Alfalfa to get back into planetary boundaries

2025 world alfalfa congress
FRANCE REIMS-CHÂLONS

Growing alfalfa to increase biodiversity and benefit crop production

Julier B. & Sokolovic D.

Plenary session

FROM 03 › TO 06 nov. 2025

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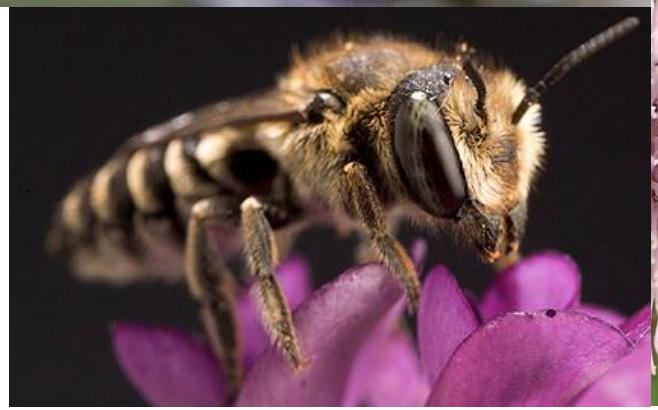
Integrated pest and pollinator management on alfalfa grown for seed in the Pacific Northwest, U.S.A.

Douglas Walsh, PhD

Washington State University

FROM 03 TO 06 nov. 2025

Some of the key pests and beneficials in alfalfa seed production



Alfalfa Seed Production in the PNW

- Growers are contracted with a genetic provider ~ 3 years is a standard contract
- Growers are paid per pound for “clean seed”
- Prices range between $1.50 to $1.70 per pound ($3.30 to $3.75 per kg)
- In most western states besides AZ and CA alfalfa seed is produced as a non-food non-feed crop
- Hence 24Cs (Pesticide Special Local Need Registrations) are relatively “easy” to get.

Pest and Pollinator Management Strategic Plan for Alfalfa Seed Production in the Western U.S.

Summary of a workshop held on
January 30-31, 2017
Las Vegas, NV
Issued March 31, 2017

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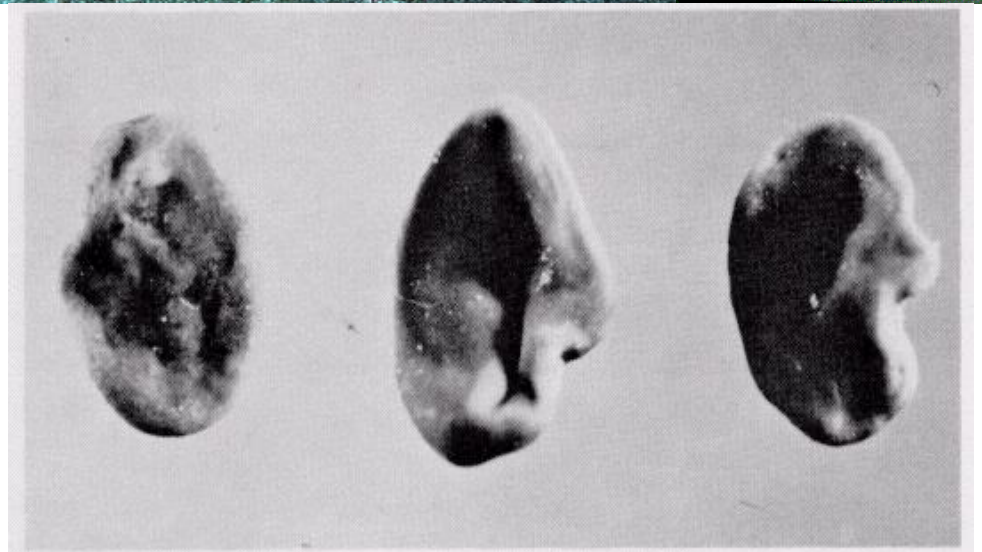
USDA This project was funded in part by the USDA National Institute of Food and Agriculture, through the Western Integrated Pest Management Center. Western IPM Center

- In 2017, thirty-nine alfalfa seed growers from across the Western US gathered and provided input and prioritized their research, education, and regulatory needs.
- The result was that this document serves as our road map for the research we conduct on alfalfa produced for seed.
- We do what the growers want us to do!

Lygus hesperus - The true key direct pest in alfalfa seed production

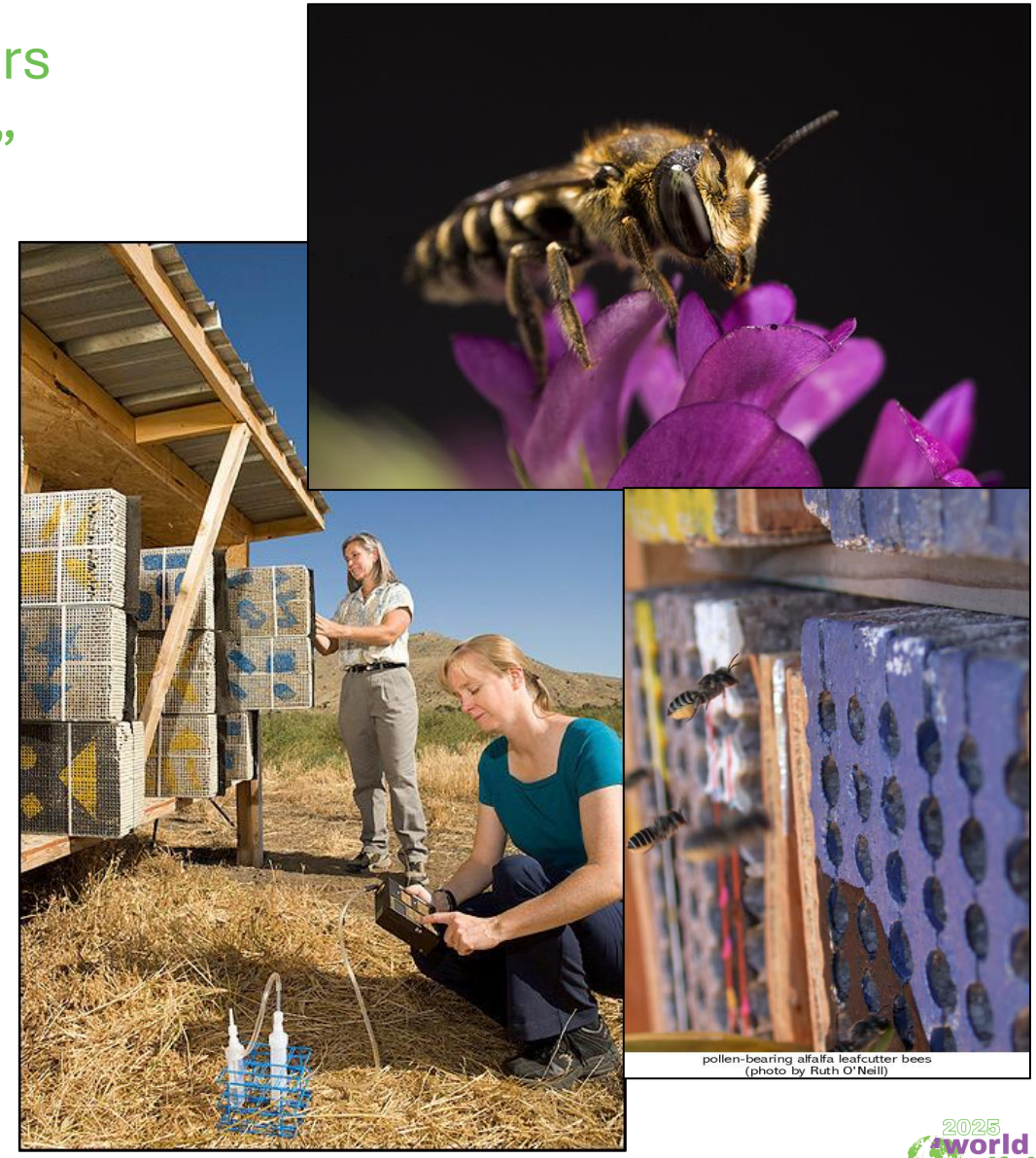
- “Native” hemipteran
- 5 nymphal instars
- Direct pest with piercing sucking mouthparts
- Documented history of insecticide tolerance
- Very low economic threshold



1.5 Alfalfa seed damaged by lygus bug photographed 2 weeks after the lygus fed.

Alfalfa Leafcutting Bee, *Megachile rotundata*

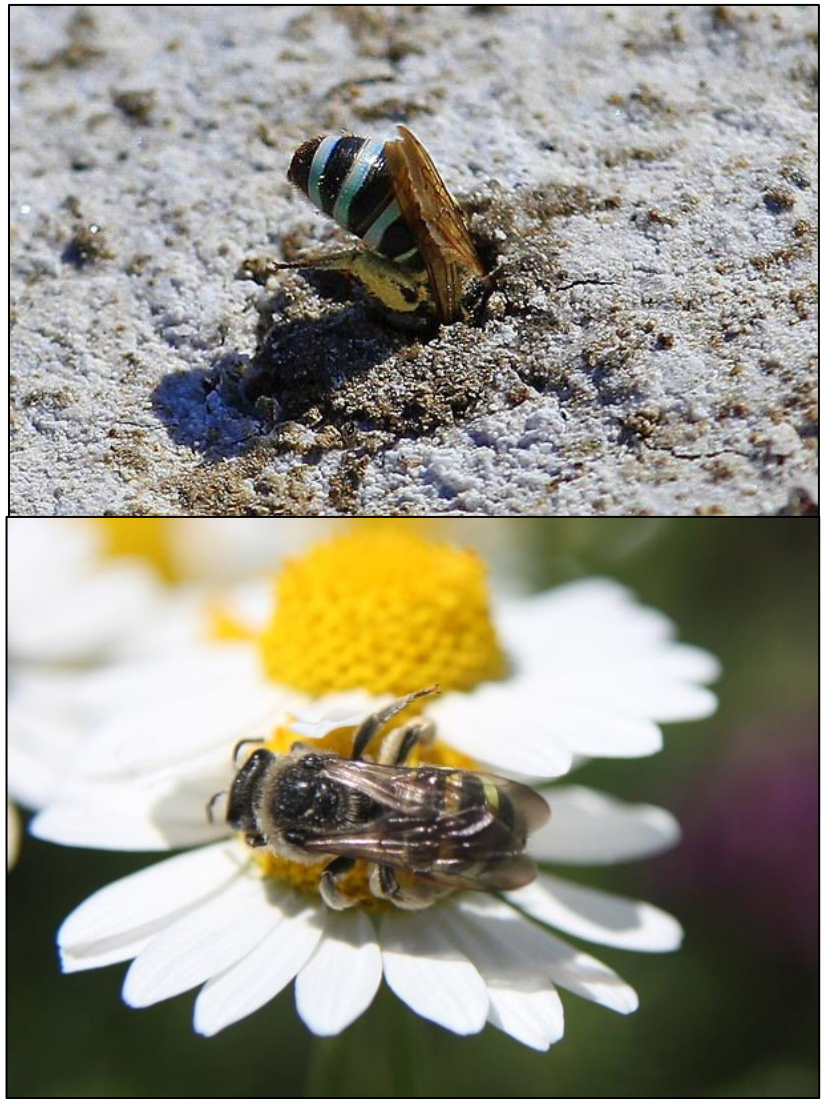
- Introduced from Eurasia, solitary, cavity-nesters
- Placed in “domiciles” and nest in “bee boards”
- Imported from Canada in fiberform boards
- Growers have control over emergence (incubation)
- Sold in 10,000 bee “gallons” 60% male, 40% female
  - Prices have varied from $35/gallon in 2010 to $155/gallon in 2012 & $125/gallon in 2013
  - ~$55/gallon in recent years
- Release rates are about 75,000 per hectare
  - This is about 30,000 female bees per hectare



pollen-bearing alfalfa leafcutter bees
(photo by Ruth O'Neill)

Alkali Bee, *Nomia melanderi*

- Native, solitary, ground-nesting bee
  - Dense aggregations called “bee beds”
  - ~ 20 cm deep in soil
- Overwinter as prepupae (last larval instar)
  - Spring emergence in sync with alfalfa bloom
- Forage 6-8 weeks in June and July
  - Females provision 15-20 individual brood cells
- We survey the population annually
  - We estimated there were 7.5 million alkali bees in Walla Walla, County, Washington in 2024

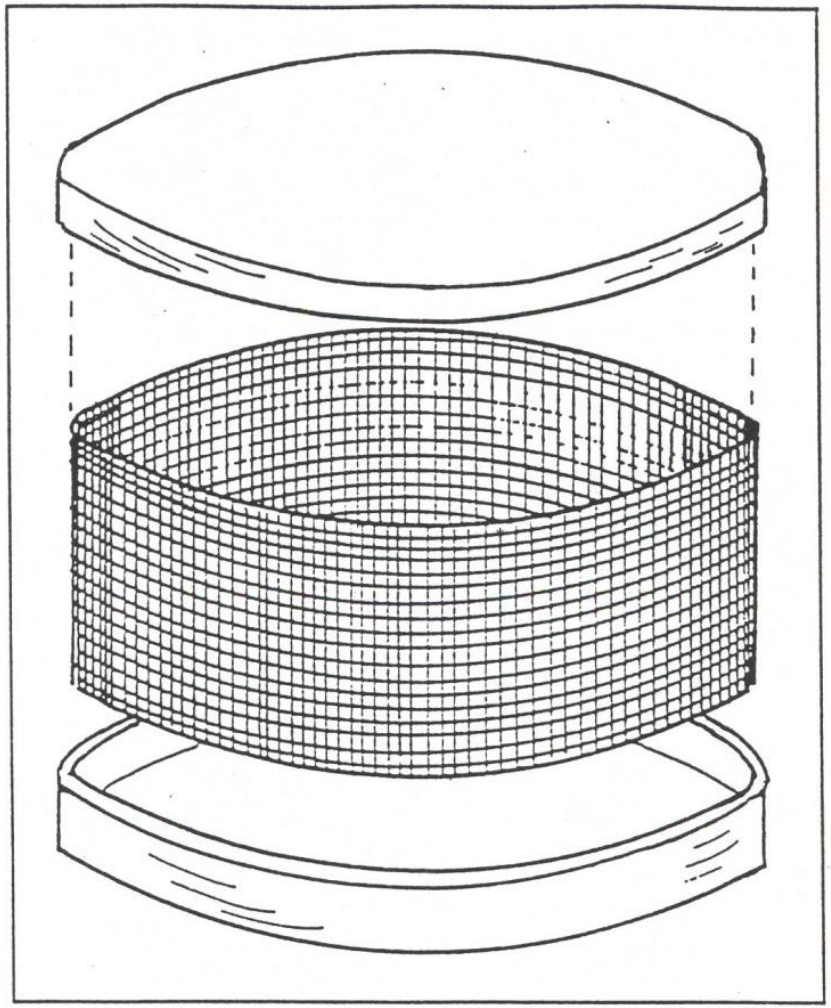


Bee safety trials:

- Small plots of 20 m^2 acre each are sprayed with insecticides at either maximum field rate or experimental rates for control of certain insects/mites on alfalfa grown for seed.

Bee safety studies conducted annually with candidate chemistries

- Alfalfa samples are collected at 1 hour post-treatment and placed into bioassay chambers.
- Approximately 20 leafcutting or 10 alkali bees are placed into each chamber and exposed to the treated alfalfa for 8 hours.
- Bees are fed 50% sucrose solution in a cotton wad.
- Mortality is scored at the end of an 8 hr exposure time



A Standard Spray Program in PNW Alfalfa Seed Production

- Pre-Bloom, 1. dimethoate, 2. chlorpyrifos, 3. zeta-cypermethrin and bifenthrin, 4. lambda-cyhalothrn, 5. sulfoxaflor.
- Unofficial cutoff is May 31
- Bloom - Historically naled. Now flonicamid and afidopyropen. Sulfoxaflor late in bloom.
- Late Bloom - Historically propargite for spider mite control. Recent increases in abamectin, bifenazate and fenpyroximate.
- Post-Bloom - Typically lambda-cyhalothrin, bifenthrin, or acephate.

Lygus Insecticide Trial — Pre-bloom 2025

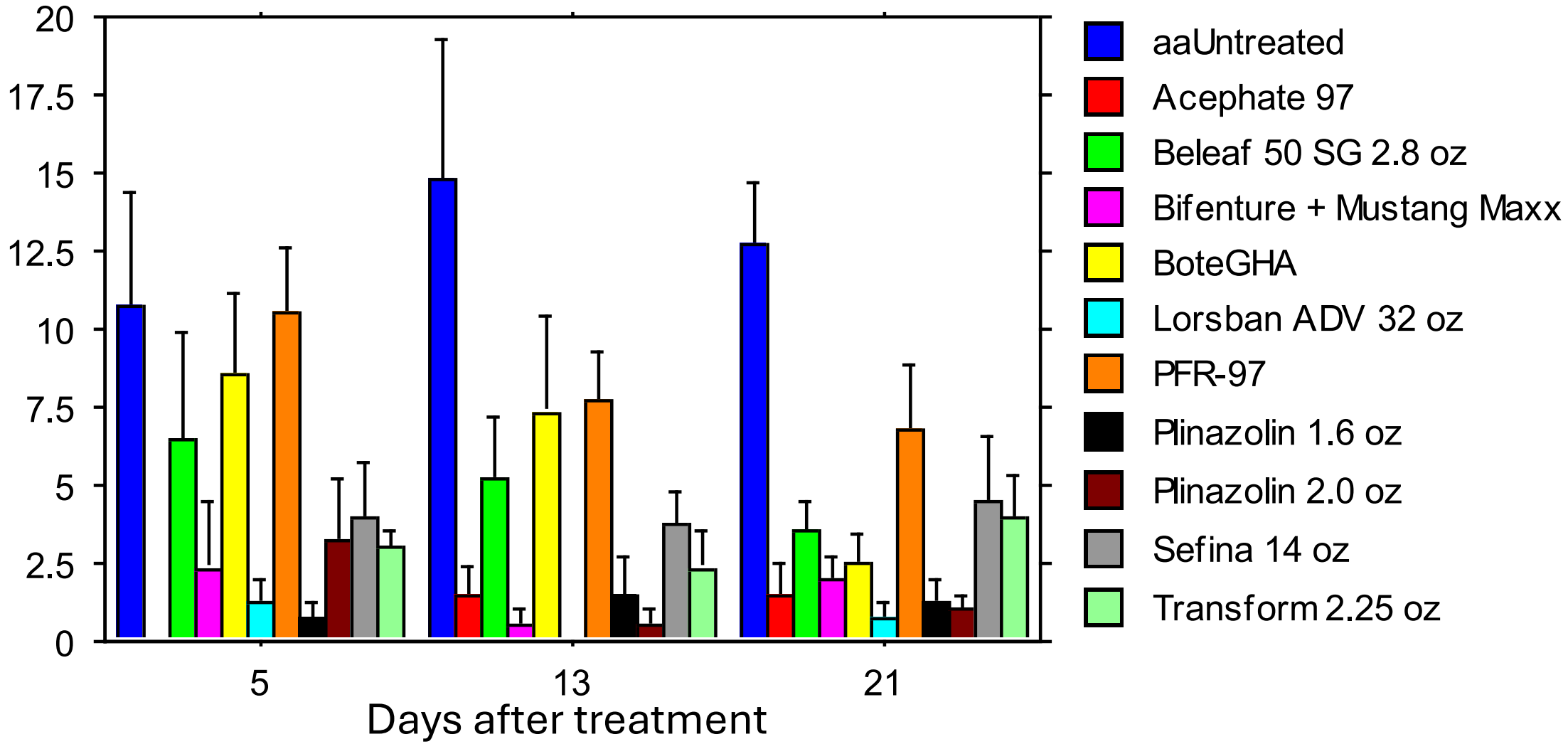
- Complete Random Block Design
- 4 Replicates
- 190 liters per hectare
- C02 Backpack Sprayer
- 60 m^2 plots
- Focus is on large and small Lygus bug nymphs

Lygus sprays- Prebloom 2025

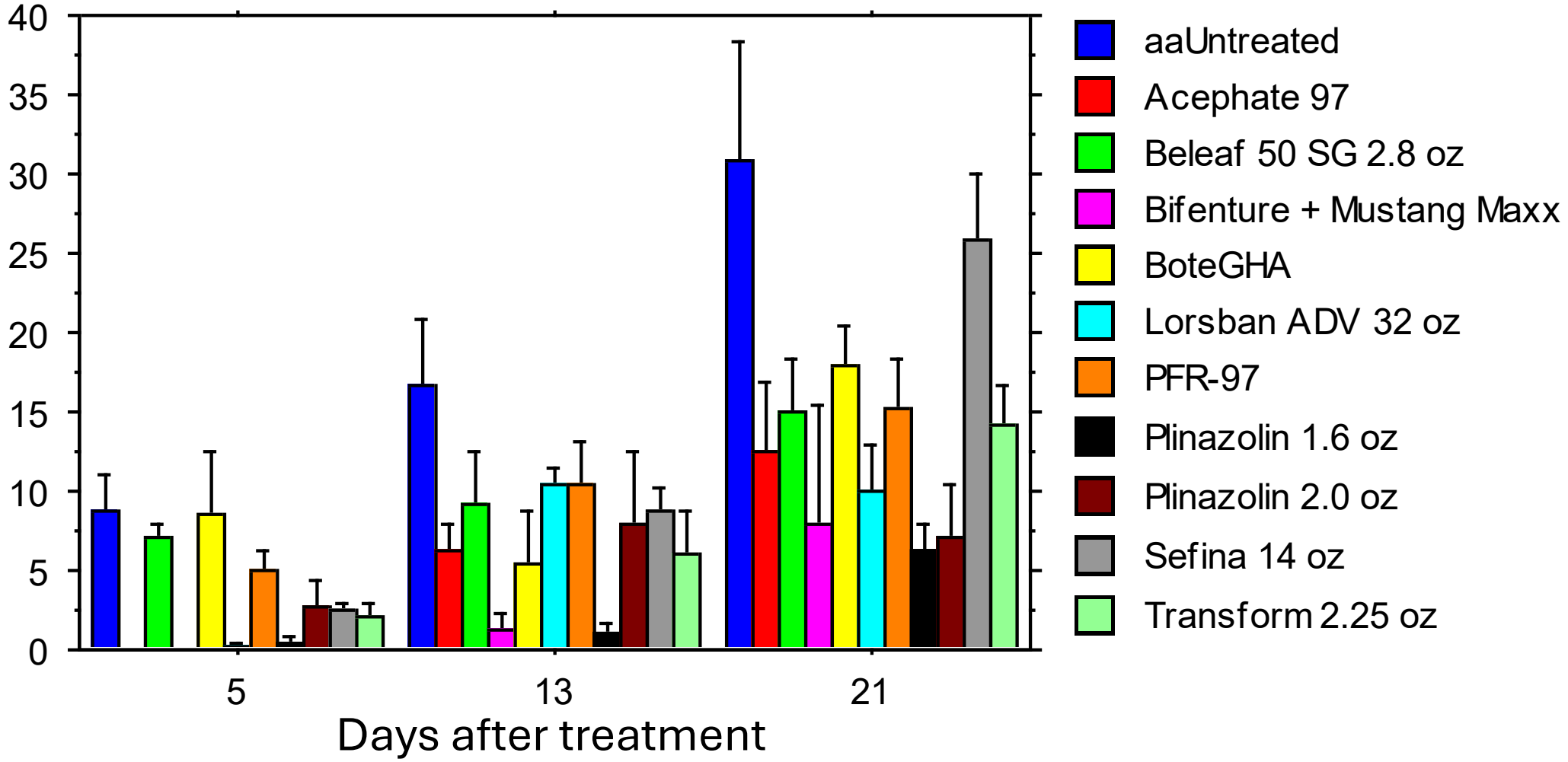
The trade name, active ingredient, and rate per acre, of plots treated with insecticides on 5/28/2025

#	Trade name	active Ingredient	rate		plot #s
1	Untreated Control				103, 211, 301, 406
2	Beleaf 50 SG	flonicamid	2.8	oz/acre	111, 202, 305, 405
3	Transform	sulfoxaflor	2.25	oz/acre	110, 205, 304, 402
4	BoteGHA	*Beauveria bassiana*	3	qt/acre	106, 203, 307, 404
5	Sefina	afidopyropen	14	Fl oz/acre	102, 206, 311, 410
6.	Bifenture +	bifenthrin	8.5	Fl oz/acre	105, 210, 308, 407
	Mustang Maxx	zeta-cypermethrin	8.0	Fl oz/acre	
7.	Plinazolin	isocycloseram	1.6	FL oz/acre	107, 201, 310, 403
8.	Plinazolin	isocycloseram	2.0	Fl oz/ acre	101, 209, 302, 409
9.	PFR-97 20% WDG	*Isaria fumosorosea*	2	lbs /acre	109, 204, 306, 411
10.	Lorsban Advanced	Chlorpyrifos	32	Fl oz /acre	108, 207, 303, 408
11.	Acephate 97	acephate	1	lb /acre	104, 208, 309, 401

Large Lygus nymphs per three 180 sweeps ± Std Error



Small Lygus nymphs per three 180 sweeps ± Std Error



Baseline toxicity data for Plinazolin - 2025

- Lygus bug populations were collected with a canvas sweep net from host plants including forage alfalfa, seed alfalfa, and pigweed (*Amaranthus*).
- The Lygus were then separated from the sweep net collection placed in a portable insect cage with each cage holding only a single population from distinct fields.

Doug Walsh, Washington State University, sweep-netting for Lygus bugs.

The next morning Lygus were sorted by population into cohorts of 10 individuals

Insecticide bioassays

- Adults of *L. hesperus* from each field location were exposed to extremely low concentrations of isocycloseram.
- The bioassays were completed using a Potter Precision Laboratory Spray Tower.
- 80 ul per 100 ml as our stock solution was equivalent to 165 ml per hectare in 190 liters of water

Methods

- Mortality was determined at 24, 48, 72, and 96 hours after treatment.
- Adults were considered dead if they were unable to move ½ their bodylength or there was no movement when prodded with a fine camel-hair brush.
- We used PoloPlus for probit analysis to calculate LC_{50} & LC_{90}, dose response curves, and X^2 goodness of fit test.

Probit analysis of populations of Lygus bug adults to Plinazolin in insecticide bioassay tests. Results are in parts per billion.

Population	LC_{50} (95% CI) ppb	LC_{90} (95% CI) ppb	Slope	X^2 (*df*)
Touchet Pigweed	198 (108-271)	746 (510-1820)	2.223±0.469	15.92 (14)
Lowden B Seed	405 (300-544)	1083 (741-2619)	2.995±0.503	18.27 (12)
Touchet W Seed	422 (423-496)	972 (745-1607)	3.54±0.649	11.80 (14)
Prosser Forage	641 (320-1020)	2379 (1489-7146)	2.25±0.342	73.33 (22)

- Alfalfa seed growers in the U.S. could soon have a powerful new replacement for the older broad-spectrum insecticides presently being used for Lygus bug control pre and post bloom.
- We plan to complete whole-field demonstration trials in 2026.

Questions or Comments?

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