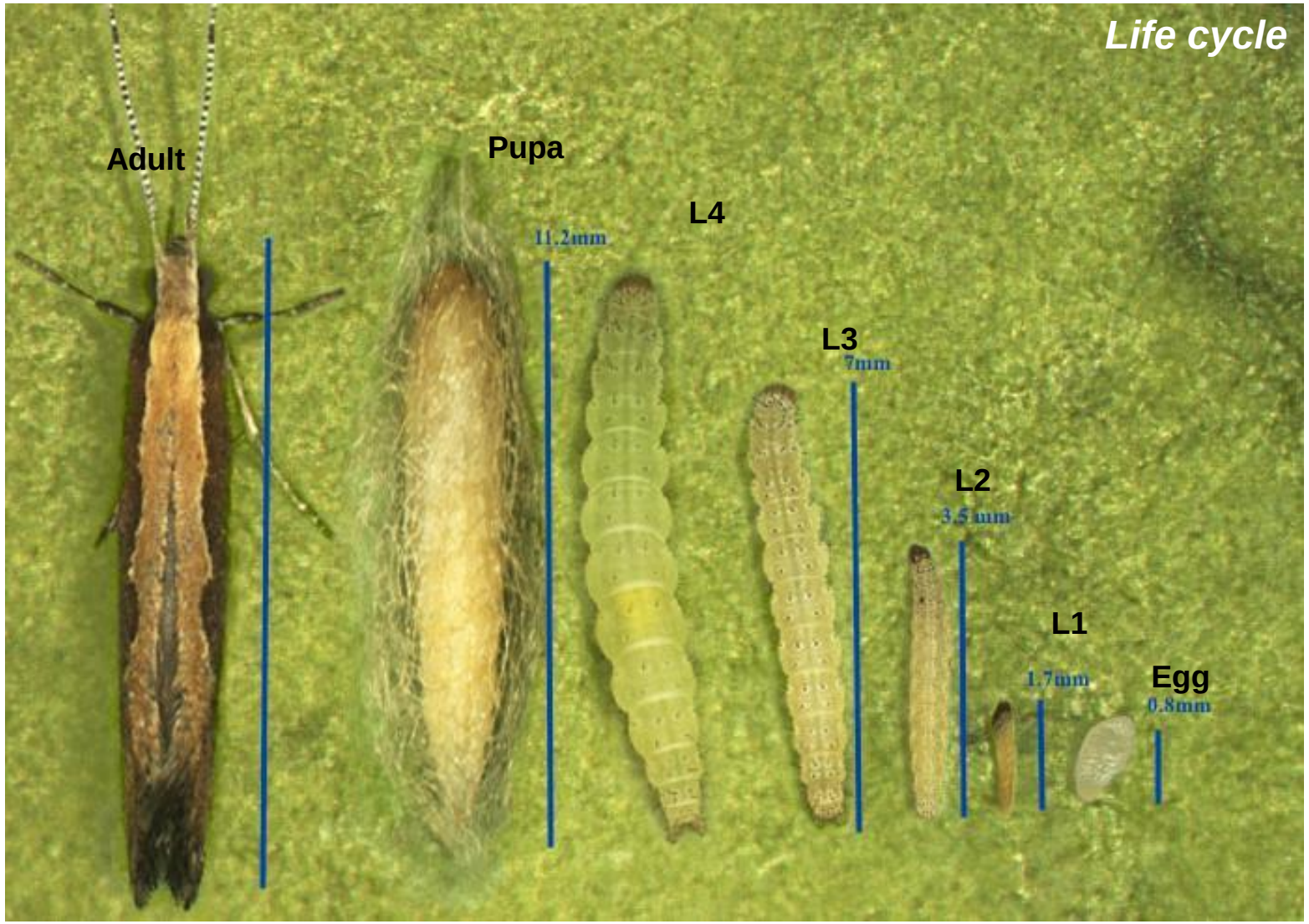
Biology and Management of Diamondback Moth

John C. Palumbo, Department of Entomology

- **Major pest of *brassica* crops world-wide.**
- **Economic losses = $4-5 billion annually.**
- **Rapid biological development**
- **Long history of resistance to insecticides**
- **Typically, a *minor pest* in the western U.S**

Diamondback Moth Biology



M. Pena, UA Yuma


A940 1280x1024 2017/09/21 16:10:19 Unit: mm Magnification: 75x No Calibration
1st instar DBM
mining in leaf
DL0
L=1.161 mm
0.5 mm


A941 1280x1024 2017/09/21 16:11:57 Unit: mm Magnification: 75x No Calibration
1st instar DBM
mining in leaf
DL0
L=1.161 mm
0.5 mm

Diamondback moth

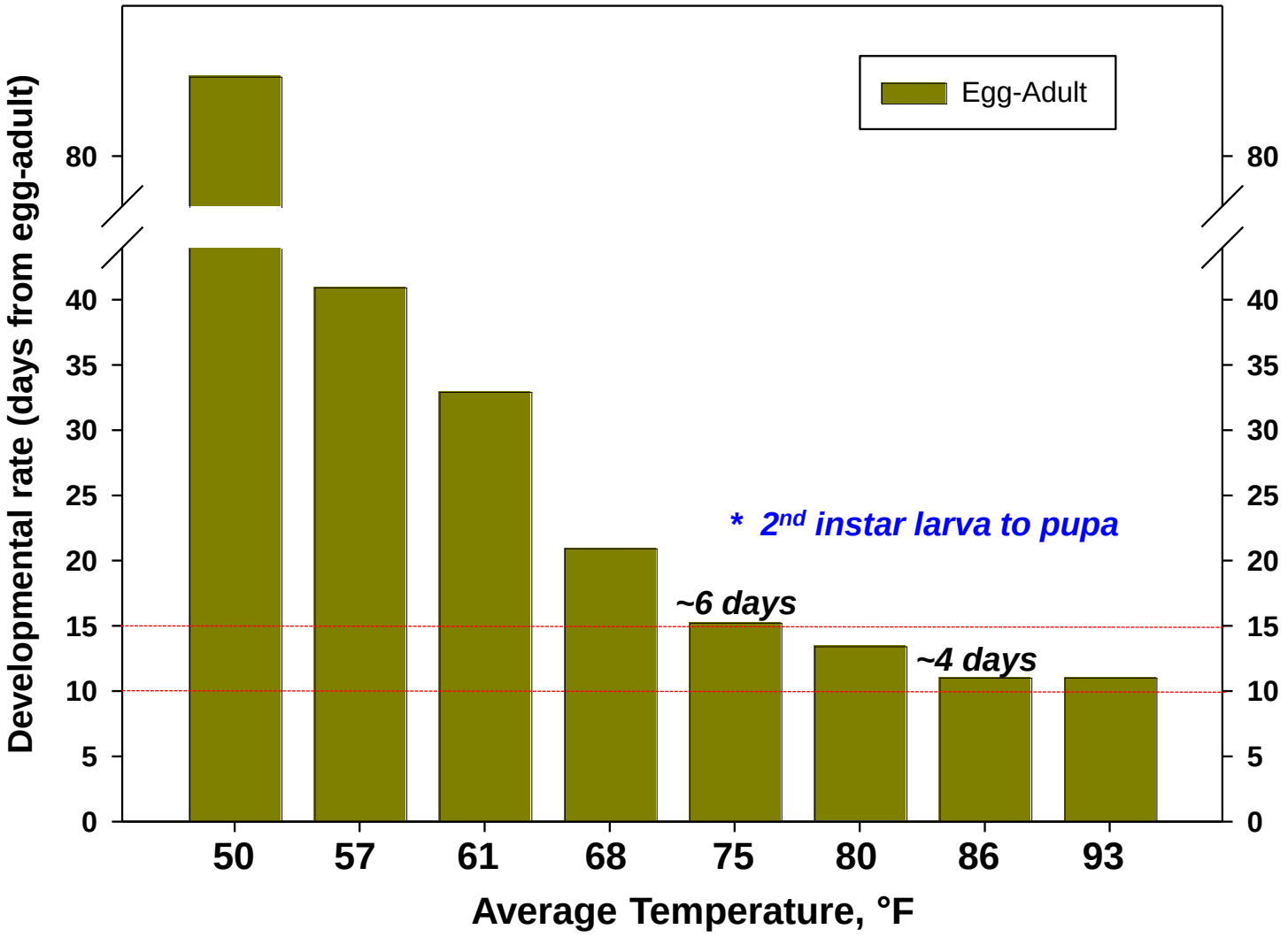
Liriomyza leafminer


L3
L2
L3
L4
L4

DBM Growth and Development

	Developmental Threshold (ºF)		Optimal Temp (ºF)	Egg-Adult (Avg. days)
	Lower	Upper		
Cabbage looper	54	95	86	18.5
Beet armyworm	54	100	86	17.9
Diamondback moth	**39**	**107**	**86**	***11.1***

Temperature and Development of DBM on Brassica crops



- **Average adult longevity, ~ 15 days**
- **Females can lay > 250 eggs**
- **The moths are weak fliers, but can disperse ~ 100 ft within a crop field**

*** Active during the day, but more active at night.**

Diamondback Moth Outbreaks

- **Hot, dry weather is conducive to exponential population growth.**
- **Poor spray coverage and/or spray timing.**
- **Marginal efficacy with standard insecticide products**

Diamondback moth Management

Sanitation

- *Prompt* destruction of crop residues following final harvest

- *Clean culture*: control of brassica weeds in and around fields

Isolation / Crop Placement

- Avoid sequential plantings in the same field

- Plant susceptible crops distant from sources of insects

Diamondback moth Management

- It starts in the nursery
- Inspect trays prior to transplanting
- ***Verimark*** transplant drench
- Scout / Monitor Thoroughly
- **Initiate Control Early**
  (prevent establishment)

Diamondback moth Management

Maximize insecticide applications

- Spray Coverage is critical
- Higher spray volumes
- *Tighten spray intervals (4-5 d)*

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Diamondback Moth Management in Desert Produce - 2021

Relative Efficacy for Diamondback Moth

Product	IRAC MOA	Larvae	Adults
Lannate	1A		
Dibrom	1B		
Malathion	1B		
Pyrethroids	3		
Assail	4A		
Cormoran	4A+15		
Radiant, Entrust	5		
Proclaim	6		
Bt, *aizawaii*	11B		
Intrepid	18A		
Torac	21		
Avaunt	22		
Movento	23		
Coragen, Besiege	28, 28+3		
Exirel, Verimark	28		
Harvanta	28		

Efficacy

- Excellent-Good control
- Fair control
- Poor to no control

** Based on local research and field observations*

Diamondback moth Management

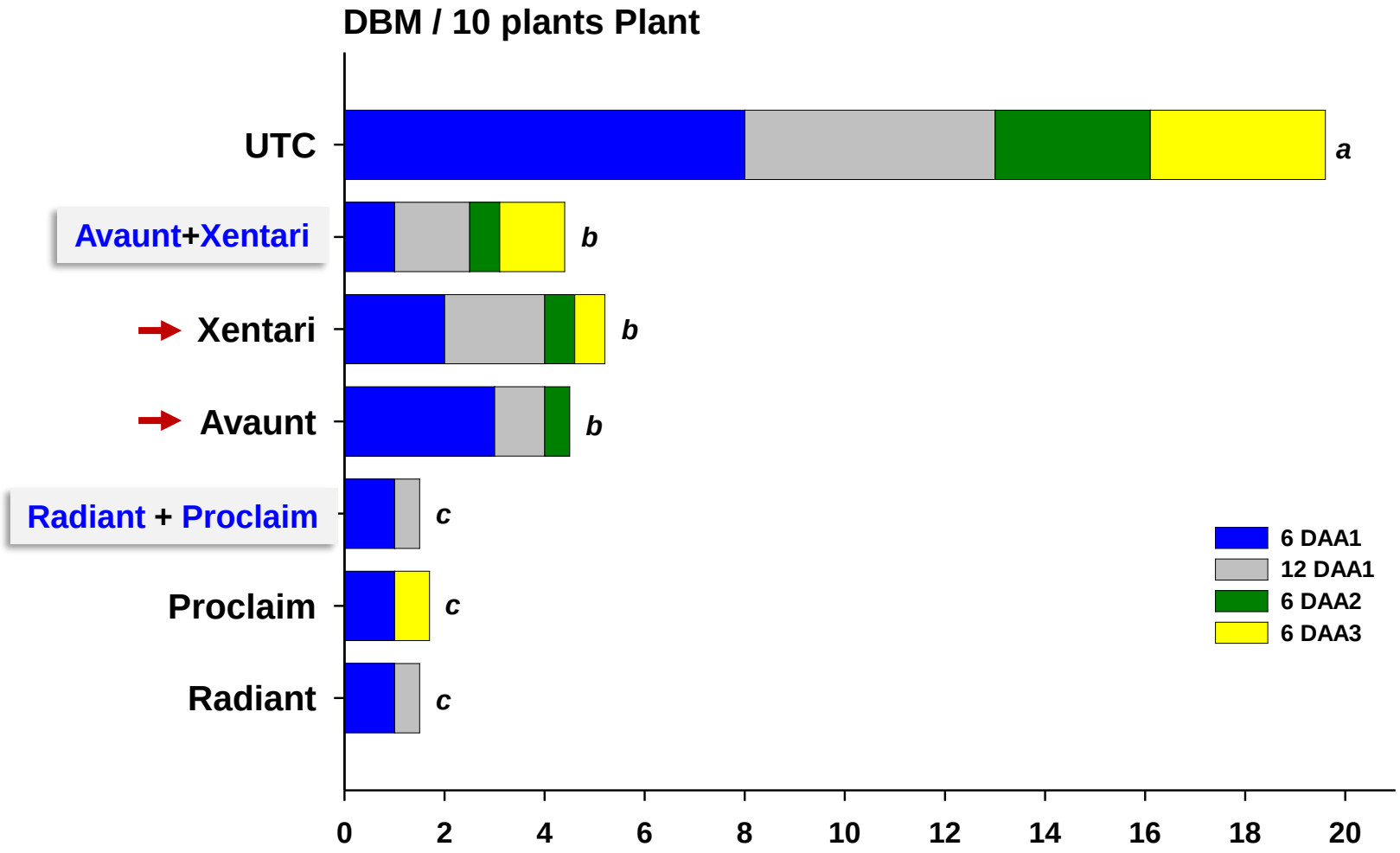
Larvae	Adults
Radiant	*Lannate*
Proclaim	*Dibrom*
Coragen	*Pyrethroids*
Exirel	
Avaunt	
Xentari	
Cormoran	
Intrepid	

- It starts in the nursery
- Inspect trays prior to transplanting
- *Verimark* transplant drench
- Scout / Monitor Thoroughly
- Initiate Control Early
- **Rotate Modes of Action**
  (Do not tank mix larvacides)

Tank-mixtures for DBM control in Cabbage

Yuma Ag Center, Spring 2020

- 3 applications
- 7-14 day spray interval
- 22.5 gpa@50 psi



Alternative Insecticides to Consider

- Movento
- Cormoran
- Harvanta
- Spear-Lep

Movento – Suppression of DBM in Brassica crops

Yuma Ag Center, 2017-2021

BRASSICA (COLE) LEAFY VEGETABLES

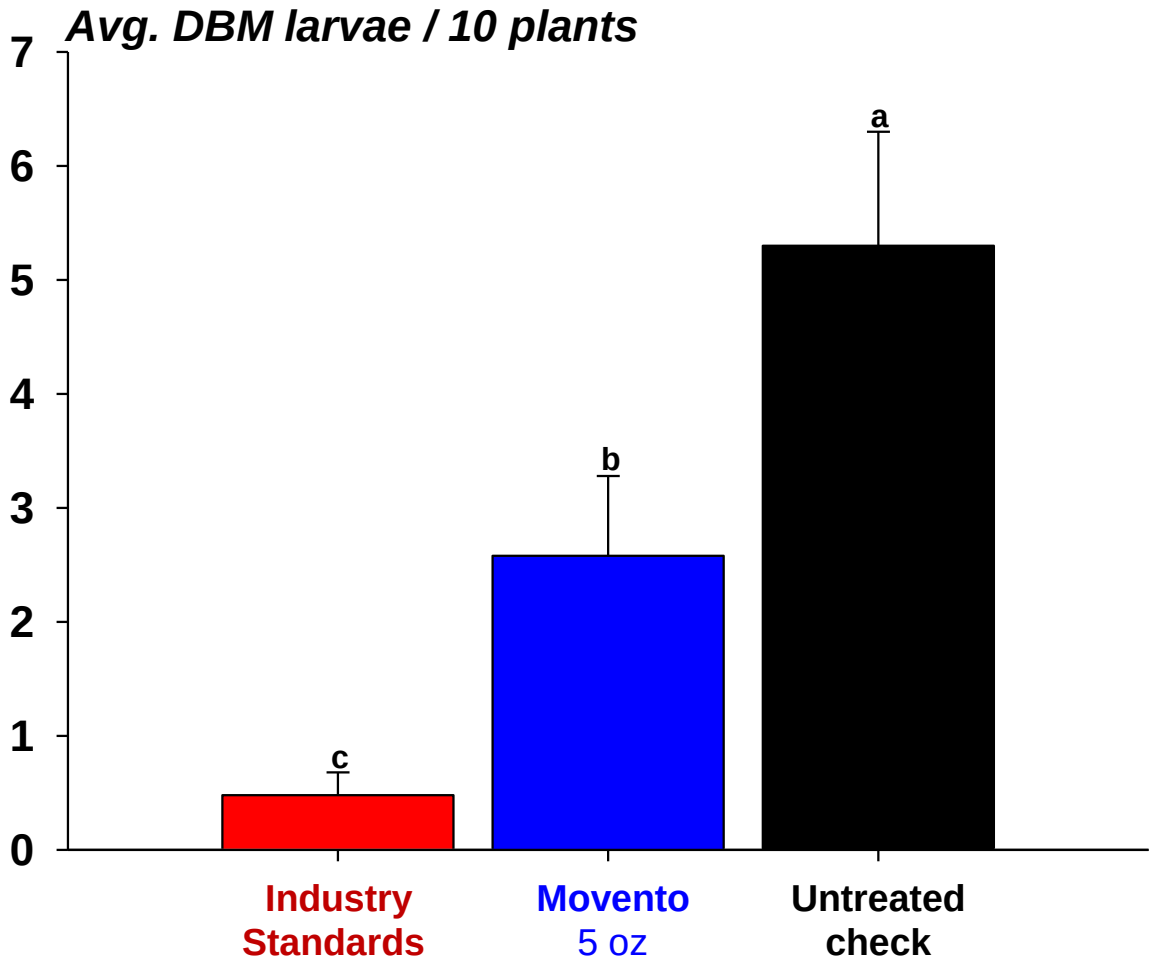
Crops of Crop Group 5 Including: Broccoli, Broccoli raab *(rapi*
Cavalo broccolo, Chinese broccoli *(gai lon)*, Chinese cabba
Chinese mustard cabbage *(gai choy)*, Collards, Kale, Kohlrabi,
Rape greens

PESTS CONTROLLED	
Aphids	Whiteflies
Swede midge	
PESTS SUPPRESSED	
Diamondback moth	
Onion thrips (larvae)	

Movento – Suppression of DBM in Brassica crops

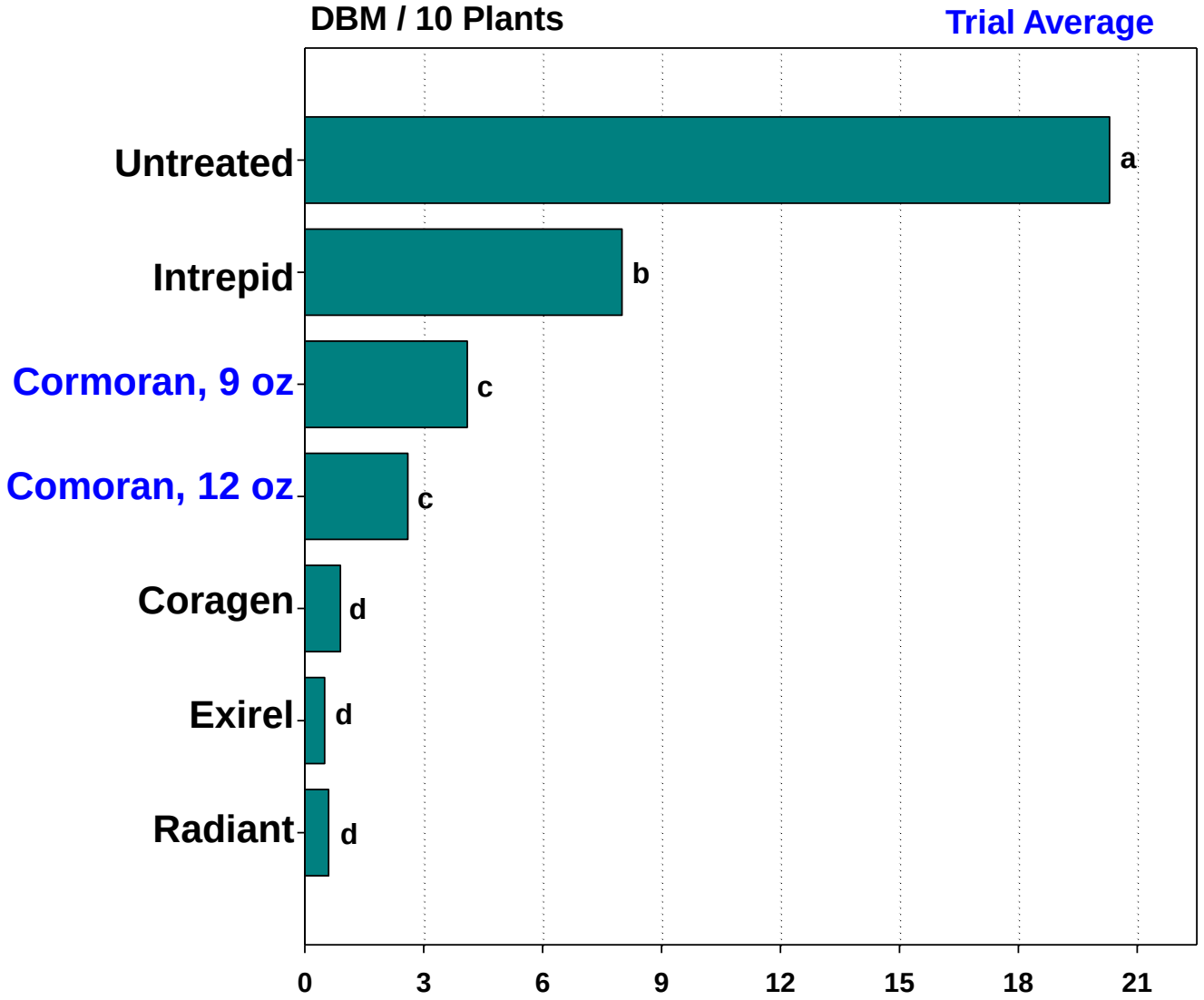
Yuma Ag Center, 2017-2021

- **7 Trials (** 2017-2021)
- Cabbage or broccoli
- 2 sprays / trial
- Industry Standards:
  - Radiant, Exirel, Proclaim
- 3, 7 & 14 DAA samples



Diamondback Moth in Broccoli with Cormoran

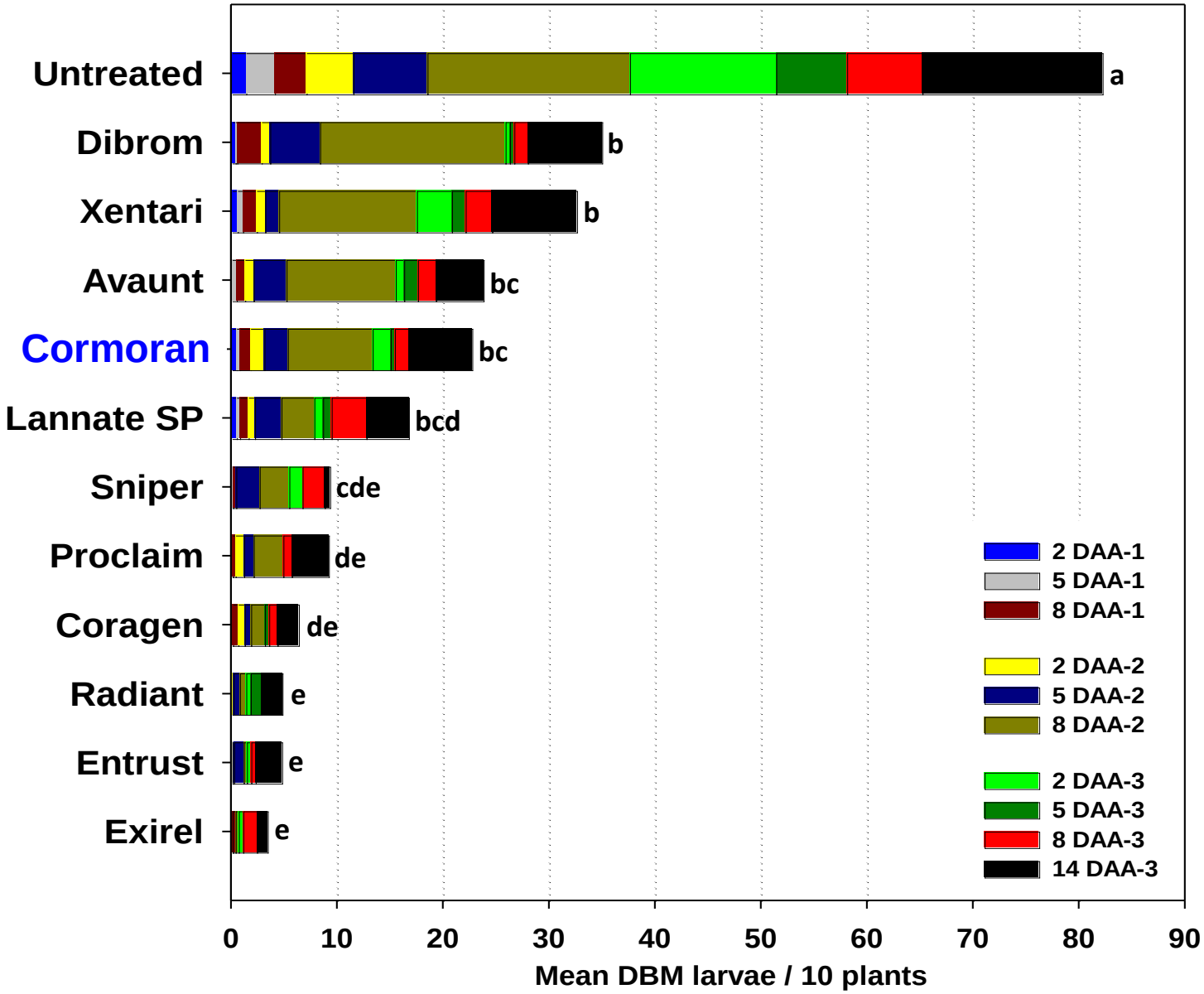
Yuma Ag Center, Fall 2017



Diamondback Moth in Broccoli

Yuma Ag Center, Spring 2018

- 3 applications
- 10 day spray interval
- 23.5 gpa@50 psi
- Sampled: 2, 5 and 8 DAA



Harvanta

cyclaniliprole, IKI-3106

0.42 lb AI / gal
Suspension Liquid

1st Generation Diamides

- Coragen
- Besiege

Chlorantraniliprole

2nd Generation Diamides

- Verimark
- Exirel
- Minecto Pro

Cyantraniliprole

3rd Generation Diamides

- **Harvanta**

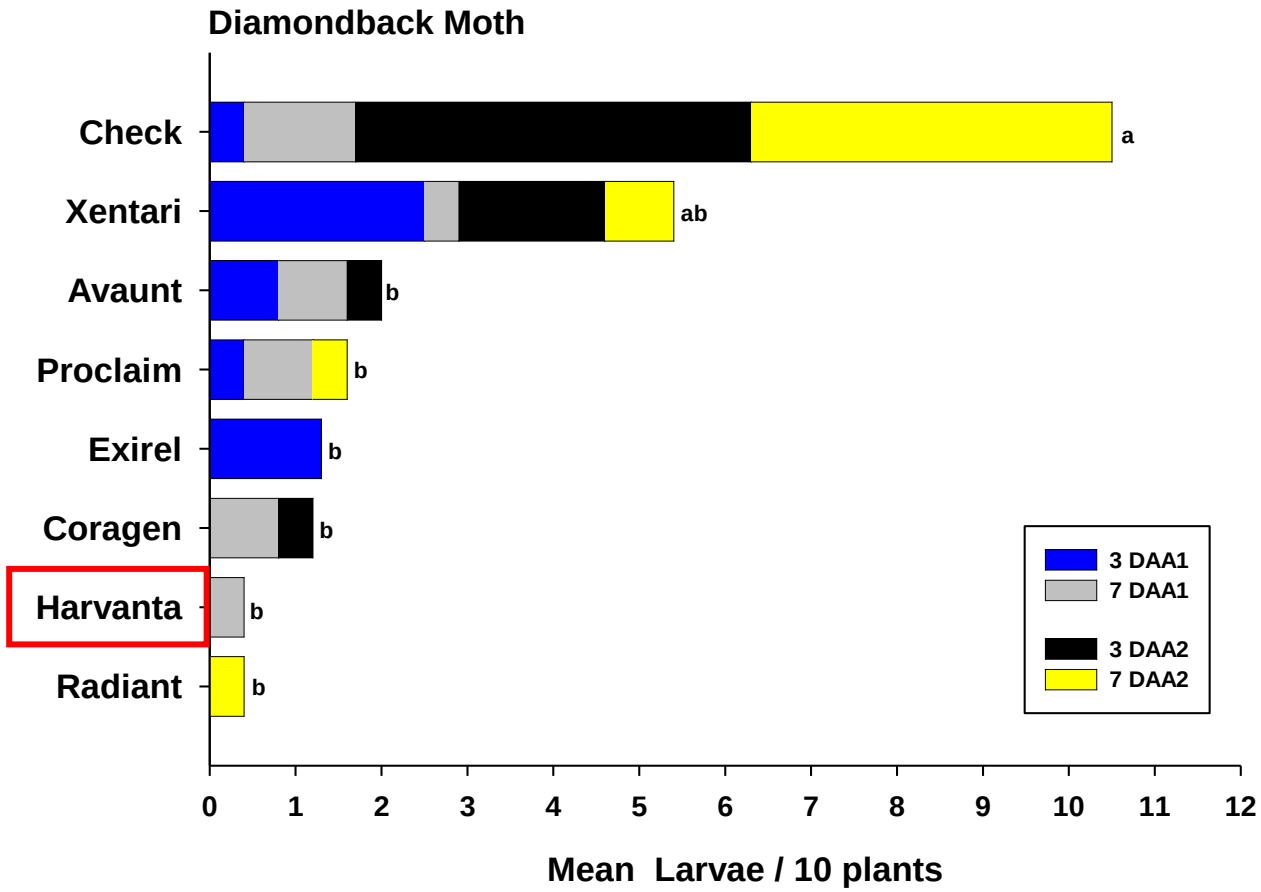
Cyclaniliprole

Harvanta

cyclaniliprole, IKI-3106

Spring Cauliflower 2019

- 25.0 gpa @ 40 psi
- 2 sprays: 8 day intervals
- Sampled at 3 and 7 DAA

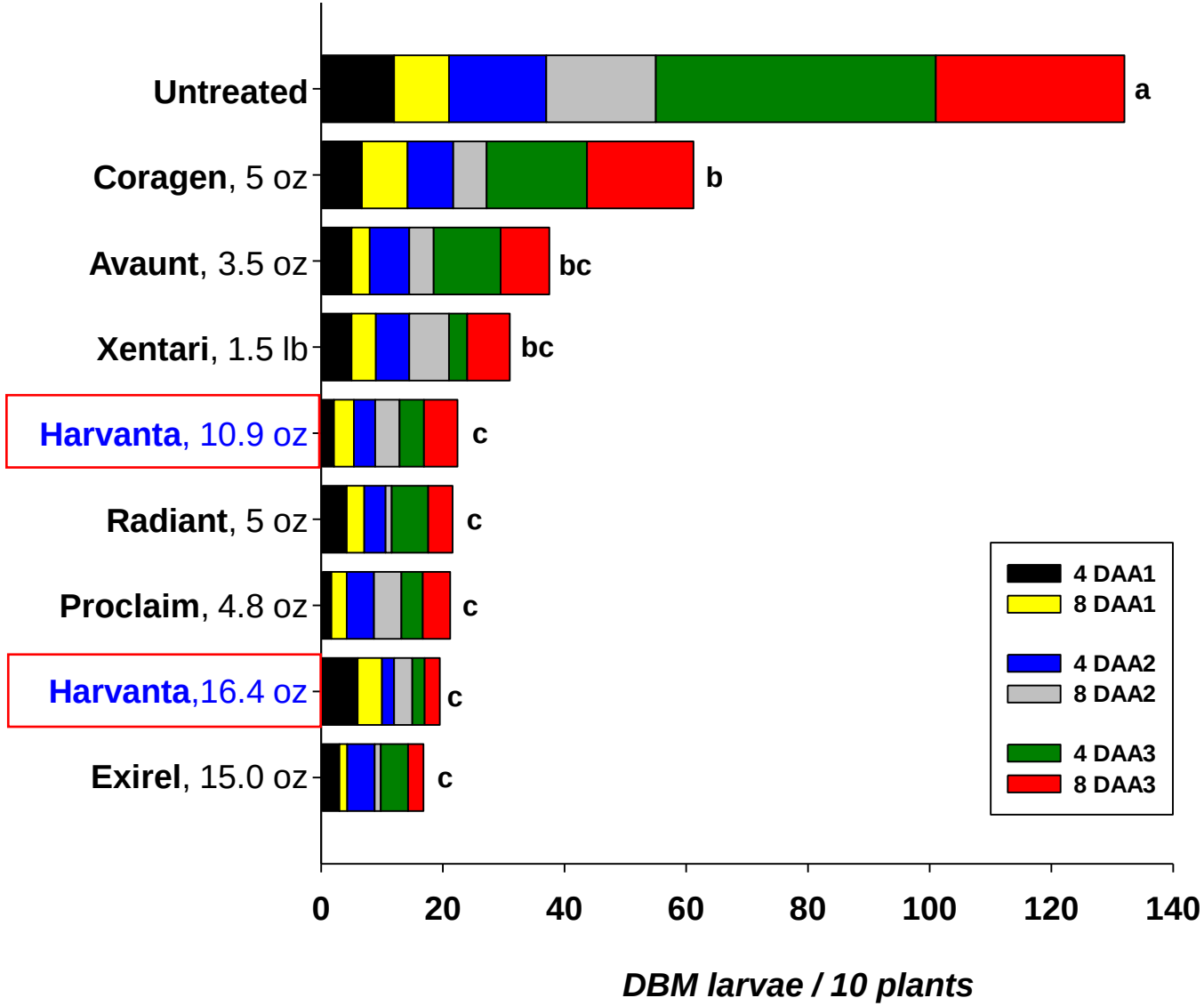


Harvanta

cyclaniliprole, IKI-3106

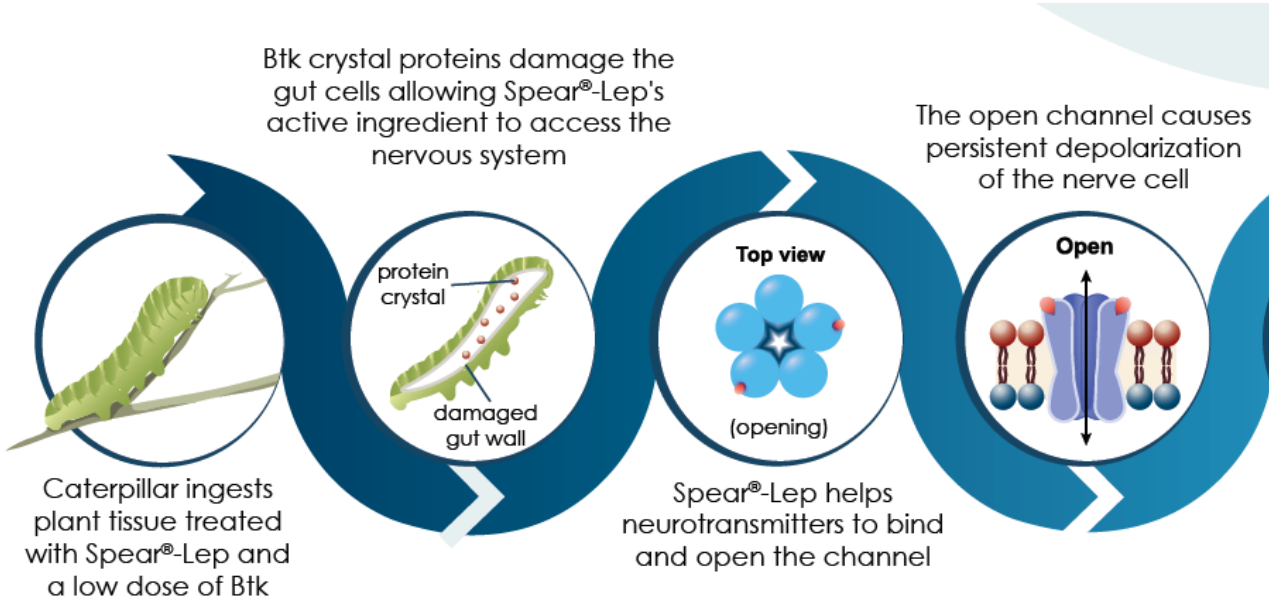
Spring Cabbage 2021

- 35 gpa @ 50 psi
- 3 sprays: 10 day intervals
- Sampled at 4 and 8 DAA



Spear-Lep

GS-omega/ kappa-Hxtx-Hv1a, peptide



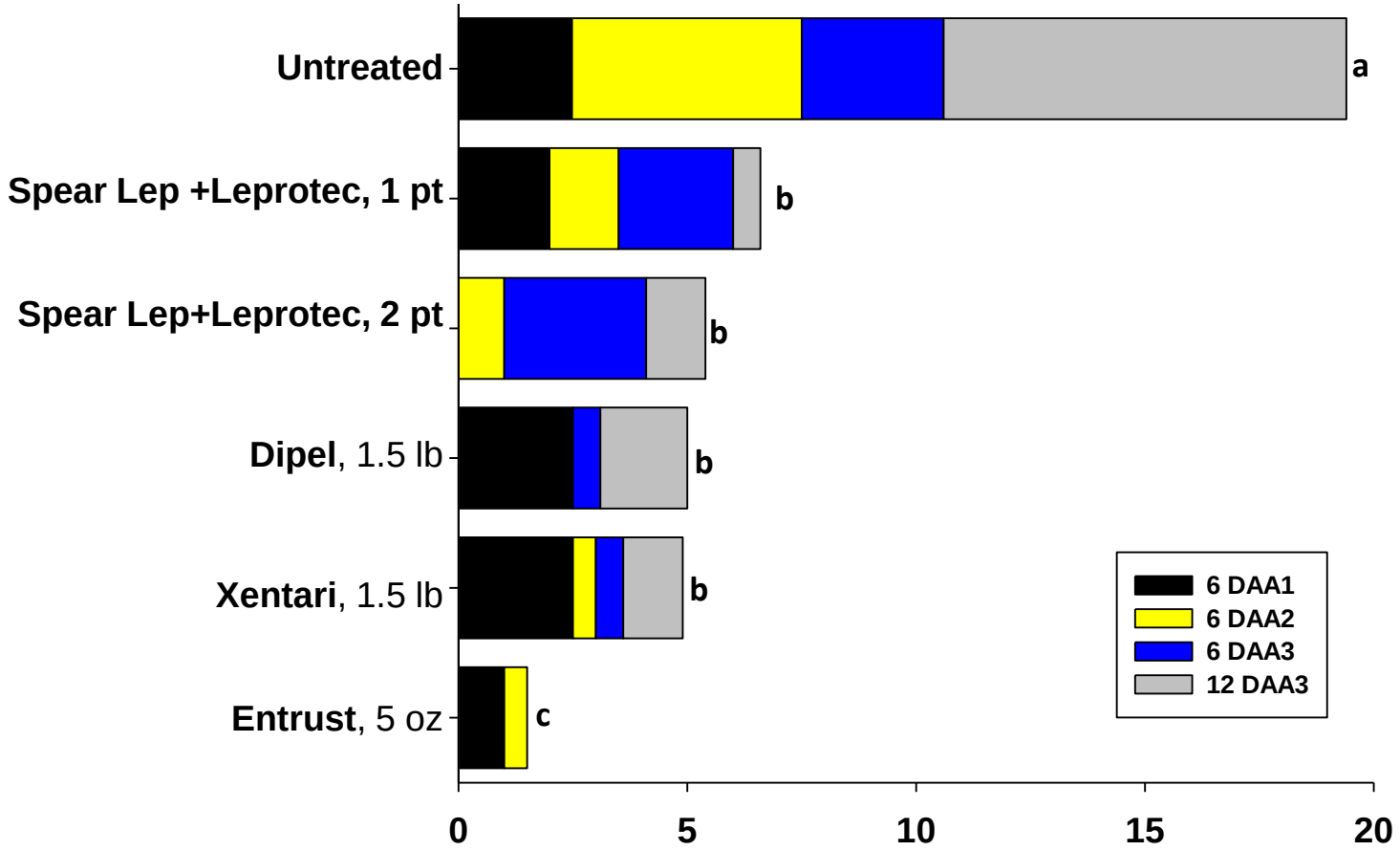
- **GS-omega/ kappa-Hxtx-Hv1a.**
- **Peptide-based insecticides**
- **Affects a specific neuromuscular target.**
- **Mixed with low dose Bt**

- **New mode of action (IRAC group 32)**
- **Potential tool for IRM**

Spear-Lep in Spring Cabbage

Yuma Ag Center, spring 2020

- 3 applications
- 7-day spray interval
- 23.5 gpa@50 psi
- Sampled: 6 and 12 DAA



There are a few more A.I.s in the pipeline

jpalumbo@ag.arizona.edu
928-920-3387