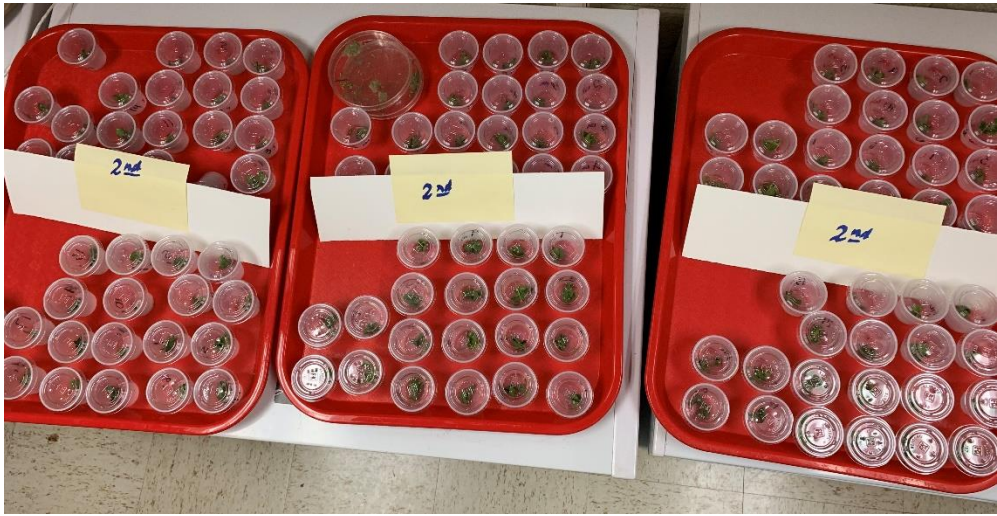
March 20th, 2019



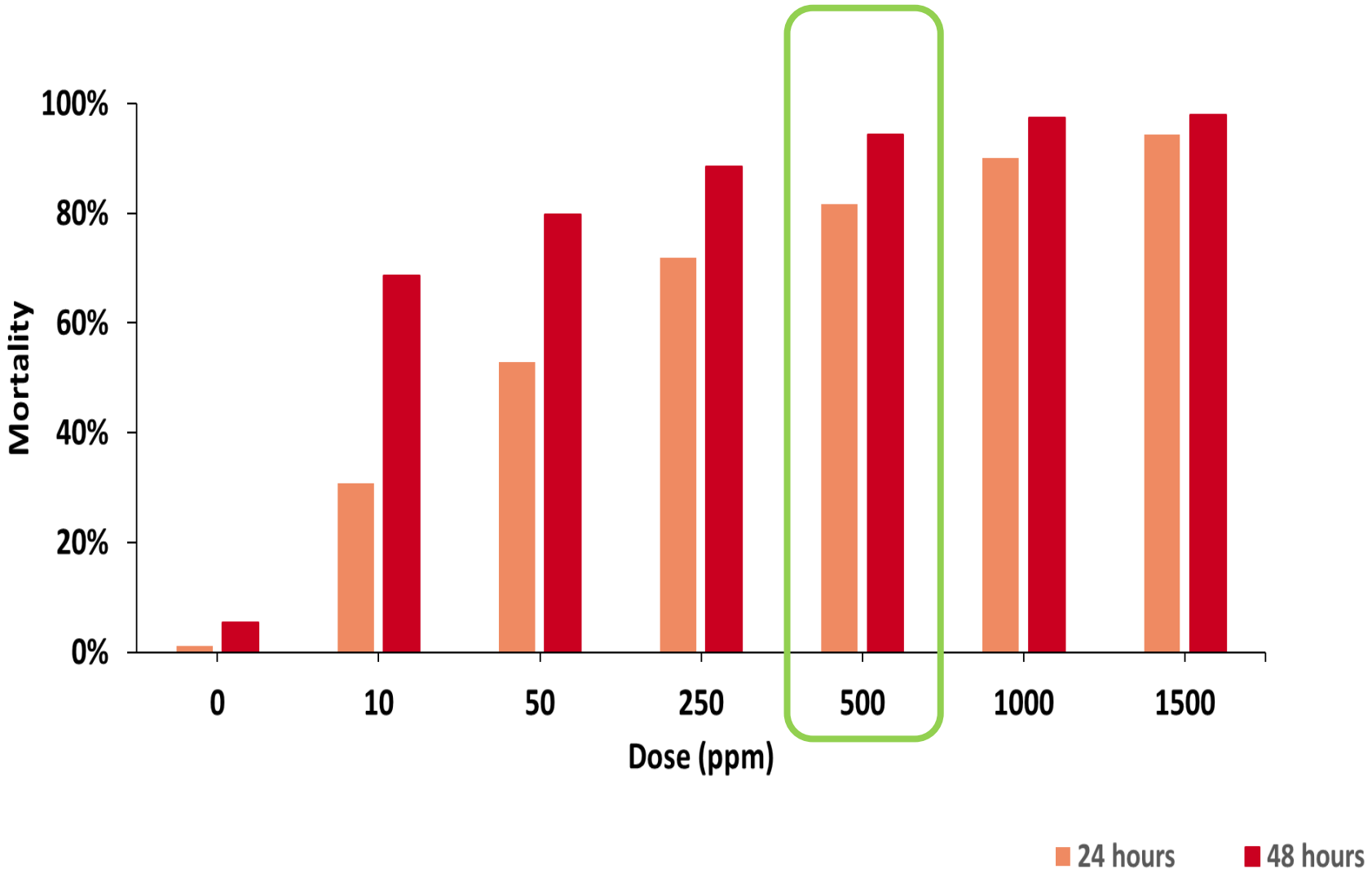
Resistance Monitoring

- Dose Response of Field Populations of **Alfalfa Weevil** to lambda-cyhalothrin Using Feeding Assay
  - **Weevil populations:**
    - Maricopa, AZ
    - Scottsdale, AZ
    - Tonopah, AZ
    - Welton, AZ
    - Poston, AZ
    - Blythe, CA
    - Holtville, CA
    - Yreka, CA
    - Tuelake, CA
    - Logan, UT
    - Los Lunas, NM
    - Radersburg, MT
    - Stillwater, OK
    - Muleshoe, TX
  - **Assay:**

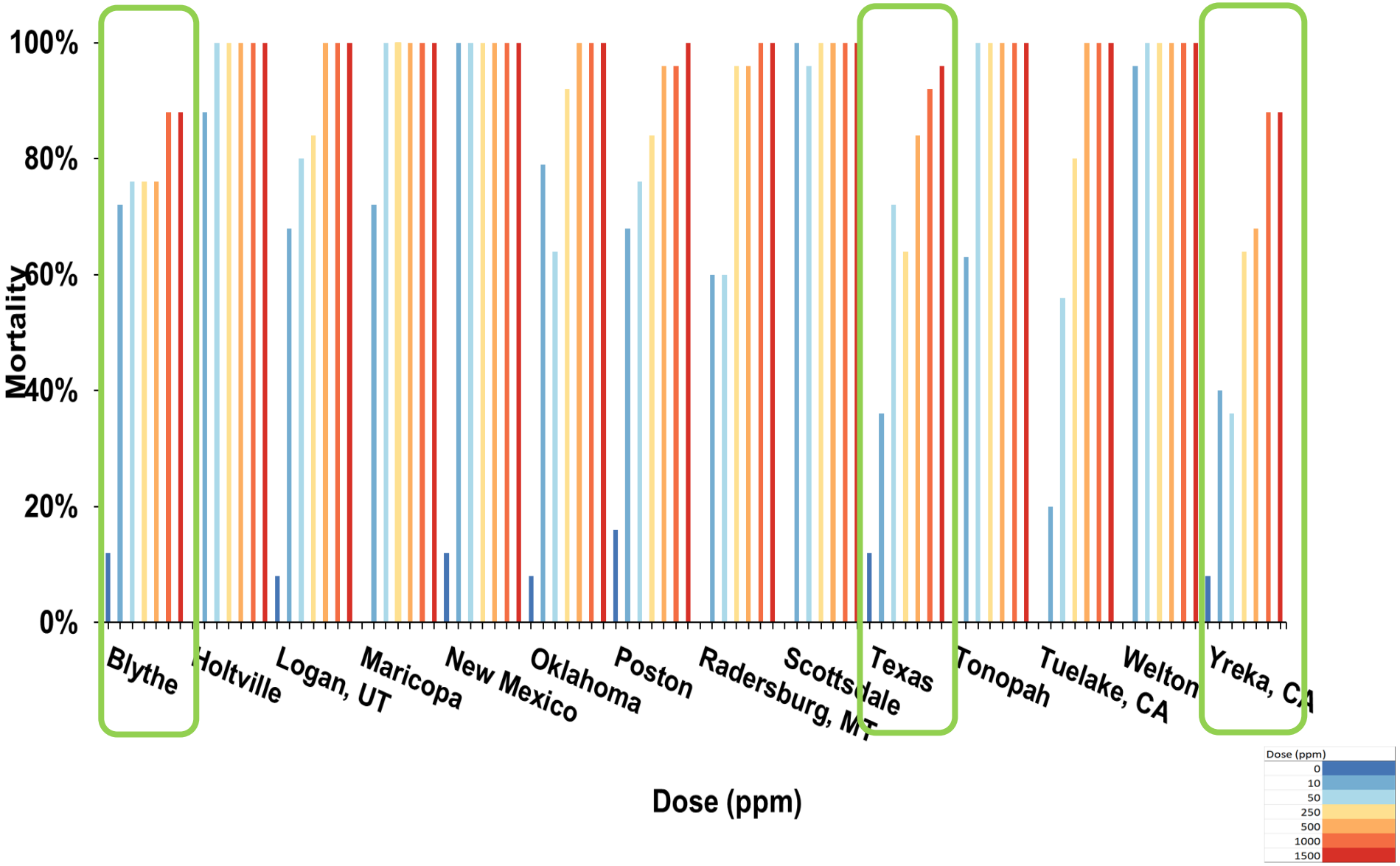




Resistance Monitoring



Resistance Monitoring



Cultural Control

- **Cultural Control**
  - **Resistant Varieties**
  - **Strip Cutting**

  - **Early harvest**
  - **Proper irrigation**

Natural Enemies … Your Friends in IPM

- **IPM & Alfalfa have a long history together**
- **Alfalfa has played a pivotal role in the advancement of IPM**
- **Alfalfa is a unique crop in its production & use**
- **Alfalfa is Ideal for practicing IPM**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THE INTEGRATION OF CHEMICAL AND BIOLOGICAL CONTROL OF THE SPOTTED ALFALFA APHID

The Integrated Control Concept
Vernon M. Stern, Ray F. Smith, Robert van den Bosch, and Kenneth S. Hagen

Field Experiments on the Effects of Insecticides
Vernon M. Stern and Robert van den Bosch

Impact of Commercial Insecticide Treatments
Ray F. Smith and Kenneth S. Hagen

UNIVERSITY OF CALIFORNIA • BERKELEY, CALIFORNIA

Dr. Vernon Stern


Dr. Ray Smith


Dr. Robert van den Bosch


Dr. Kenneth Hagen

IPM Continuum

Biologically-based strategies

Biologically Reliant

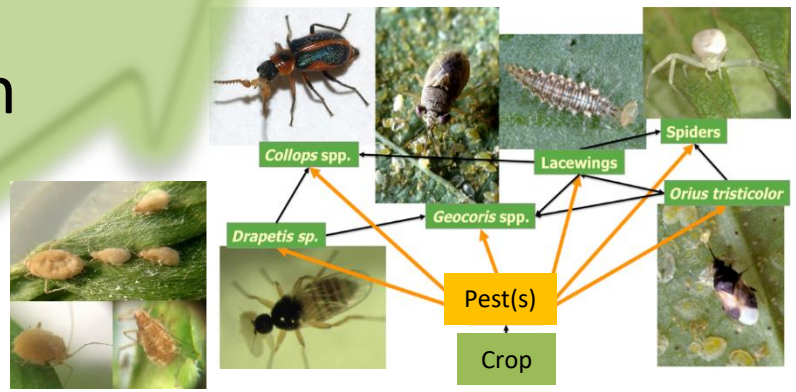
Prevention

Reduced risk insecticides

Thresholds

Scouting

Chemically Reliant



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- **Western IPM Center**
- **University of Arizona**
- **Maricopa County Electric District #8**
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