University of California
Agriculture and Natural Resources

Role of lygus bug in fruit deformity

IPM tools for managing lygus bug

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Strawberry fruit deformation

Strawberry fruit deformation

Fruit deformity to due lygus bug damage

Deformity due to poor pollination, genetic, environmental, and other factors

Role of lygus bug on fruit deformation

- Conventional (18) and organic (10) fields
- 9 Sampling dates
- 4 replications (different parts of the field)
- At least 100 deformed berries/replication

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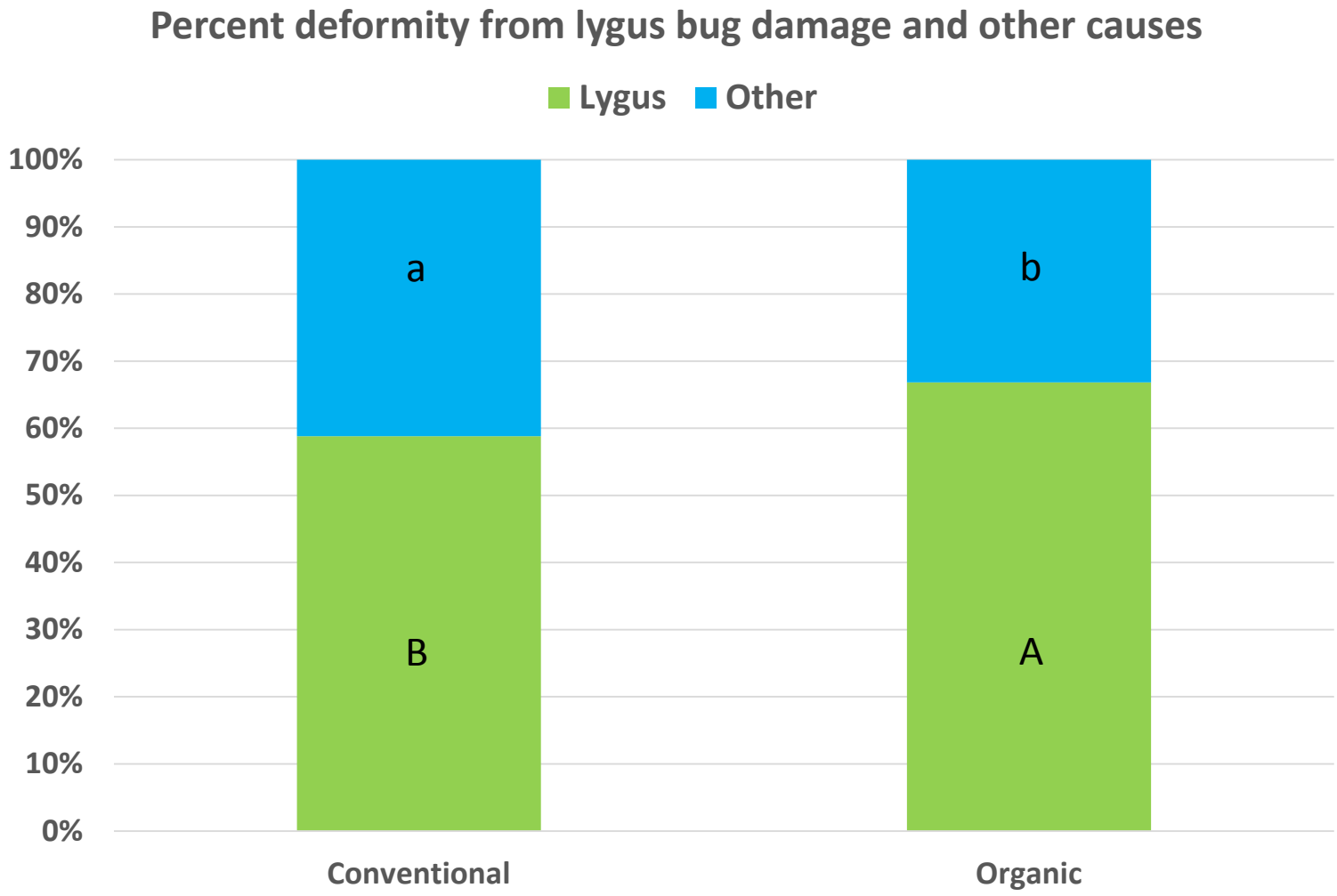
Role of lygus bug on fruit deformation



Tukey's HSD at $P = 0.0002$

Conclusions

- In both conventional (59%) and organic (67%) fields majority of the deformity was related to lygus bug feeding
- Lygus-related damage was significantly higher in organic fields and damage due to other factors was significantly higher in conventional fields
- Sampling for lygus is the most reliable way to make treatment decision

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Acknowledgements

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Technical assistance

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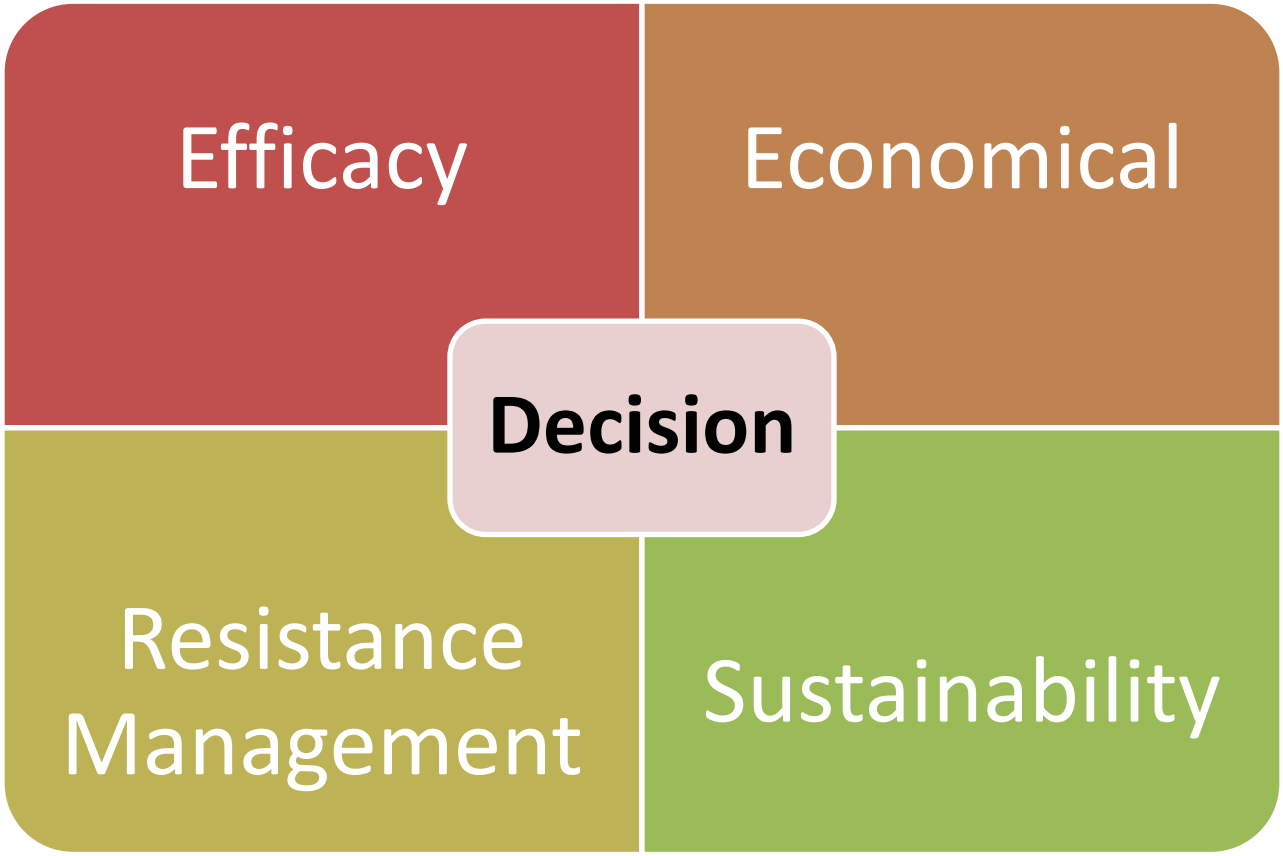
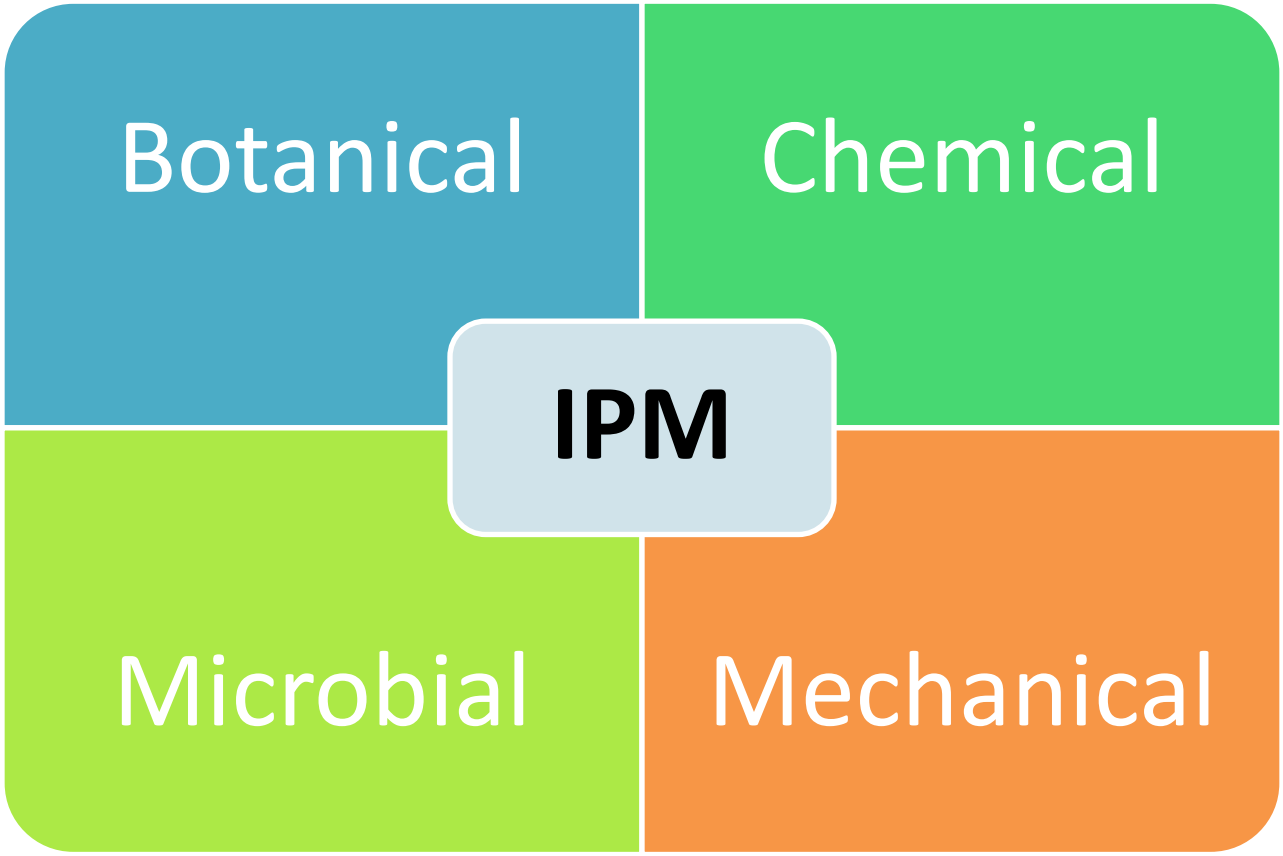
Decision making for pest management



IPM Tools for Strawberries



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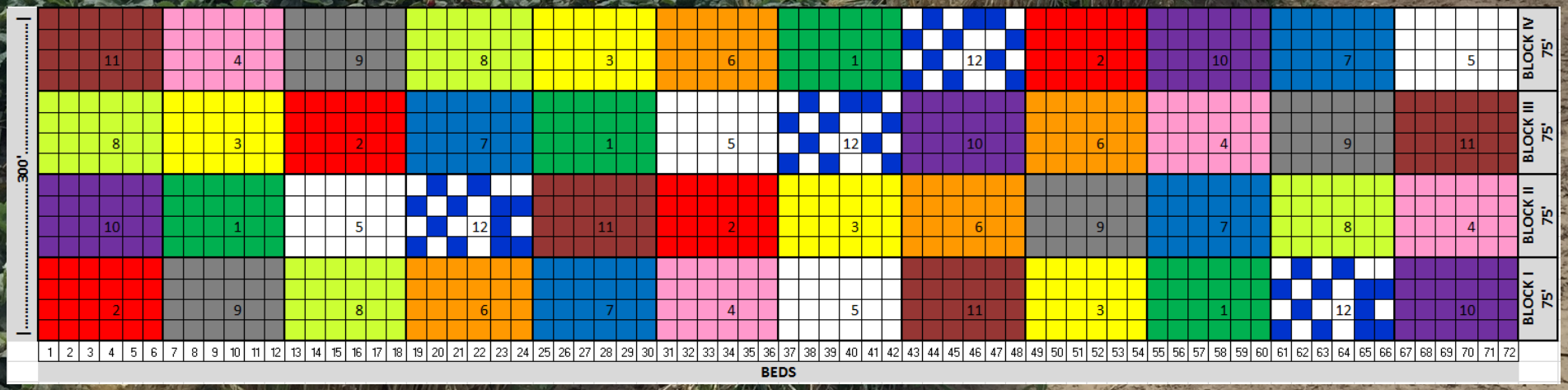
2015 Strawberry IPM trial

Sundance Berry Farms, Santa Maria



Chemicals-Mode of action groups

3A Pyrethrins-Sodium channel modulators

4A	Neonicotinoids	Nicotinic acetylcholine receptor competitive modulators
4C	Sulfoximines	
4D	Butenolides	

9C Flonicamid – Modulators of chordotonal organs

15 Benzoylureas - Inhibitors of chitin biosynthesis

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Non-chemical alternatives

- Entomopathogenic fungi, *Beauveria bassiana*, *Isaria fumosorosea*, and *Metarhizium brunneum*
- Botanical insect growth regulator, azadirachtin
- Mechanical removal - vacuuming

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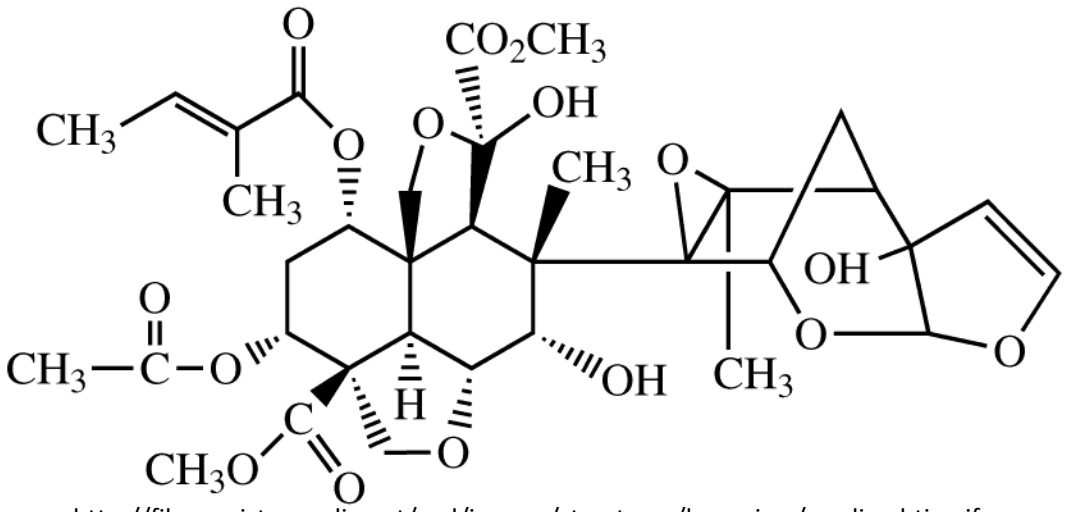
Azadirachtin mode of action



http://files.meistermedia.net/cpd/images/structures/largeview/azadirachtin.gif

- Interferes with protein synthesis
- Affects molting and metamorphosis
- Disturbs mating and sexual communication
- Sterilizes adults
- Reduces reproductive ability
- Acts as antifeedant and repellent

Lygus bug management study

	1st application (Rate/acre)	2nd application (Rate/acre)	3rd application (Rate/acre)
1	Untreated	Untreated	Untreated
2	Assail 70 WP (3 oz) **4A***	Assail 70 WP (3 oz) **4A**	Assail 70 WP (3 oz) **4A**
3	Vacuum	Vacuum	Vacuum
4	Rimon 0.83 EC (12 fl oz) **15** + Brigade (16 oz) **3A**	Met52 EC(16 fl oz) + Debug Turbo (104 fl oz)	Met52 EC (16 fl oz) + AzaGuard (16 fl oz)
5	Sequoia (4.5 oz) **4C**	Sequoia (4.5 oz) **4C**	Vacuum
6	Pfr-97 (2 lb) + Neemix (9 fl oz)	Pfr-97 (2 lb) + Neemix (9 fl oz)	Vacuum
7	Vacuum	Sivanto (14 fl oz) **4D** + Debug Turbo (104 fl oz)	Rimon 0.83 EC (12 fl oz) **15** + Brigade (16 oz) **3A**
8	Sivanto (14 fl oz) **4D**	Sivanto (14 fl oz) **4D**	Vacuum
9	Sequoia (4.5 oz) **4C**	Sivanto (14 fl oz) **4D**	Beleaf 50 SG (2.8 oz) **9C**
10	*B. bassiana*+neem (1qrt)	*B. bassiana*+pyrethrum **3A**+neem (1qrt)	*B. bassiana*+pyrethrum **3A** (1qrt)
11	*B. bassiana*+pyrethrum **3A** (1qrt)	*B. bassiana*+neem (1qrt)	Beleaf 50 SG (2.8 oz) **9C**
12	*B. bassiana*+pyrethrum **3A** (1qrt)	Vacuum	Rimon 0.83 EC (12 fl oz) **15** + Brigade (16 oz) **3A**

*MoA group

3A Pyrethrins-Sodium channel modulators

4A Neonicotinoids
4C Sulfoximines
4D Butenolides
} Nicotinic acetylcholine receptor competitive modulators

9C Flonicamid – Modulators of chordotonal organs

15 Benzoylureas - Inhibitors of chitin biosynthesis

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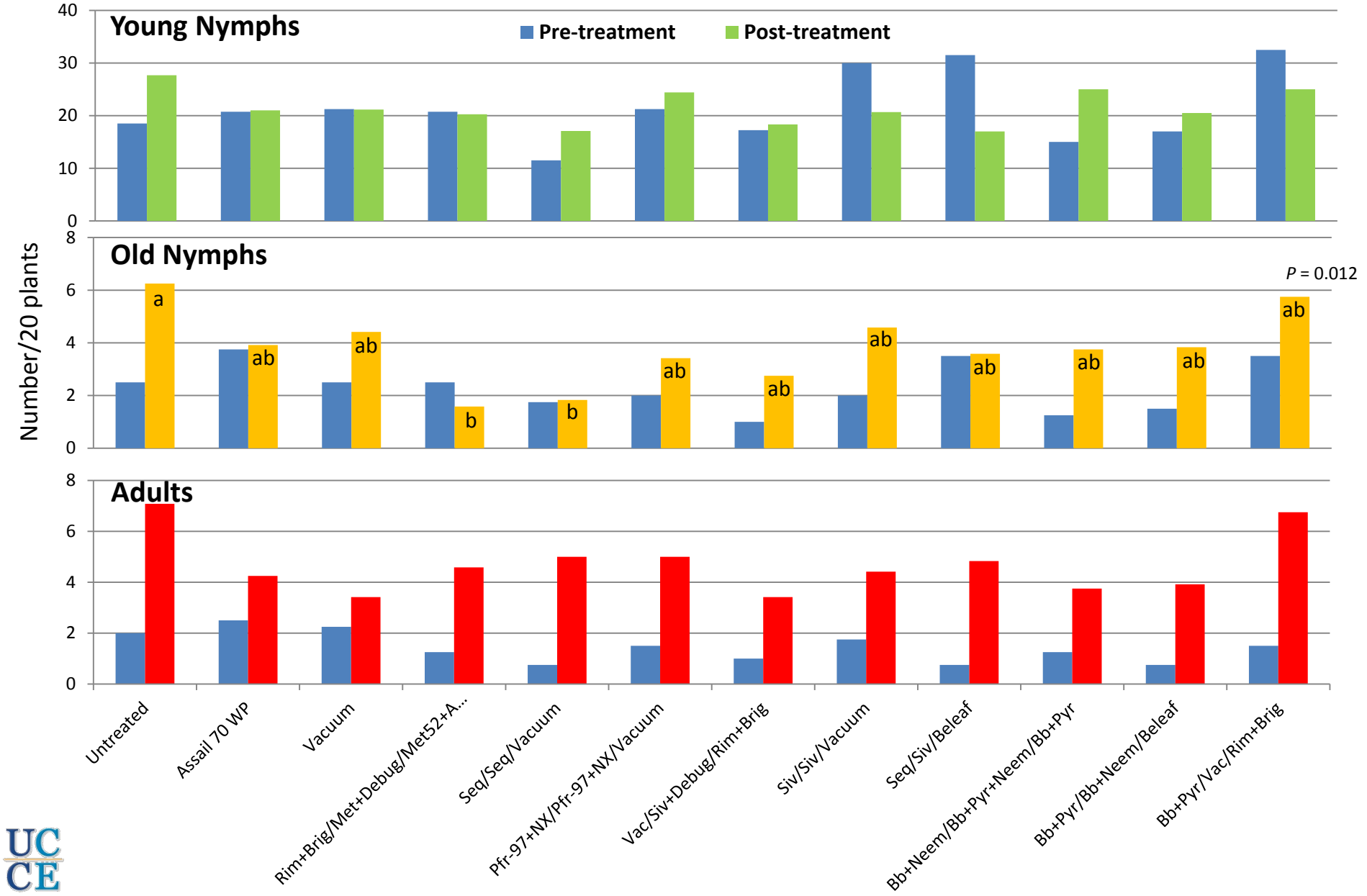
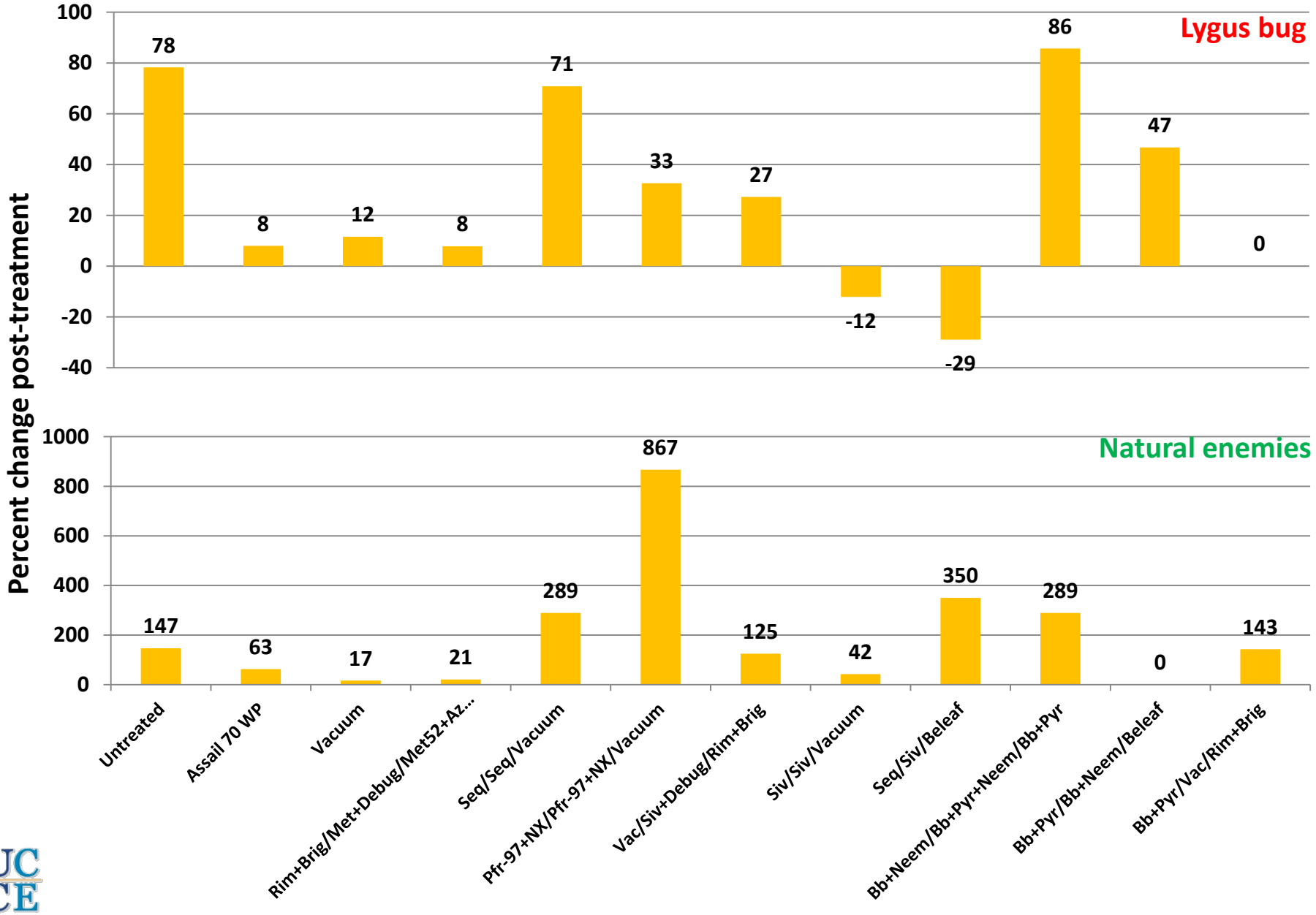
Treatments and sampling

- Treatments applied on 26 August, 2 and 9 September, 2015
- Vacuuming was done twice a week only in vacuum treatments
- Spray volume was 100 gpa for all treatments
- Sampled 6 days after each application

Lygus life stages after three applications



Change in lygus and natural enemy populations



Treatment efficacy

Rank	% Change	I Spray	II Spray	III Spray
I	-28.9	Sequoia (4.5 oz) **4C***	Sivanto (14 fl oz) **4D**	Beleaf 50 SG (2.8 oz) **9C**
II	-12.1	Sivanto (14 fl oz) **4D**	Sivanto (14 fl oz) **4D**	Vacuum
III	0.0	*B. bassiana*+pyrethrum **3A** (1qrt)	Vacuum	Rimon 0.83 EC (12 fl oz) **15** + Brigade (16 oz) **3A**
IV	7.8	Rimon 0.83 EC (12 fl oz) **15** + Brigade (16 oz) **3A**	Met52 EC(16 fl oz) + Debug Turbo (104 fl oz)	Met52 EC (16 fl oz) + AzaGuard (16 fl oz)
V	8.0	Assail 70 WP (3 oz) **4A***	Assail 70 WP (3 oz) **4A**	Assail 70 WP (3 oz) **4A**
VI	11.5	Vacuum	Vacuum	Vacuum
VII	27.3	Vacuum	Sivanto (14 fl oz) **4D** + Debug Turbo (104 fl oz)	Rimon 0.83 EC (12 fl oz) **15** + Brigade (16 oz) **3A**
VIII	32.7	Pfr-97 (2 lb) + Neemix (9 fl oz)	Pfr-97 (2 lb) + Neemix (9 fl oz)	Vacuum
IX	46.8	*B. bassiana*+pyrethrum **3A** (1qrt)	*B. bassiana*+neem (1qrt)	Beleaf 50 SG (2.8 oz) **9C**
X	70.8	Sequoia (4.5 oz) **4C**	Sequoia (4.5 oz) **4C**	Vacuum
XI	78.3	Untreated	Untreated	Untreated
XII	85.7	*B. bassiana*+neem (1qrt)	*B. bassiana*+pyrethrum **3A** +neem (1qrt)	*B. bassiana*+pyrethrum **3A** (1qrt)

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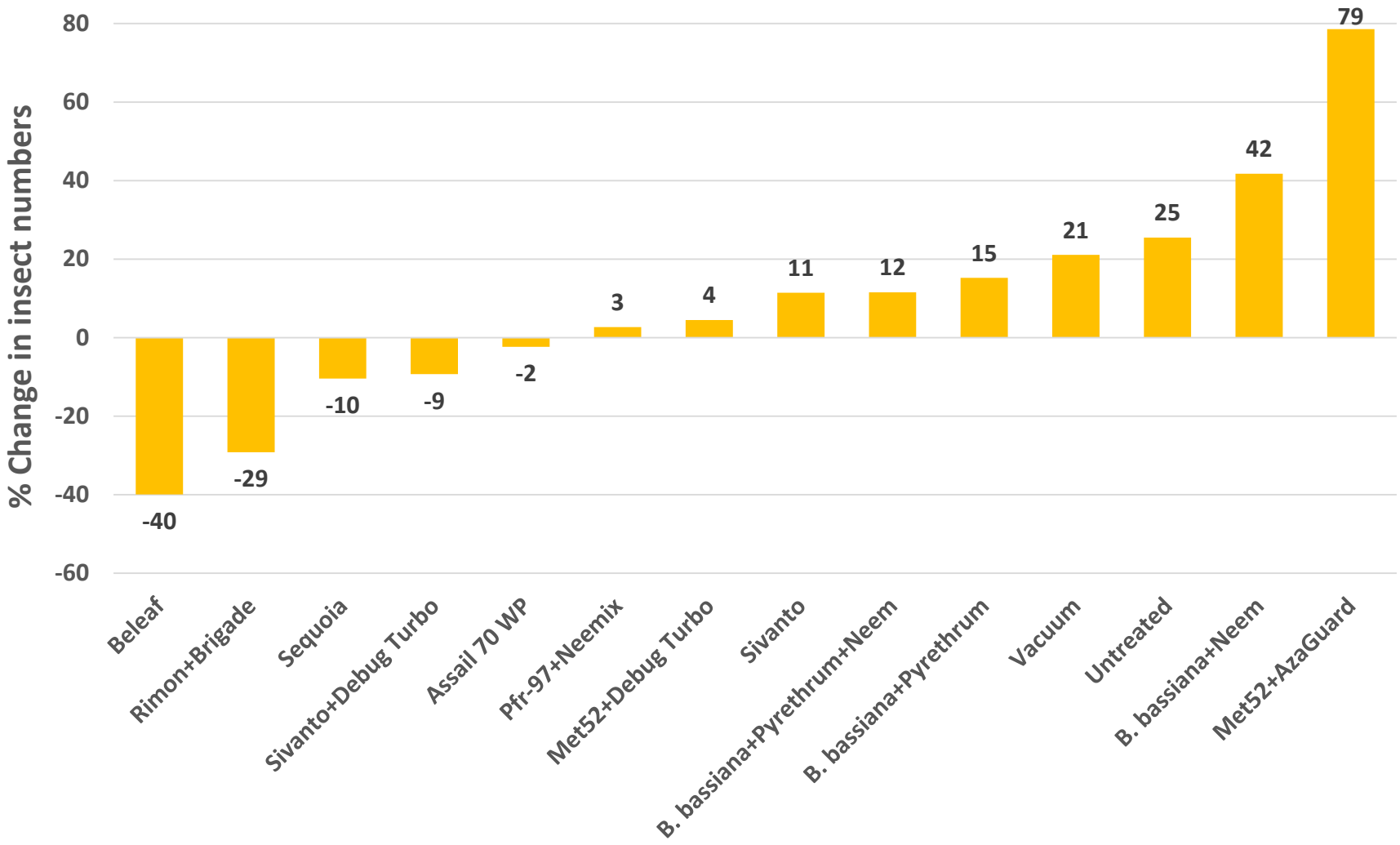
*Mode of action group

Product efficacy against lygus nymphs



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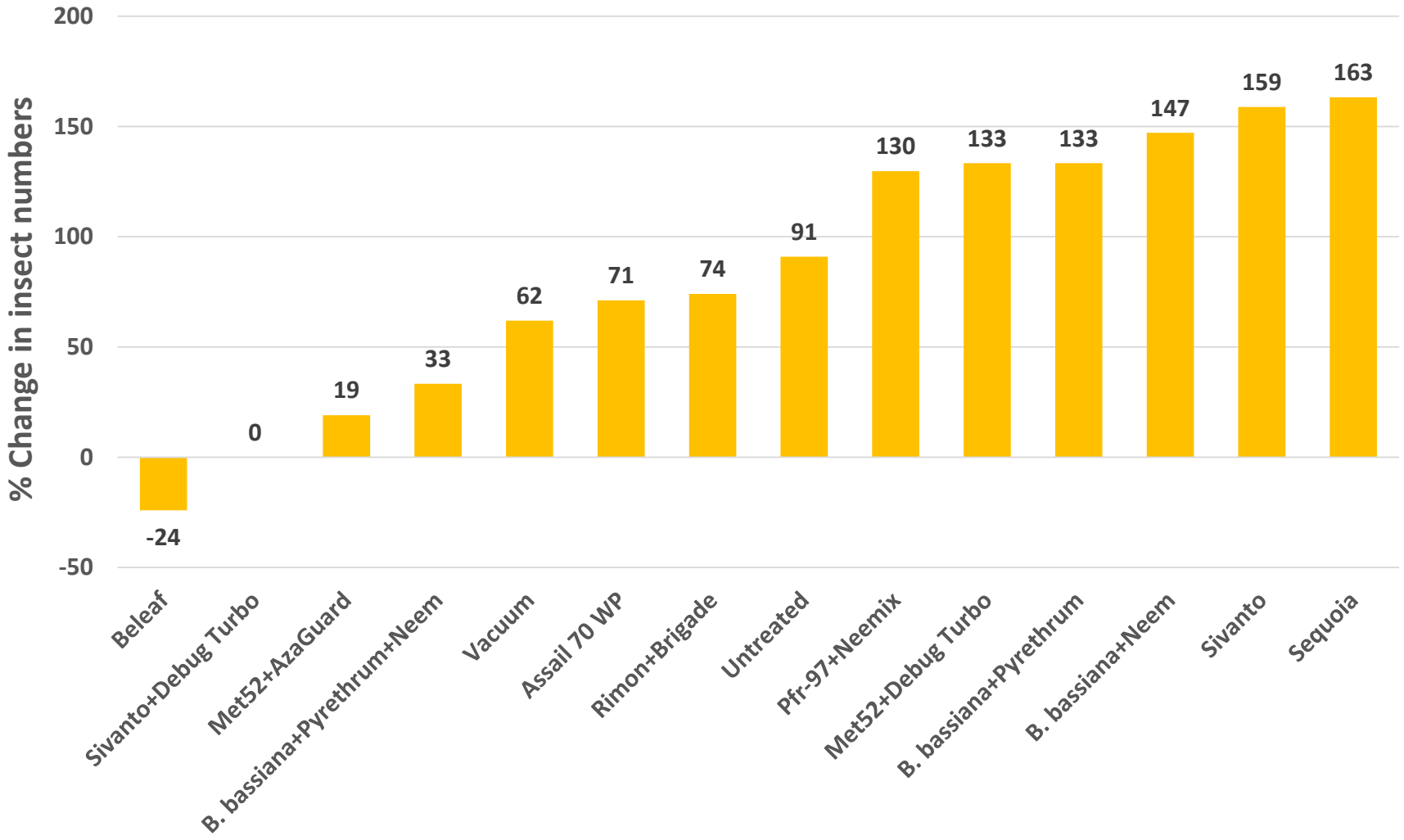
Product efficacy against lygus adults



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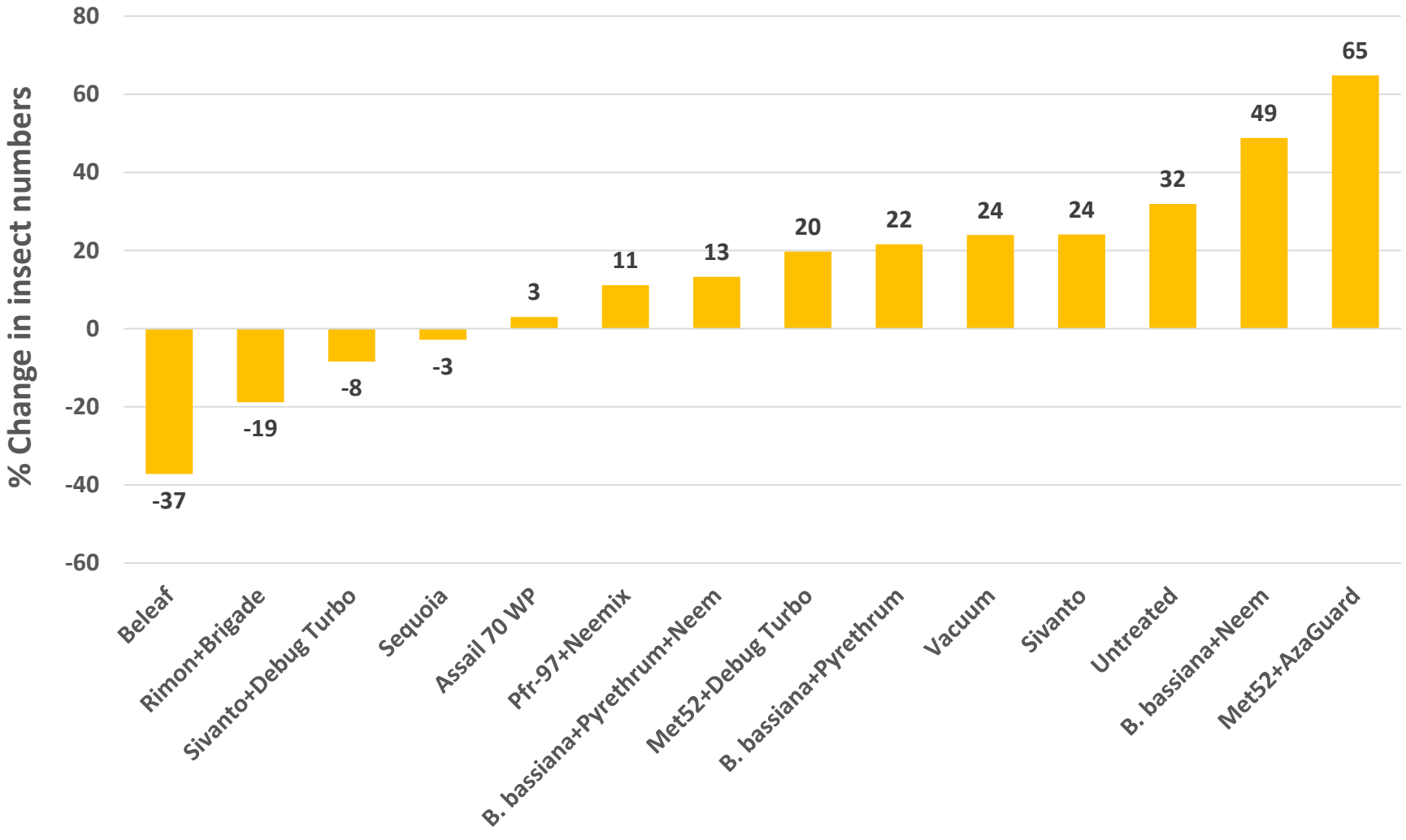
Product efficacy against all life stages



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Conclusions

- Lygus infestations were very high and only two treatments reduced their populations and one treatment prevented their buildup
- Consider IPM strategy by using chemical, botanical, microbial, and mechanical tools

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Thank you!

Full articles of these studies can be found at
http://ucanr.edu/strawberries-vegetables