ENHANCING AND PROTECTING POPULATIONS OF ALFALFA SEED POLLINATORS

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

Summary of a workshop held on
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Thirty nine alfalfa seed growers from across the Western US provided input and prioritized their research, education, and regulatory needs.

https://ipmdata.ipmcenters.org/documents/pmsps/AlfalfaSeedPMSP_FINAL.pdf

Washington State Managed Pollinator Plan for Alfalfa Seed Production

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WSDA

http://ipm.wsu.edu/wp-content/uploads/sites/56/2017/10/alfalfa-seed-mp3.pdf

Lygus Management Studies 2015-2017

- Native hemipteran
- 5 nymphal instars
- Direct pest
- Documented history of insecticide tolerance

Typically we conduct several Lygus insecticide control studies annually

- Complete Random Block Design
- 4 Replicates
- 15 Gallons per acre
- $C0_2$ Backpack Sprayer
- 18x36 ft. plots

Applications were made on June 5, 2015 in 19.8 gallons water per acre
Arthropod counts are averages of 5 sweeps per plot.
Each treatment was replicated 4 times on 18 by 20 foot plots (360 sq feet)

Lygus Nymphs		**4-Jun**	**9-Jun**	**11-Jun**	**15-Jun**
Treatment	**rate/oz/acre**	**Pre Trt**	**4 DAT**	**6 DAT**	**10 DAT**
Beleaf 50 SG	2.8	22.25	1.5	5.25	0
Beleaf 50 SG /Steward EC	2.8/11.3	18.25	0.75	3.25	0
Bifenture EC	6.4	19	1.25	2.5	0
Cobalt Advanced	16	18.5	0.25	0.75	1
Dimethoate 4 ECX	16	23.75	1	0	0
Rimon .83 EC	12	21.75	4.25	2.75	0
Rimon 0.83 EC`/Steward EC	12/11.3	18.5	0.75	0	0
Sivanto 200 SL*	14	15.75	3.75	2.5	0.5
Sivanto 200 SL*/Steward EC	14/11.3	23.75	1.25	1	0
Transform WG	2.25	21.75	1	0	0
Transform WG /Steward EC	2.25/11.3	13.25	1	1	0
Untreated		13	1.25	6.5	0.75

Large plots 2016

- At sunset on June 20 forty acre blocks were treated with either Transform at 1.5 oz/acre or with BeLeaf at 2.8 oz/acre.
- A 40 acre control field where no insecticide was sprayed was immediately north of the treated field.
- Pretreatment sweepnet samples were taken from the 80 acre field that was to be treated with Transform and BeLeaf and from the Control field (unsprayed) on June 17, 2017.
- Additional counts were taken post treatment on June 23, 2017, three days post insecticide treatment.
- The Transform application numerically reduced the abundance of pest Lygus compared to the Beleaf treatment and the control plots.

Large plots: Lygus & aphids per sweep

June 17, 2016 Pre treatment	Lygus Adults	Small nymphs	Large nymphs	Aphids
Experimental field	16.16	1.63	1.42	19.10
Control field	17.6	1.35	0.85	11.2

June 23, 2016 Post treatment	Lygus Adults	Small nymphs	Large nymphs	Aphids
Control	19.56	3.76	0.60	12.00
Beleaf	18.56	1.36	0.40	2.52
Transform	3.36	0.45	0.00	0.50

Large plots: Beneficial arthropods

June 17, 2016 Pre treatment	BEB[1]	Spiders	LW[2] larva	LBB[3]	MPB[4]
Experimental field	1.07	0.20	0.50	0.36	0.82
Control field	0.40	0.33	0.2	0.35	0.67

June 23, 2016 Post treatment	BEB[1]	Spiders	LW[2] larva	LBB[3]	MPB[4]
Control	0.54	0.33	0.20	0.62	0.67
Beleaf	0.60	0.50	0.27	0.40	0.60
Transform	0.75	0.00	0.00	0.33	0.00

[1]/ Big eyed bugs, [2]/ Lacewing, [3]/ Ladybird beetles, [4]/ Minute pirate bugs

Small plots 2017
Prosser IAREC

Product	Rate/acre	
Control		Fl oz/acre
Beleaf 50 SG	2.8	oz/acre
Sivanto*	14	Fl oz/acre
Naled	16	Fl oz/acre
Transform	1.5	oz/acre
Transform	2.25	oz/acre
Biological Soil & foliar	96	Fl oz/acre
Biological Soil & foliar	128	fl oz/acre
Grandevo	48	oz/acre

Standard Experimental Design: Application Date July 27, 2017

Lygus adults per sweep- 2017

	Day after treatment			
Treatment	1	3	7	10
Beleaf	34.5	14	14.5	20
Biol-128	11.25	11.25	19.5	10.25
Biol-96	37.25	11.25	18.25	18.75
Grandevo	21.5	10.75	19.5	19.25
Naled	32.25	11.5	22.75	22.25
Sivanto	30.75	14.5	15.75	17.75
Transform 2.25	4.25*	4	15	24
Trans-1.5	5*	7.25	19.25	20.75
Untreated	47.5	14.75	14.25	23.25

Lygus nymphs per sweep- 2017

	Day after treatment			
Treatment	1	3	7	10
Beleaf	68.25	26.25	22.25	17
Biol-128	14*	58.25	29.25	16.25
Biol-96	53*	49.5	17.75	19.75
Grandevo	51.25*	51.25	22.25	18.75
Naled	52*	38	32	22.75
Sivanto	34.25*	54.5	27.5	18.25
Transform 2.25	1.5*	3.75*	7.5	23
Trans-1.5	5.5*	7*	20.5	35.25
Untreated	114.5	56.25	28.5	19

Conclusions:

- Transform does a great job at controlling Lygus
- Part of EPA's concern with the Washington State Section 18 request was that we had to prove Transform was "more effective" than Dibrom and BeLeaf.
- It was!

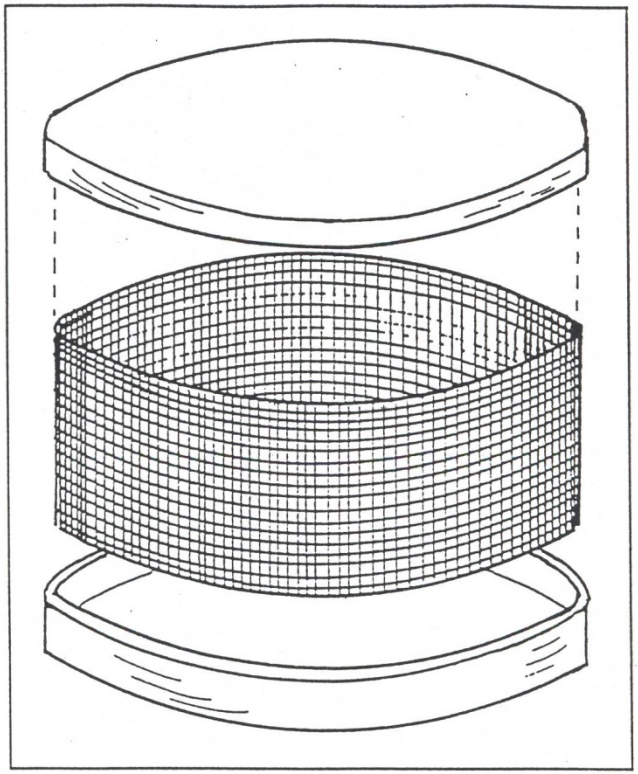
- Biological Soil and Foliar. I have no clue

Bee safety trials: Small plots of 0.01 acre each were sprayed with insecticides at either maximum field rate or experomental rates for control of certain insects/mites on alfalfa grown for seed.

A CO_2 pressurized sprayer was used at a rate of 26 gpm using a hand-held boom.

Bioassay Protocol

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



Summer 2015 Insecticide Safety Studies

Domicile near control field- pesticide safety

Domicile in Sivanto treated field

Additionally, we collected leafcutting bees from both locations. 50 in EtOH and 50 in rna-later from both sites.

Results- 2015, 1-hr residual contact bioassays following 8 hrs of exposure

		Leafcutting bees			Alkali bees	
Treatment	Rate/acre	% mortality corrected			% mortality corrected	
Cobalt	16 oz	96			100	
Beleaf	2.8 oz	0			0	
Sivanto	14 oz	2			4	
Transform	2.25 oz	6			10	

- **We conclude that Transform is safe at the 2.25 oz per acre rate.**

Results- 2017, 1-hr residual contact bioassays following 8 hrs of exposure

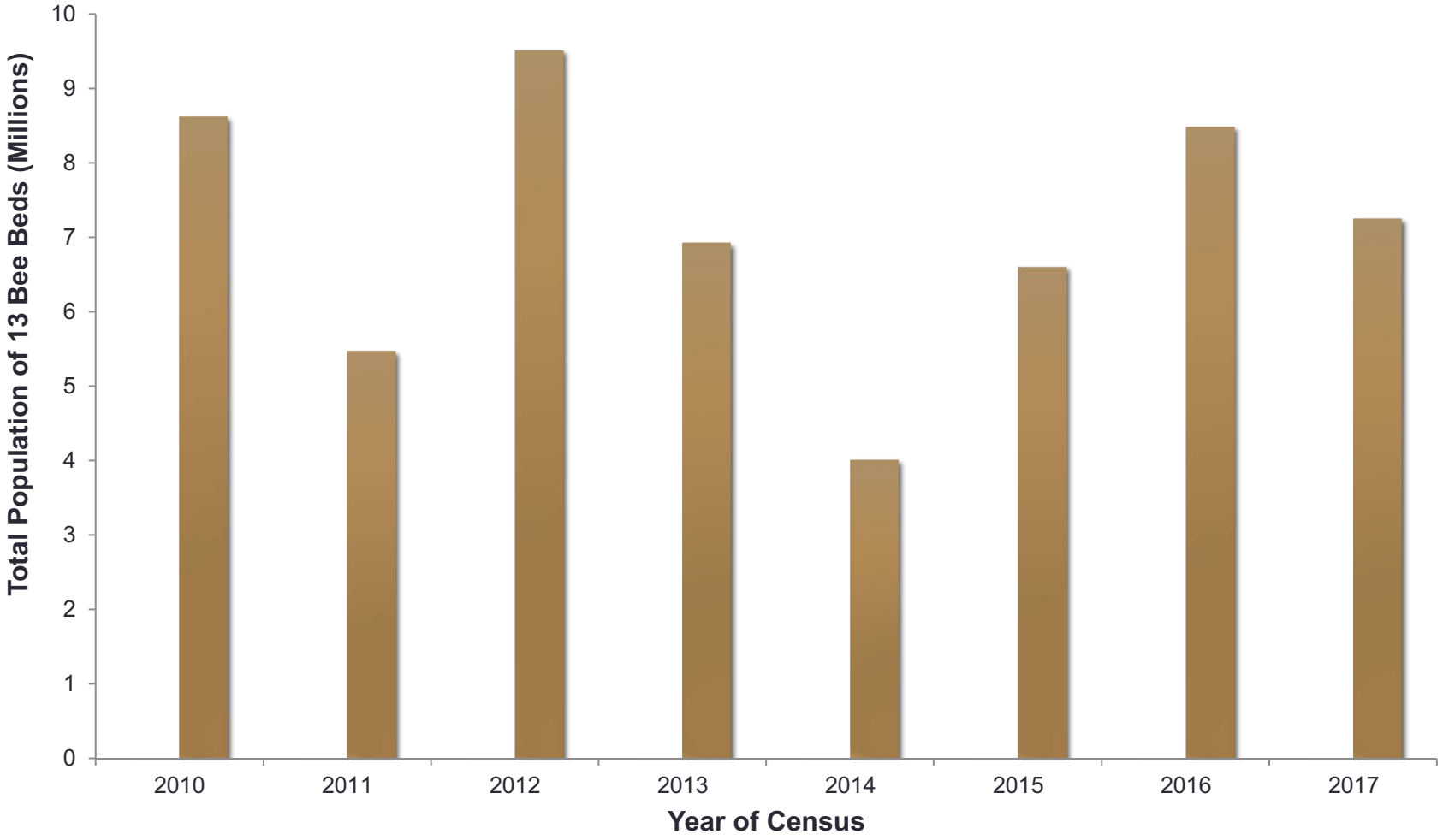
Product	Rate per acre	ALCB % Cor Mort		Alkali bee % Cor Mort
Spiromesifen (Envidor)	24.7 fl oz	11		9
Fenpyroximate (Fujimite)	2 pints	17		13
Acequininocyl (Kanemite)	31 fl oz	4		4

- **We conclude that these miticides are safe and could warrant further large plot research**

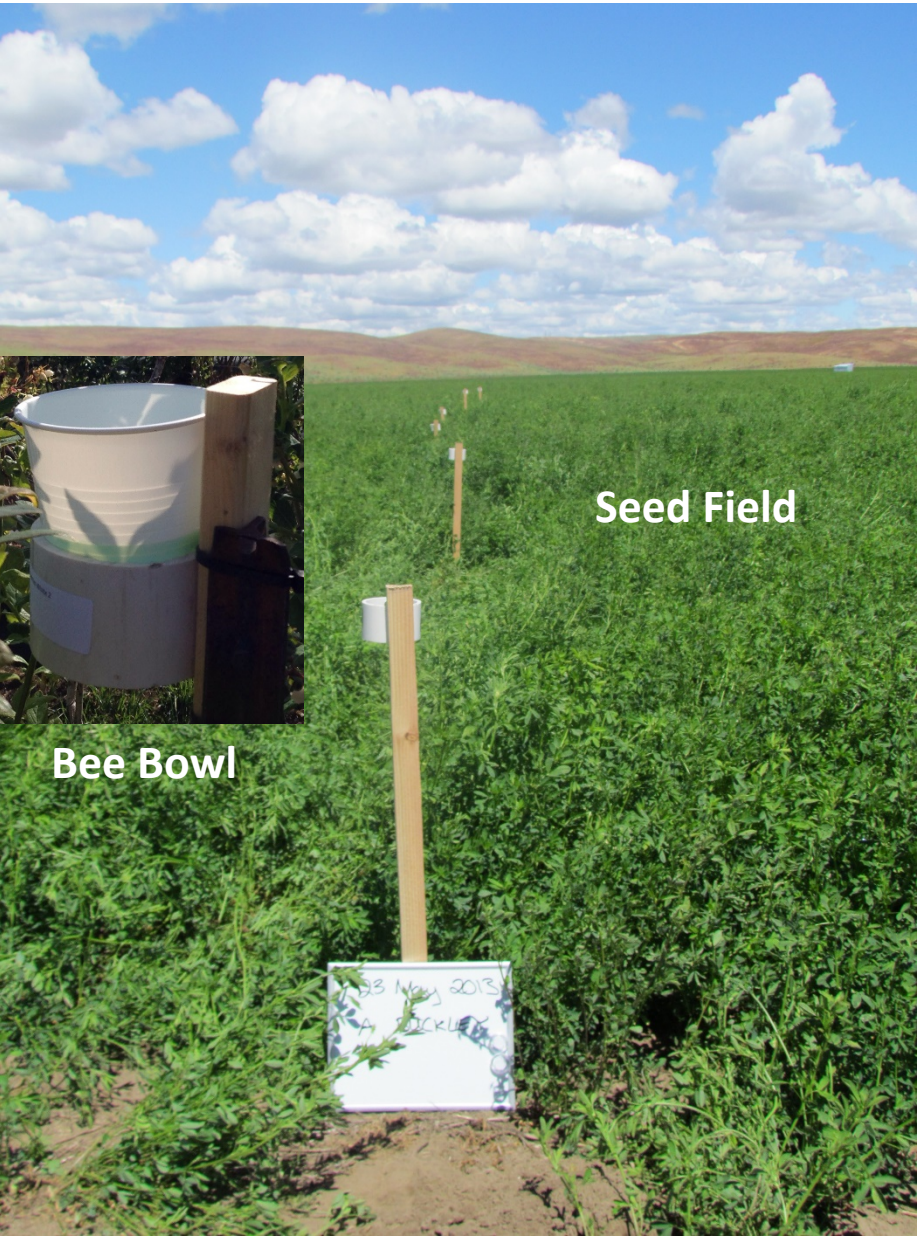
Population Survey- We've done this for 10 years and a chapter in Emily's MS thesis summarizes the data.

- **"Quadrat Method for Assessing the Population Abundance of a Commercially Managed Native Soil-nesting Bee, *Nomia melanderi* (Hymenoptera: Halictidae) in Proximity to Alfalfa Seed Production in the Western USA"**

The estimated alkali bee population in the Touchet Valley from 2010 to 2017.



Other bees present in alfalfa seed fields?”



One of the greatest criticisms of our pollinator research was that we focused too much on the managed bees and ignored the “other” bees that might be involved with pollinating alfalfa.

So in 2013 Amelia Jordan completed her MS project entitled- *“A qualitative survey of the "other" pollinators present in and near alfalfa seed fields”.*

In this survey Ms. Jordan ran transects through alfalfa seed fields with yellow, blue, and white bee bowls on a weekly basis during alfalfa bloom for 9 weeks in 2012 and 8 weeks in 2013.

In total 4,450 bees were collected from alfalfa seed fields in bee bowls in 2013

1. *A. mellifera*	490
2. *N. melanderi*	473
3. *M. rotundata*	203
4. Genus *Agapostemon*	1121
5. All other *Apidae*	2163
Total	**4450**

4 species of *Agapostemon*

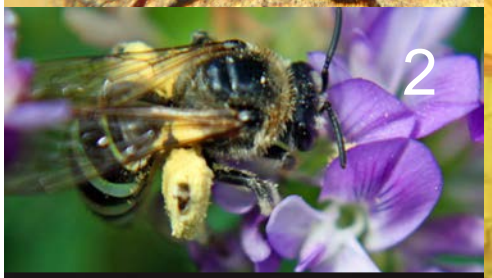
texanus

angelicus

femoratus

virscens?

Halictus spp. (farinosus) was very abundant



5. There were numerous other “micro” bees captured. But these bees probably do not trip blossoms

Questions and/or Comments?

Seattle Times 8.7.2012