

# Welcome!

- **Pollinators: What's the Current Buzz**
- Cristi L Palmer, IR-4 Environmental Horticulture Program Manager



# Acknowledgements



## Environmental Horticulture Program

### Registration Support

NIFA IR-4 Grant 2015-34383-23710  
USDA-ARS  
State Agricultural Experiment Stations  
Crop Protection Industry

### Invasive Species

USDA-APHIS

### Pollinator Protection

NIFA SCRI Grant 2016-51181-25399  
"Protecting Pollinators with Economically Feasible and Environmentally Sound Ornamental Horticulture"

Funds since 2003  
(16 years)

~\$20,000,000

\$5,155,465

\$6,509,975

# Research Team

- James Bethke (University of California-ANR)
  - Lea Corkidi, Leah Taylor, Annika Nabors
- Christine Casey (University of California-Davis)
- JC Chong (Clemson University)
- Rich Cowles (Connecticut Agricultural Experiment Station)
- Brian Eitzer (Connecticut Agricultural Experiment Station)
- Dan Gilrein (Cornell Cooperative Extension of Suffolk County)
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  - Emily Erickson, Doug Sponsler
- Zachary Huang (Michigan State University)
- Hayk Khachatryan (University of Florida)
- Andrea Nurse (University of Maine)
- Elena Nino (University of California-Davis)
- Cristi Palmer (IR-4, Rutgers University)
  - Amy Abate, Dave Bodine, Tom Freiberger, Yu-Han Lan, Carolina Roe-Raymond
- Harland Patch (Penn State University)
- Dan Potter (University of Kentucky)
  - Adam Baker, Bernadette Mach, Carl Redmond
- Dave Smitley (Michigan State University)
  - Erika Hotchkiss, Colin O'Neal
- Kimberly Stoner (Connecticut Agricultural Experiment Station)
- Nishanth Tharayil (Clemson University)
  - Elizabeth Leonard



# Background Challenges

- Most regulatory data related to pollinators was generated on large row agriculture
  - concern about seed treatment and dust during application
  - concern about systemic treatments over large acreage
- Sublethal impacts published with high doses in artificial diets
- Highly publicized bumble bee mortalities after misapplications in Oregon landscapes
- Calls for bans of systemic neonicotinoid insecticides

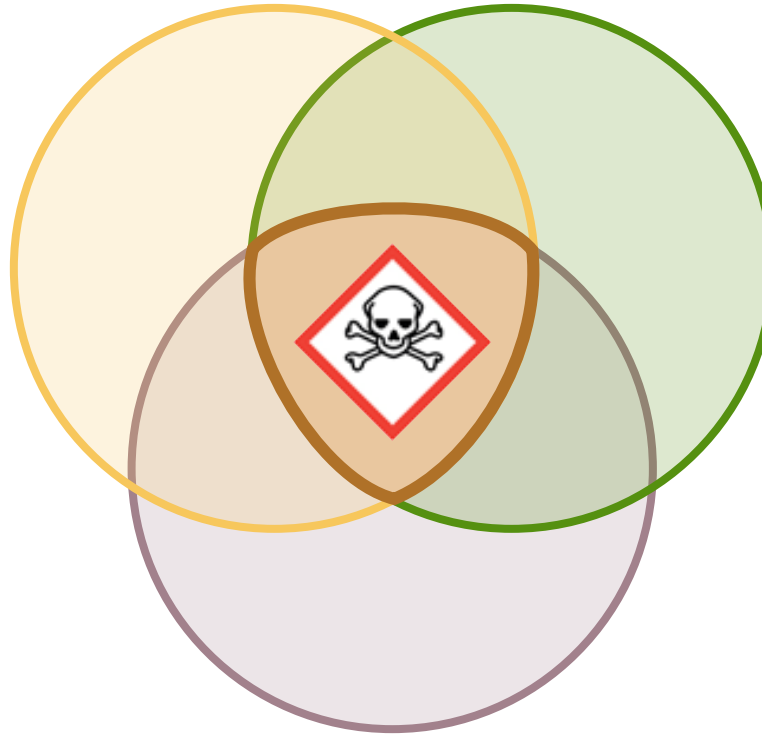
# Systemic insecticides and pollinator risk

## Pollinator

What and how much do insect (bee) pollinators eat?

What are pollinator foraging patterns?

Are they social or solitary?



## Plant

Are plants good forage materials for insect (bee) pollinators?

How many are available in the landscape?

Are plants treated to manage pest insects?

## Insecticide

How impactful is the active to pollinator health?

When are applications needed to manage pests, protect pollinators?

How much is needed?

# Pollinator Attractiveness – Data Review

- 23 published manuscripts
- 3 years of non-published field plot data from research team
- Average attractiveness rating is based on applying a scale of high (3), moderate (2), low (1), or virtually no (0) visitors

Rating	Numerical	Number Visitors per 10 Minutes
High	3	10 or more bees
Moderate	2	3 to 10 bees
Low	1	1 to 3 bees
Virtually None	0	Less than 1 bee

# Comparing Bee Attractive with Top Crops

## Plants with Bee Attractive Counts/Ratings

*Hylotelephium spectabile*  
*Rosa* 'cultivar name'  
*Tagetes patula*  
*Tagetes sp.*

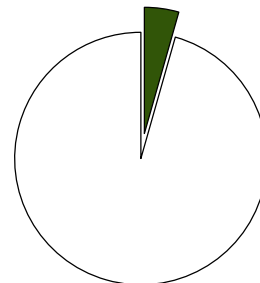
Plant  
Genera

## Crops Listed in 2014 NASS Census of Horticulture

Sedum  
Rose  
Marigold

# Percent Crop Units Sold Attractive to Bees

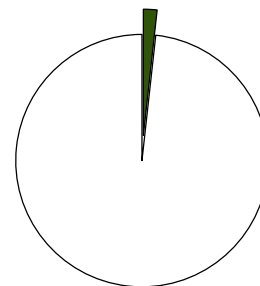
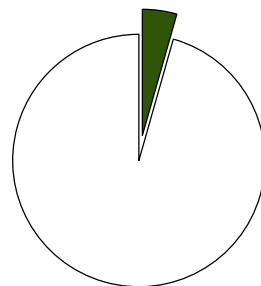
Crop Type (#)	Moderately Attractive (2.0)
Annuals (54)	0.2%
Herbaceous Perennials (72)	8.6%
Woody Perennials (62)	14.0%
Combined (183)	4.4%
Rating scale	3 or more bees in 10 min





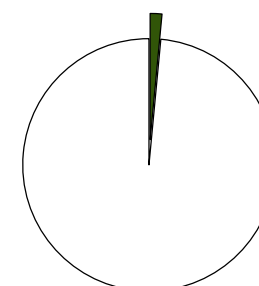
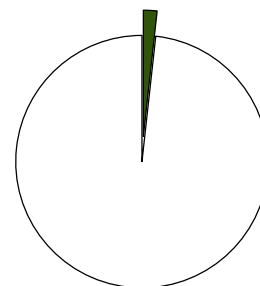
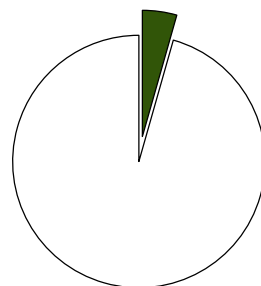
# Percent Crop Units Sold Attractive to Bees

Crop Type (#)	Moderately Attractive (2.0)	Moderately-High Attractive (2.5)
Annuals (54)	0.2%	0%
Herbaceous Perennials (72)	8.6%	2.4%
Woody Perennials (62)	14.0%	7.2%
Combined (183)	4.4%	1.7%
Rating scale	3 or more bees in 10 min	~6 or more bees in 10 min

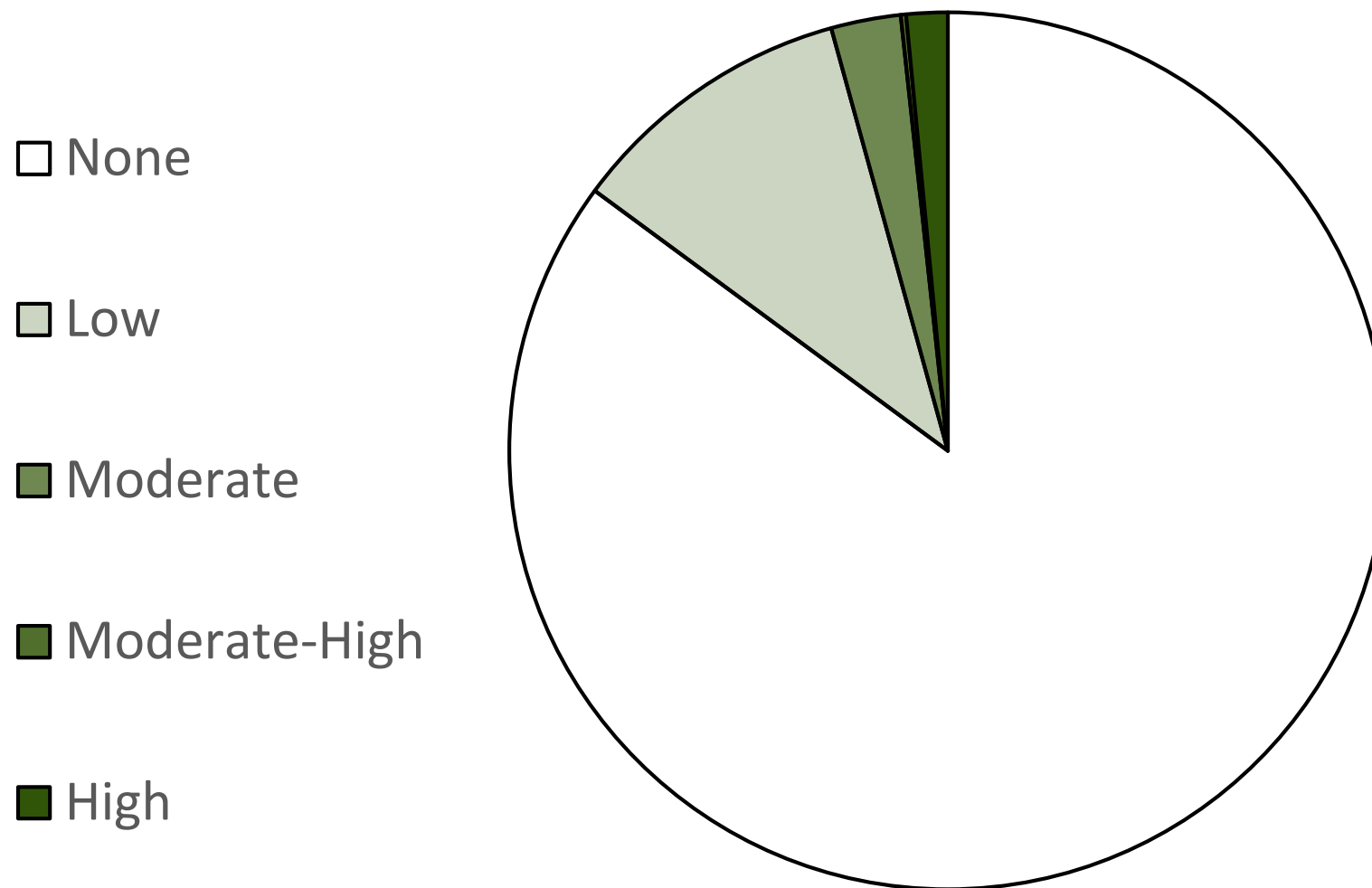


# Percent Crop Units Sold Attractive to Bees

Crop Type (#)	Moderately Attractive (2.0)	Moderately-High Attractive (2.5)	Highly Attractive (3.0)
Annuals (54)	0.2%	0%	0%
Herbaceous Perennials (72)	8.6%	2.4%	0.3%
Woody Perennials (62)	14.0%	7.2%	7.2%
Combined (183)	4.4%	1.7%	1.5%
Rating scale	3 or more bees in 10 min	~6 or more bees in 10 min	10 or more bees in 10 min



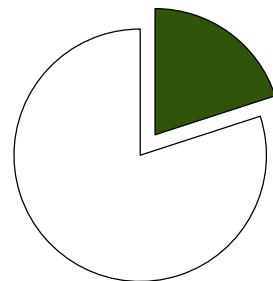
# Percent Crop Units Sold Attractive to Bees



# Percent Crop Genera Attractive to Bees for All Crops



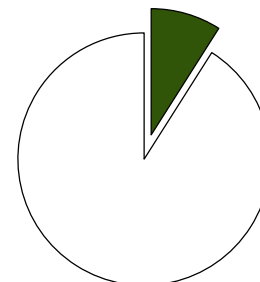
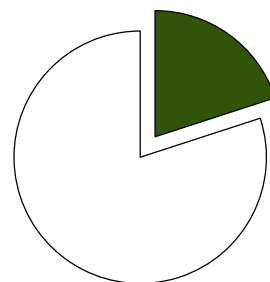
Crop Type (#)	Moderately Attractive (2.0)
Annuals (54)	8%
Herbaceous Perennials (72)	38%
Woody Perennials (62)	13%
Combined (183)	20%
Rating scale	3 or more bees in 10 min



# Percent Crop Genera Attractive to Bees for All Crops



Crop Type (#)	Moderately Attractive (2.0)	Moderately-High Attractive (2.5)
Annuals (54)	8%	4%
Herbaceous Perennials (72)	38%	21%
Woody Perennials (62)	13%	2%
Combined (183)	20%	9%
Rating scale	3 or more bees in 10 min	~6 or more bees in 10 min

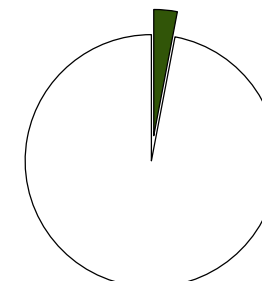
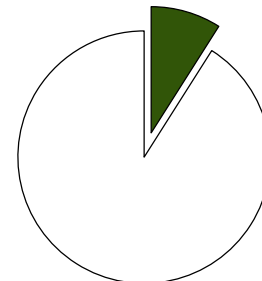
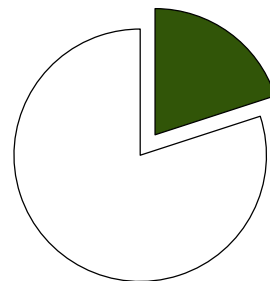




# Percent Crop Genera Attractive to Bees for All Crops

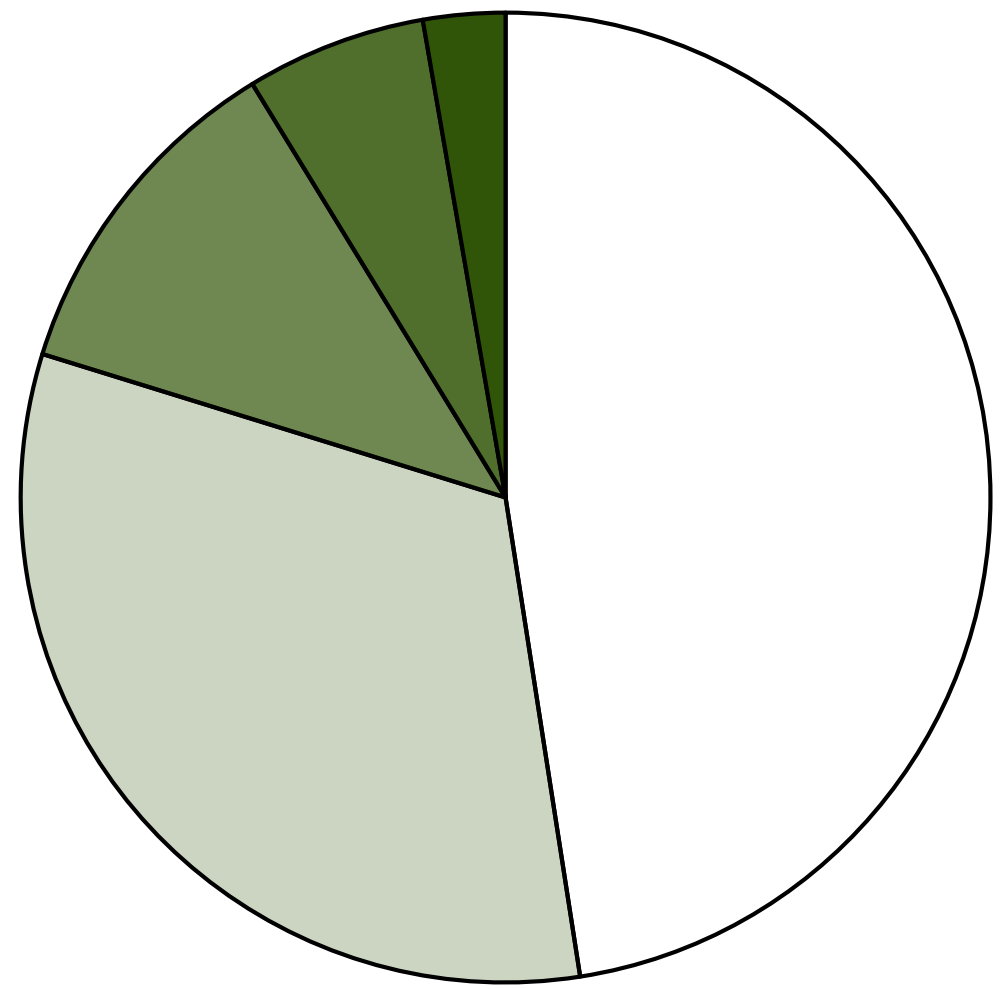


Crop Type (#)	Moderately Attractive (2.0)	Moderately-High Attractive (2.5)	Highly Attractive (3.0)
Annuals (54)	8%	4%	0%
Herbaceous Perennials (72)	38%	21%	6%
Woody Perennials (62)	13%	2%	2%
Combined (183)	20%	9%	3%
Rating scale	3 or more bees in 10 min	~6 or more bees in 10 min	10 or more bees in 10 min



# Percent Crop Genera Attractive to Bees

- None
- Low
- Moderate
- Moderate-High
- High



# Proposed Definition of Bee Attractive

Moderate level of bee visitation (average of 3.0 or more visits by specific bee group during 10 minutes across multiple studies) for the bloom period.

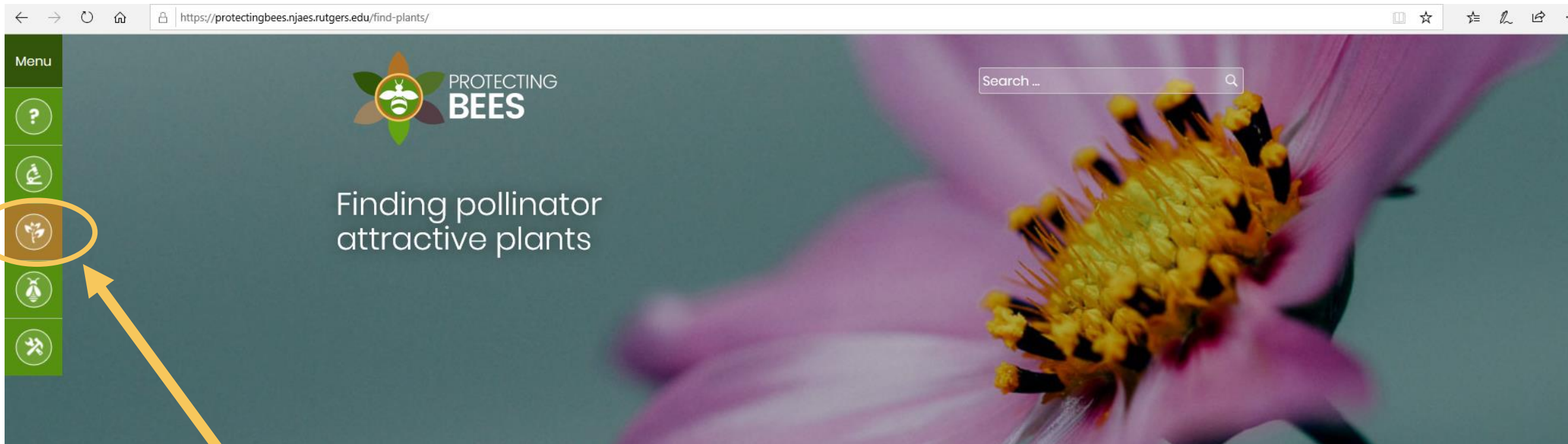
Immature plants of a perennial plant species regarded as bee attractive but which will not flower for at least one year are not considered bee attractive.

- Stage of Adoption
  - Proposed
  - Adjustments
  - Consensus



# Pollinator / Plant Interaction

- <https://protectingbees.njaes.rutgers.edu>



In the side menu

# Residue Analysis: Planned Model Crops

Plant Type	Pollen	Nectar
<b>Annual</b>	Sunflower 'Taiyo' ( <i>Helianthus</i> sp.)	Annual salvia ( <i>Salvia splendens</i> ) Snapdragon ( <i>Antirrhinum majus</i> )
<b>Herbaceous Perennial</b>	Dahlia 'Bishop' series ( <i>Dahlia</i> sp.)	Red Hot Poker ( <i>Kniphofia uvaria</i> ) Salvia 'Black & Blue'
<b>Woody Perennial</b>	Rhododendron PJM or <i>R. catawbiense boursault</i>	Rhododendron PJM or <i>R. catawbiense boursault</i> Geraldton Wax Flower ( <i>Chamelaucium uncinatum</i> )





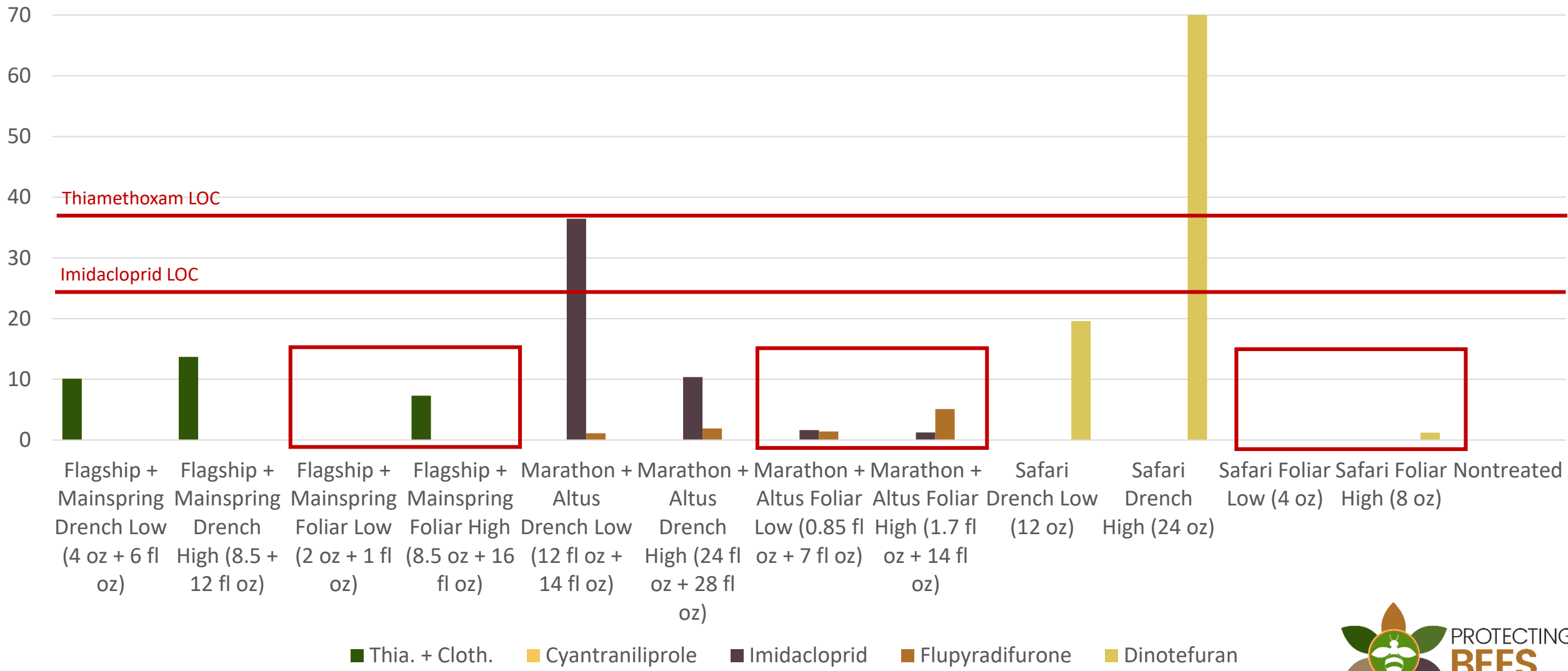
Product (active ingredient)	Application Methodology	Rates (according to label with exception of those highlighted to provide a minimum of ½ x for a rate range)	
		Product 1	Product 2
<b>Marathon (imidacloprid) + Altus aka BYI-2960 (flupyradifurone)</b>	Foliar	0.85 fl oz per 100 gal	7 fl oz per 100 gal
		1.7 fl oz per 100 gal	14 fl oz per 100 gal
	Drench	0.85 fl oz per number of pots in sufficient volume to wet pot without loss of liquid **	14 fl oz per acre **
		1.7 per number of pots in sufficient volume to wet pot without loss of liquid **	28 fl oz per acre **
<b>Safari (dinotefuran)</b>	Foliar	4 oz per 100 gal	n/a
		8 oz per 100 gal	
	Drench	12 oz per acre **	
		24 oz per acre **	
<b>Flagship (thiamethoxam) + Mainspring (cyantraniliprole)</b>	Foliar	2 oz per 100 gal water	1 fl oz per 100 gal water
		8.5 oz per 100 gal water	16 fl oz per 100 gal water
	Drench	4 oz per 100 gal water**	6 fl oz per 100 gal water**
		8.5 oz per 100 gal water**	12 fl oz per 100 gal water**

# 2018 Perennial Salvia Fall Treatment/Collections

- Salvia potted in 2.5 gal pots
- Baseline collections in Aug 2018
- Treatments in early Sept 2018
  - Drench treatments were 10 fl oz solution per pot
- First collections in early Oct 2018 for fall drenched plants
  - Team: Amy Abate, Dave Bodine, Tom Freiberger, Cristi Palmer, Carolina Roe-Raymond



# 2018 Perennial Salvia Fall Collection Nectar Residues (ppb) – *using half LOQ where residues had been detected in at least one rep*



Samples analyzed by Nishanth Tharayil and Elizabeth Leonard, Clemson University

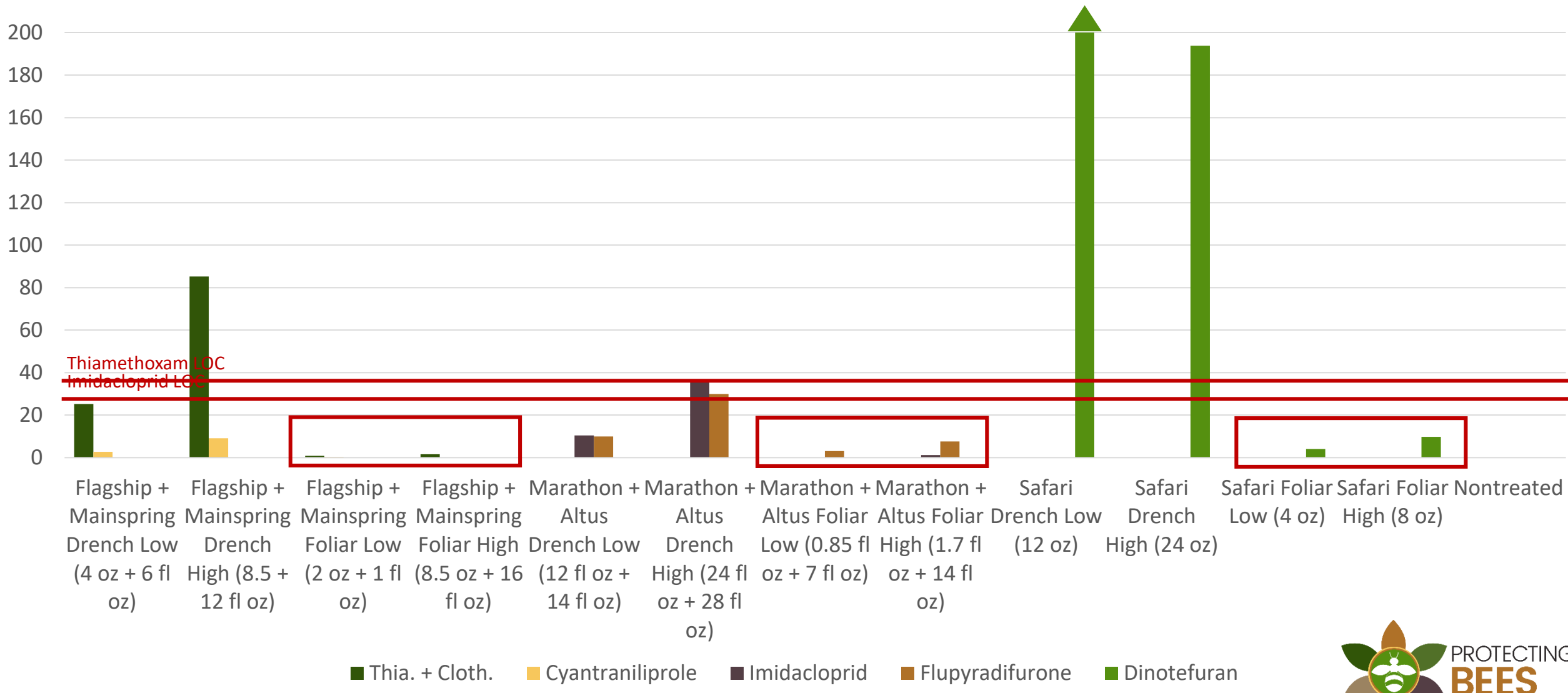




## 2018 Snapdragon Systemic Insecticide Residue Experiments

# 2018 Snapdragon Collection Nectar Residues (ppb) – 6 WAT

– using half LOQ where residues had been detected in at least one rep



Samples analyzed by Nishanth Tharayil and Elizabeth Leonard, Clemson University



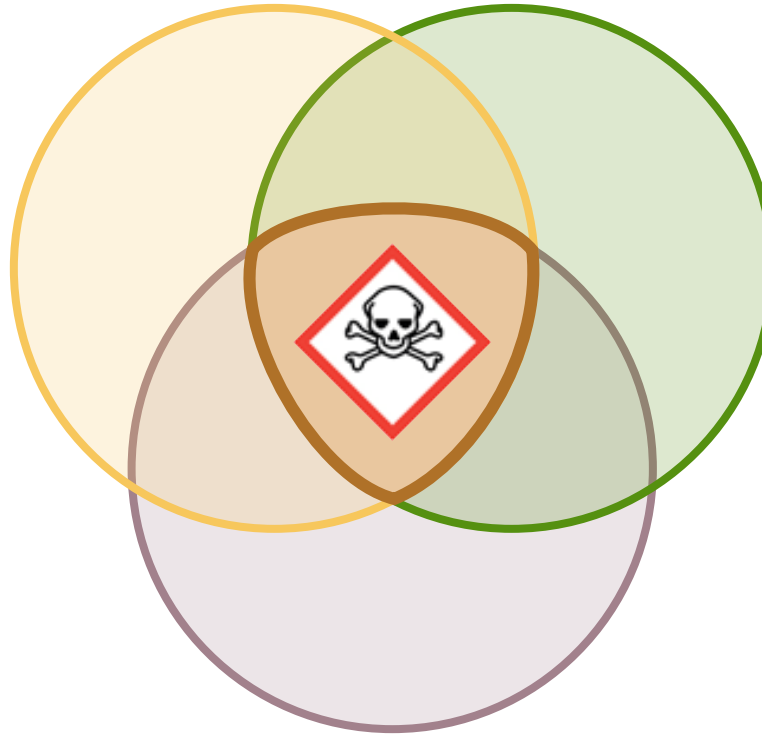
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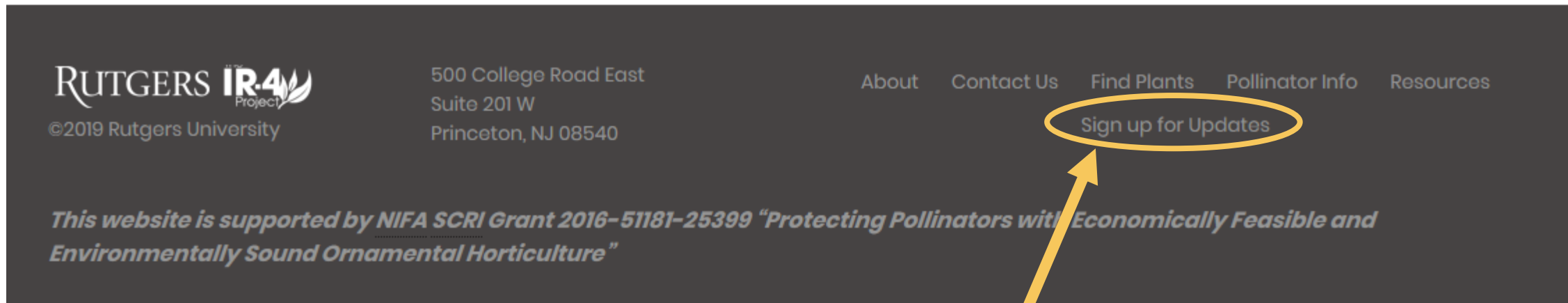
How impactful is the active to pollinator health?

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# Sign up for notifications

- <https://protectingbees.njaes.rutgers.edu/>



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Thank  
you!

*Questions?*