

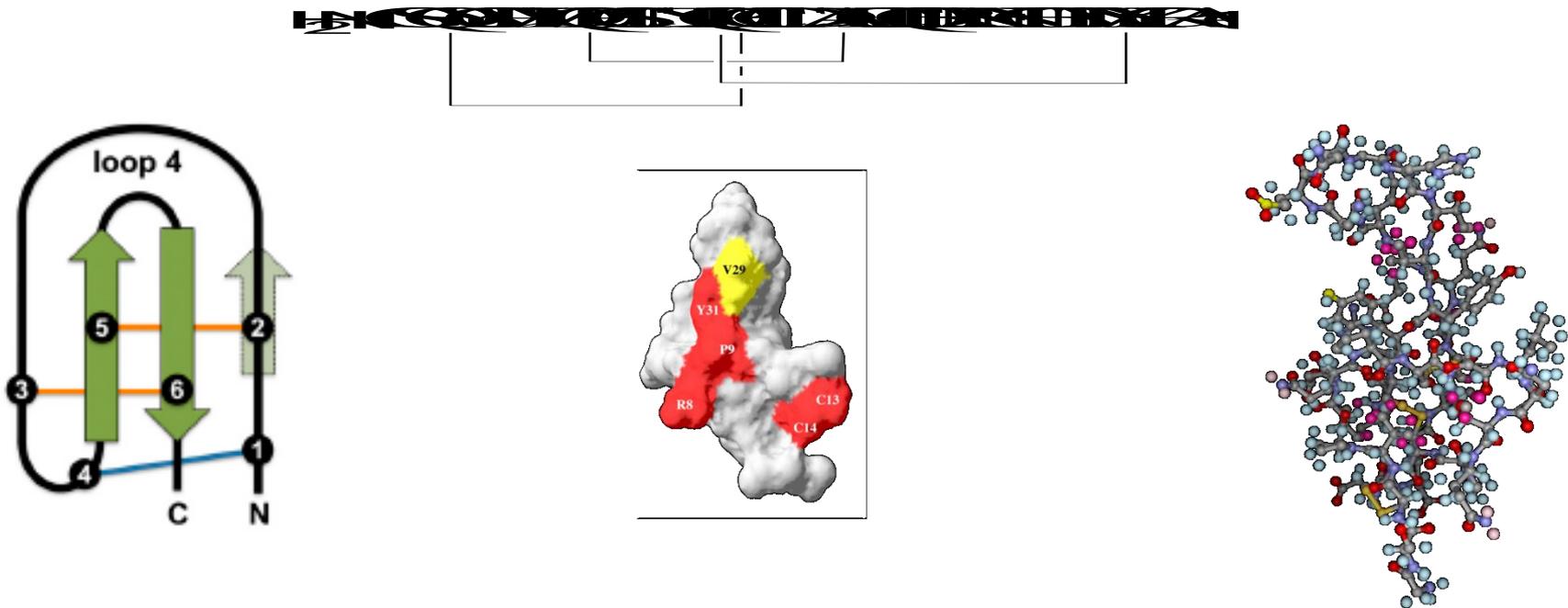
***Introducing:
SPEAR™ Biopesticide Products***

ABIM

October 20th, 2015

Basel, Switzerland

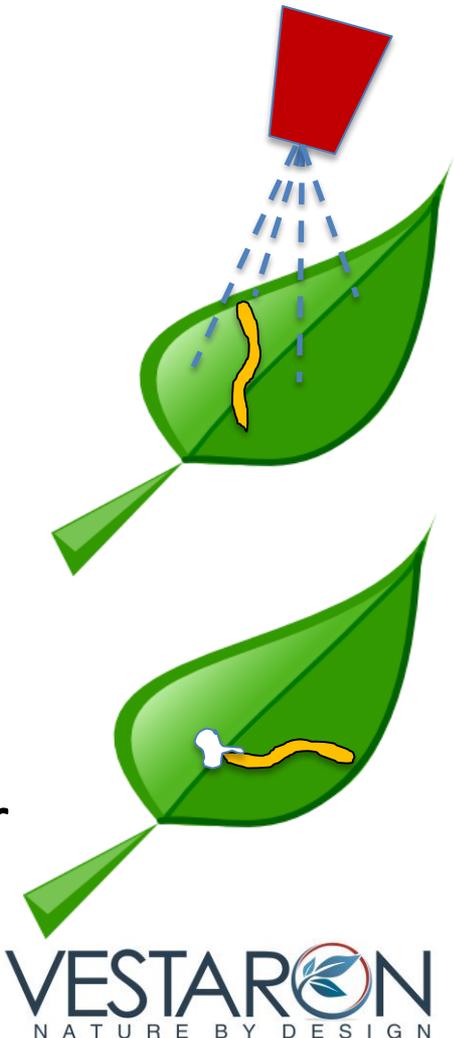
SPEAR™ Active Ingredient: GS-omega/kappa-Hxtx-Hv1a



Omega/Kappa - K⁺ & Ca⁺⁺ CNS channel antagonist

Modes of Action/Exposure

- *Two modes of action – built in resistance management*
 - Voltage activated Calcium ion channel inhibitor
 - Potassium ion channel inhibitor
- *Two routes of entry*
 - *Contact* – for existing insects at the time of spray (through spiracles/surface to volume ratio)
 - *Oral ingestion* – for insects that appear post-spray (synergistically enhanced by Bt)



Characteristics of the Biopesticide



- Broad pest killing spectrum
- Two novel modes of action
- Water soluble
- Resistant to extremes of pH, sunlight, temperature
- Non-toxic to mammals & birds, fish
 - Submitted pollinator & have beneficial data
- 0 Days Pre-harvest Interval
- 4 hr Re-entry Interval
- No toxic residues
- Effective for 7 – 10 days in the field
- EPA and California approved

Initial Market Entry Point – SPEAR™-T



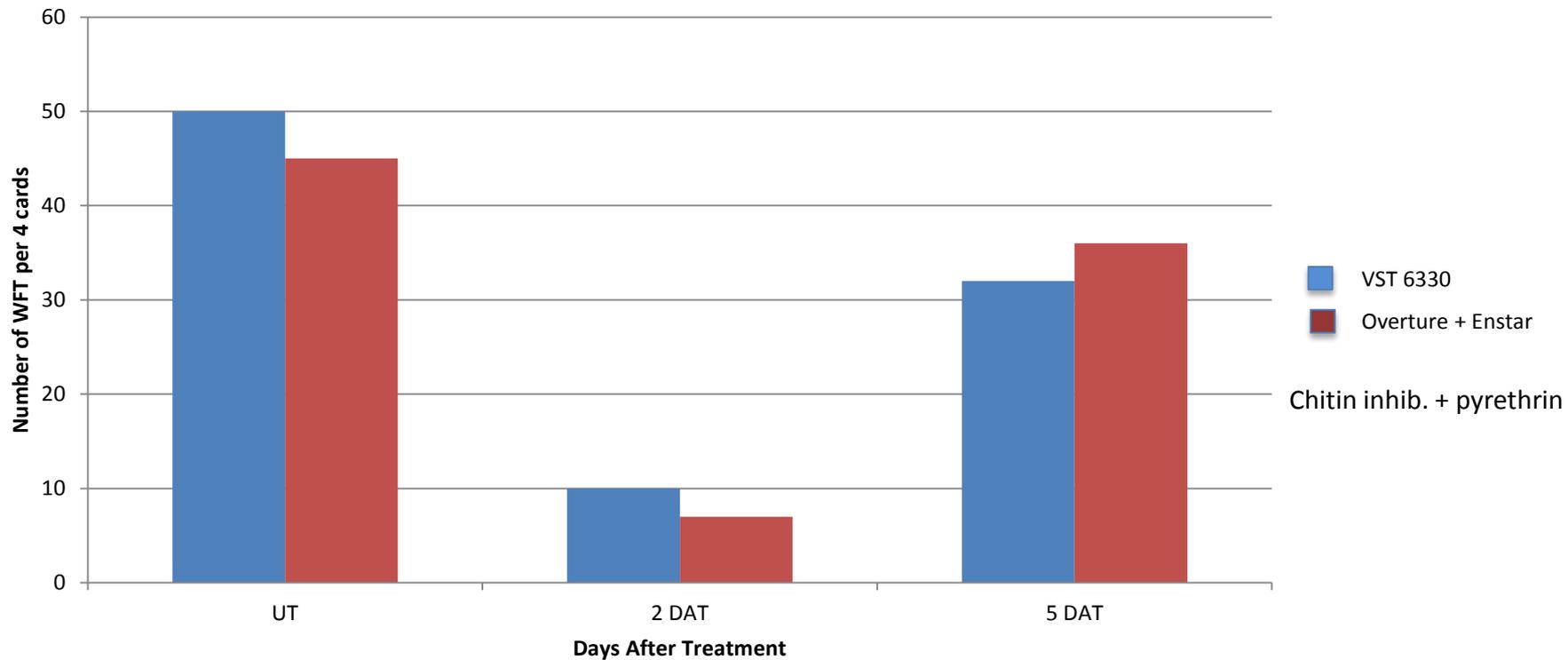
- Market launch in late 2015/early 2016
- Controls thrips and whiteflies in greenhouses
- Field trials (14,000 sq ft) have demonstrated that results are equivalent or superior to conventional control chemicals



Spear™-T will be priced comparably to conventional control chemicals

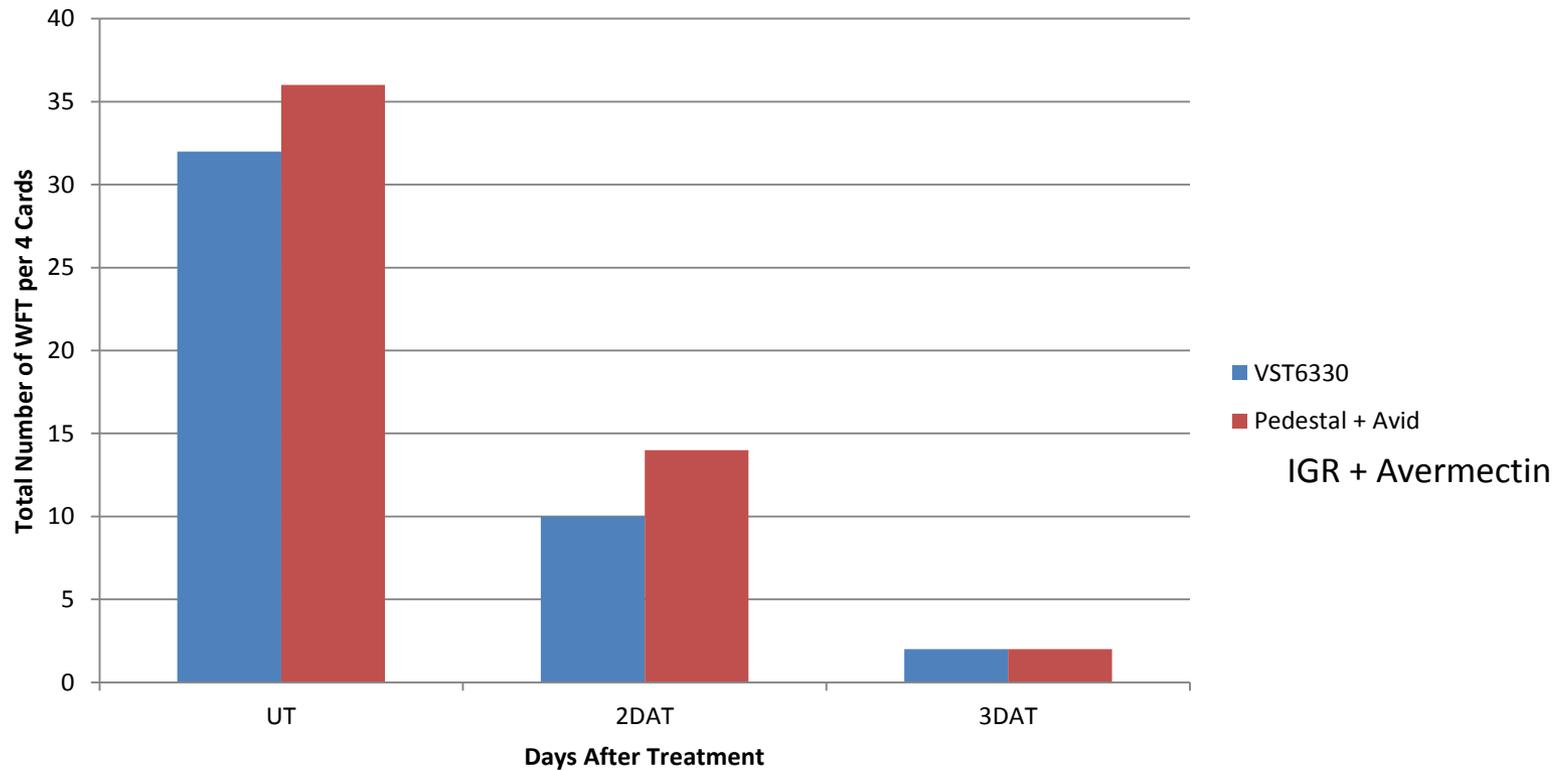
Greenhouse Grower Trials

Kalamazoo Glasshouse Trial North Range
VST 6330 and Overture + Enstar AQ vs. Western Flower Thrips
1st Spray Application September 2014



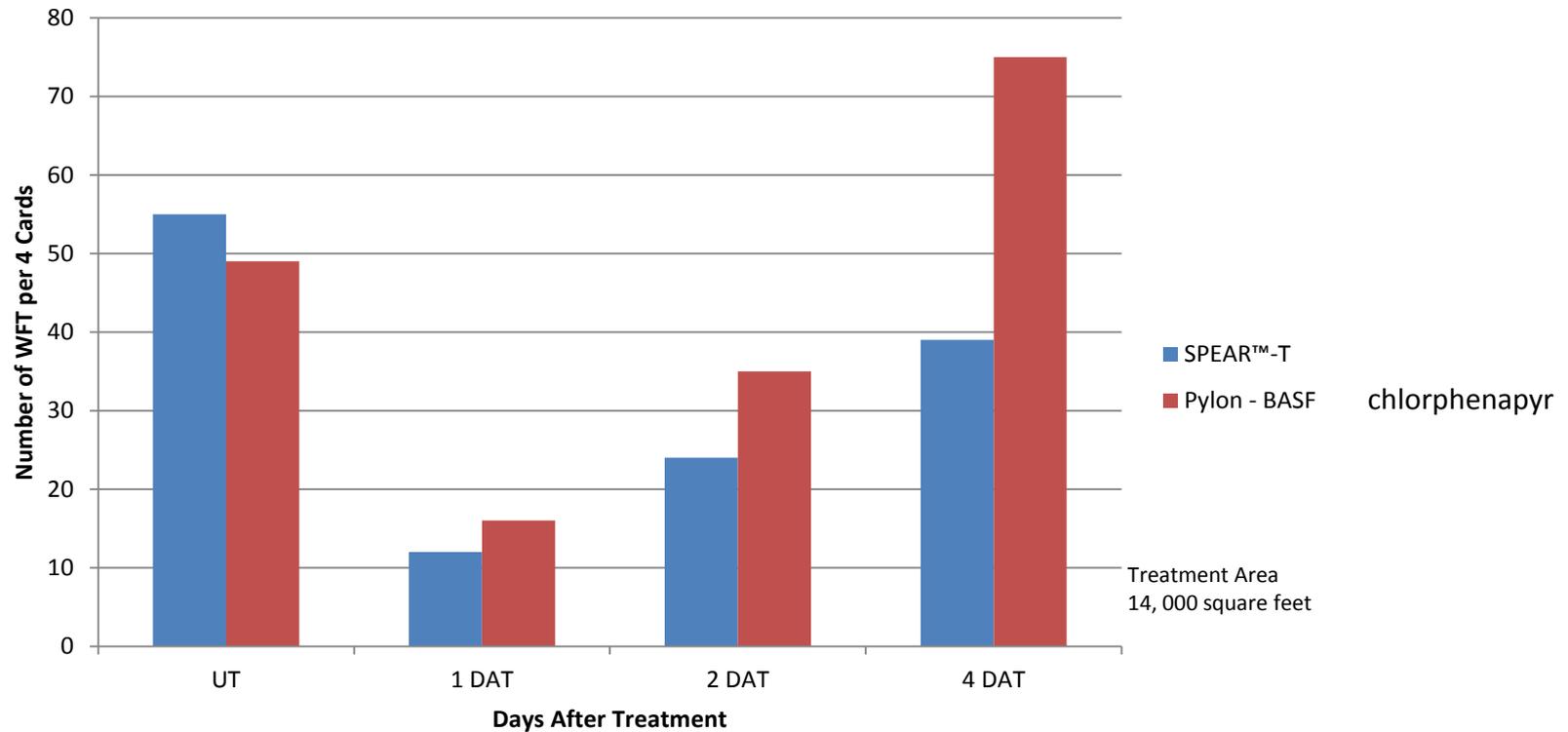
Greenhouse Grower Trials

Kalamazoo Glasshouse North Range
VST6330 and Pedastel + Avid vs. Western Flower Thrips
2nd Spray Application September 2014



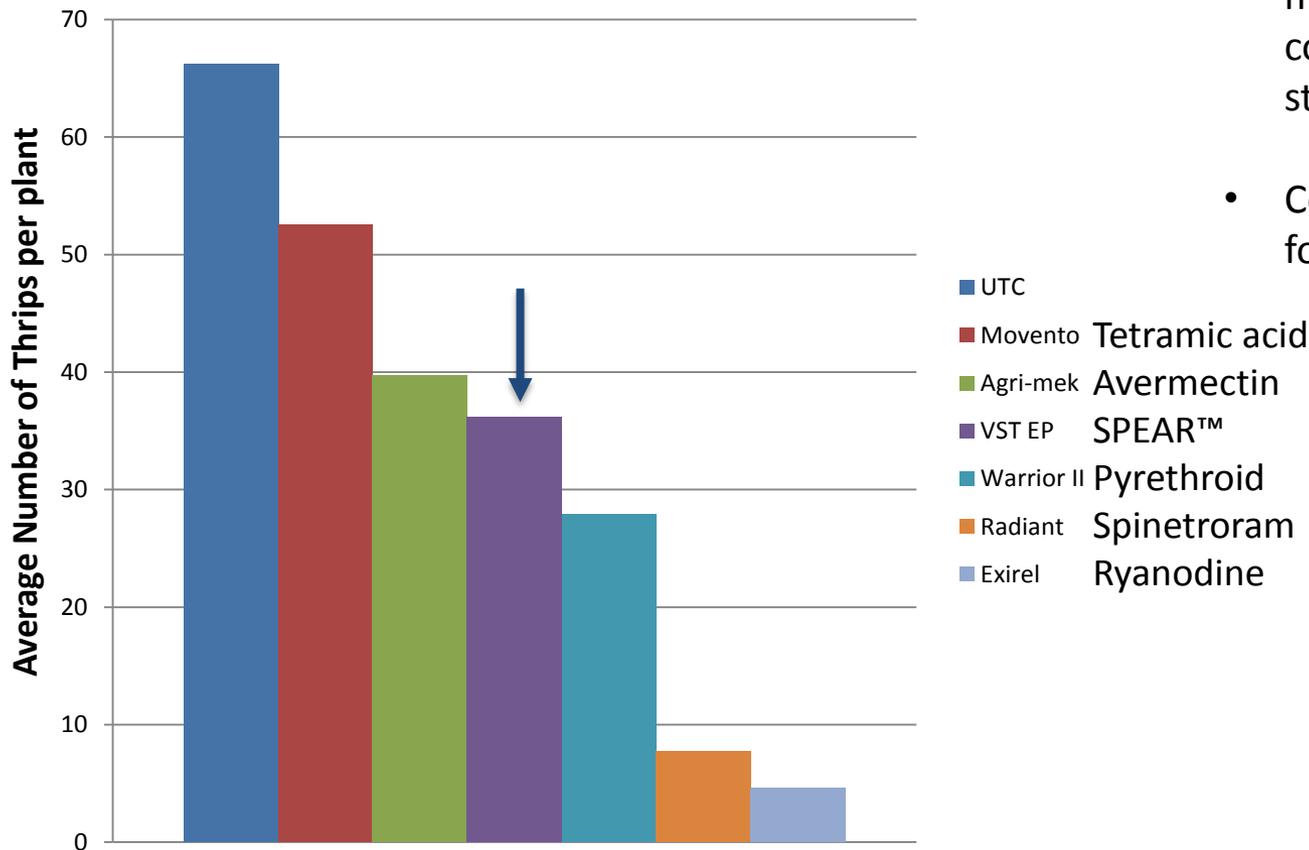
Control of Thrips in Greenhouses

Kalamazoo Glasshouse Trial South Range
VST 6330 and Pylon vs. Western Flower Thrips
1st spray application September 2014



Onion Thrips Trials

Ranked Efficacy Results U of Wisconsin - Onion thrips

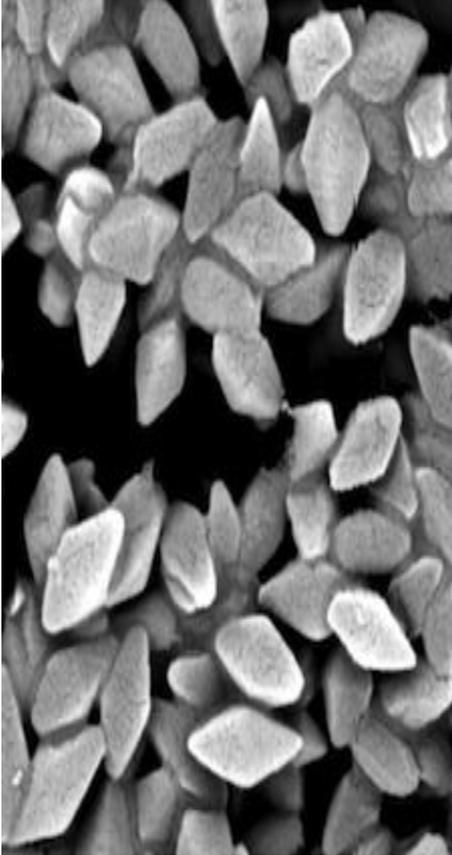


Aug 18 (7 DAT)

Confidential - Do Not Duplicate

- First outdoor trial against thrips
- Modest control but mid-pack with commercial synthetic standards
- Complementary control for potatoes

Innovation: Using Bt to Bite

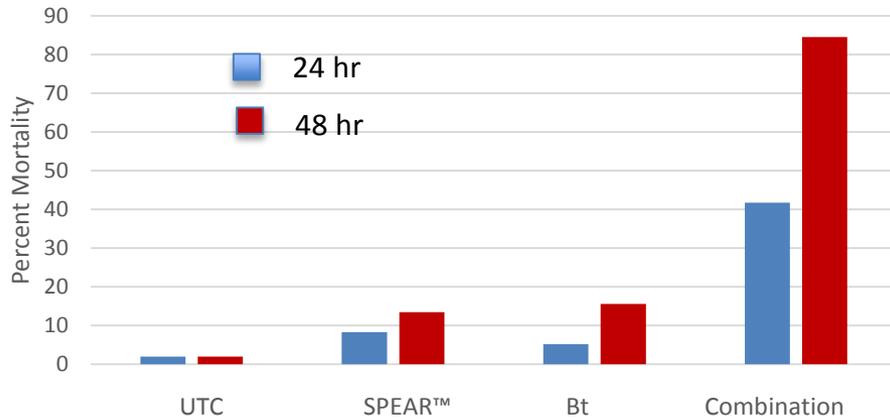


- Mixing omega/kappa with Bt yields a synergistic response – due to Bt’s effects on the gut
- The combination product:
 - Longer duration than Bt alone
 - Kills larger instars of insects than Bt alone
 - Kills more extensively than Bt alone

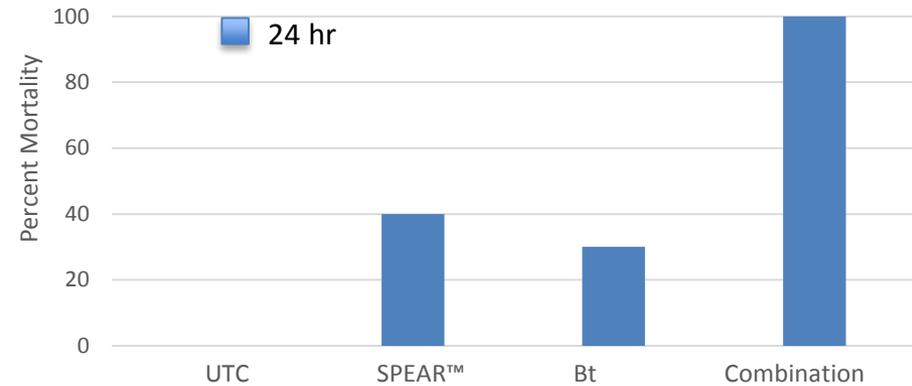
Early market prep will be with tank mix but full launch will be a co-formulation

Synergy With Bt

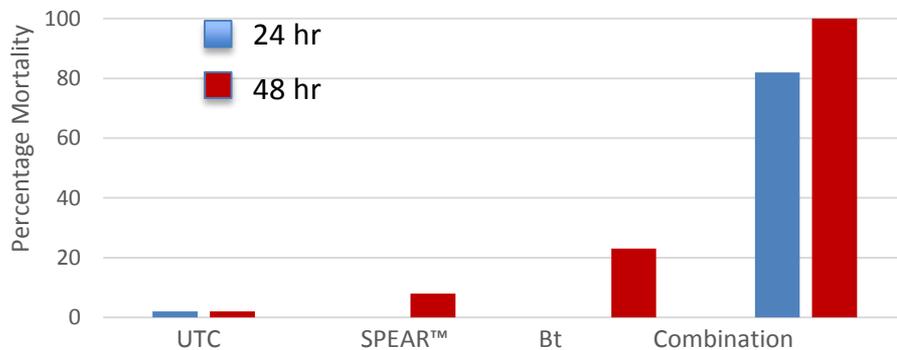
24, 48 hr Mortality
2nd Instar Beet Army Worm



24 hr Mortality
Mosquito Larvae



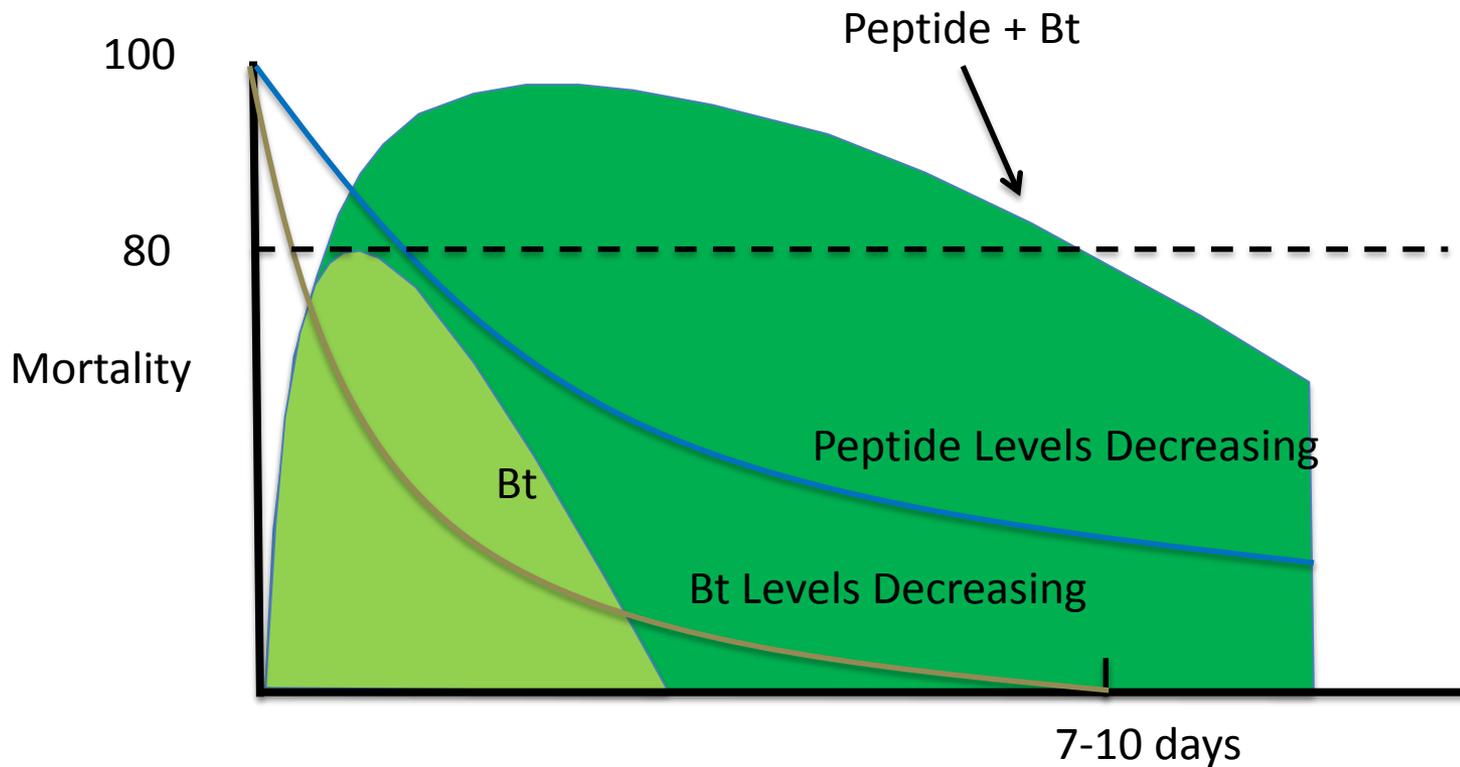
24,48 hr Mortality
2nd Instar Colorado Potato Beetle



A difficult lab experiment!

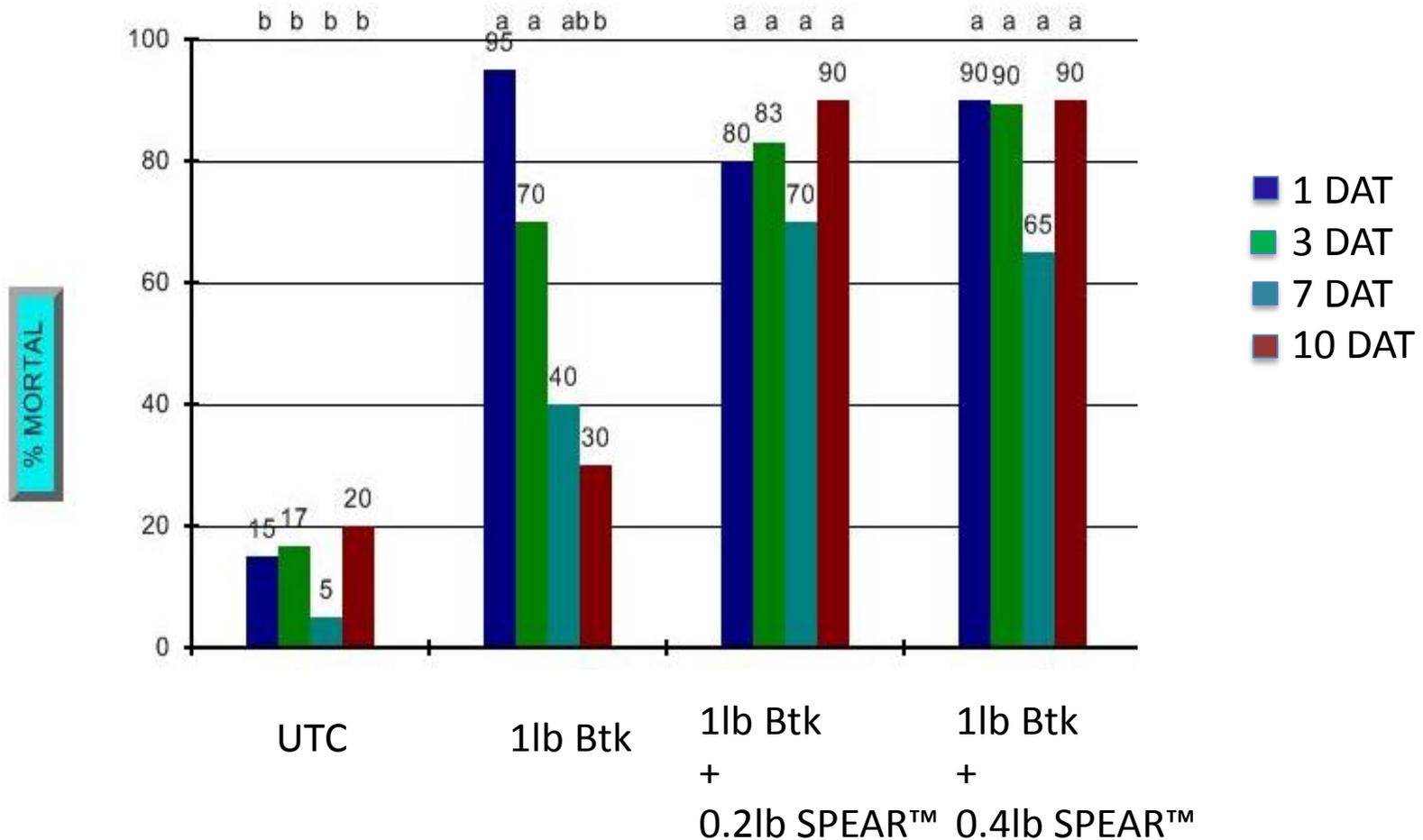
Sub-lethal doses of Peptide and Bt, and the combination of the two at the same concentrations

Combination product in the field

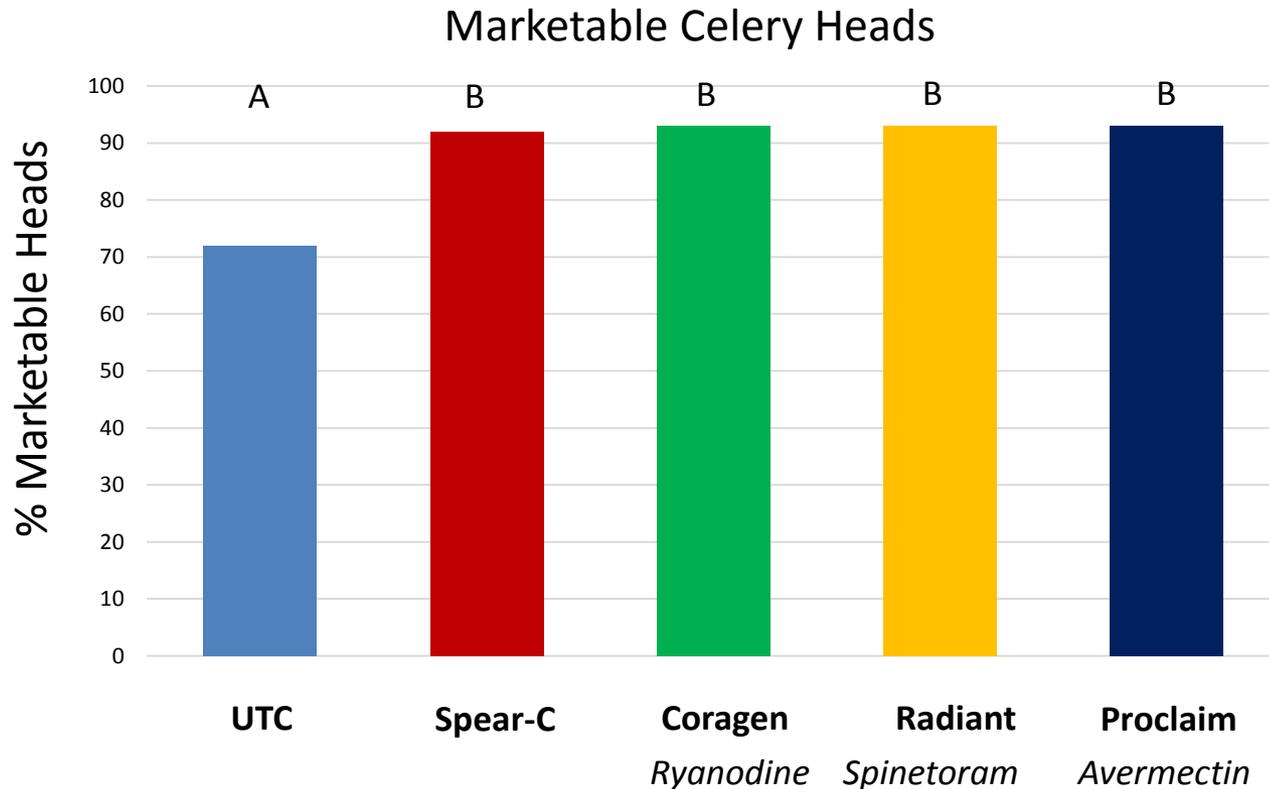


This is a reconstructed thought experiment, not an indictment.

2nd Instar *H. zea* on Tomatoes



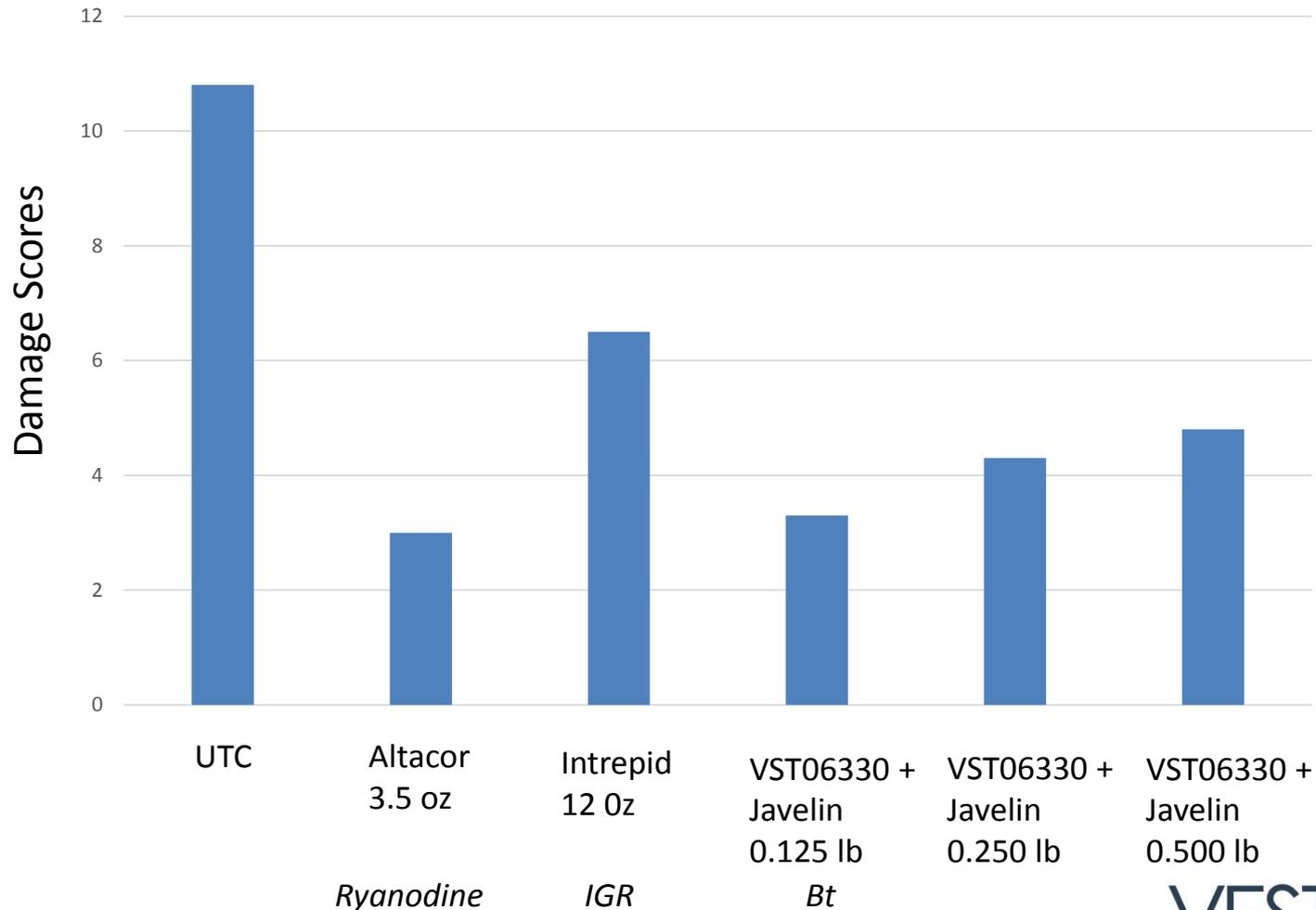
Arizona Grower Trial - 2015



Three consecutive sprays with Spear-C or industry standards at label rates followed by harvest and evaluation of marketable heads.

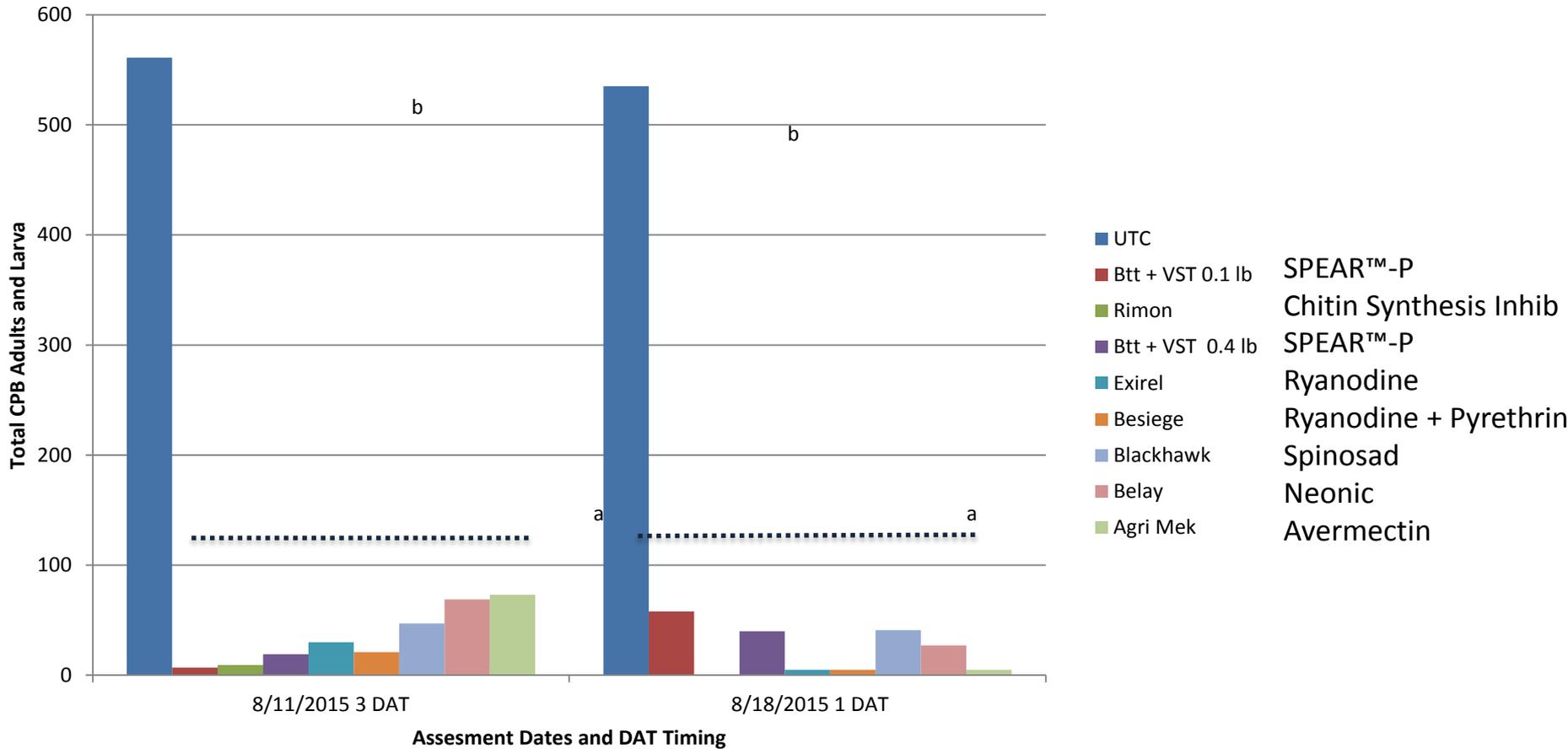
Peach Twig Borer in Almonds

Hull Damage Scores



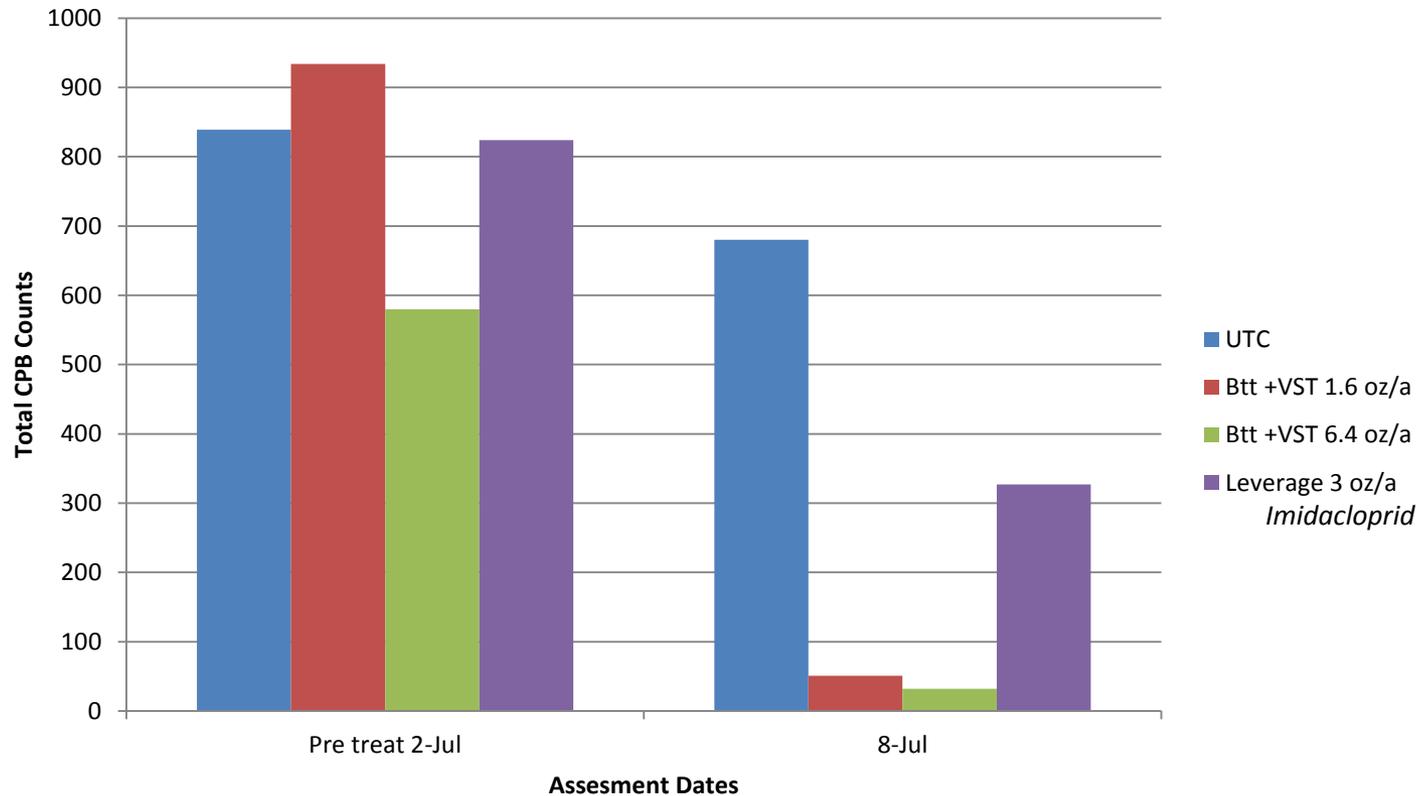
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Colorado Potato Beetle – WI, USA



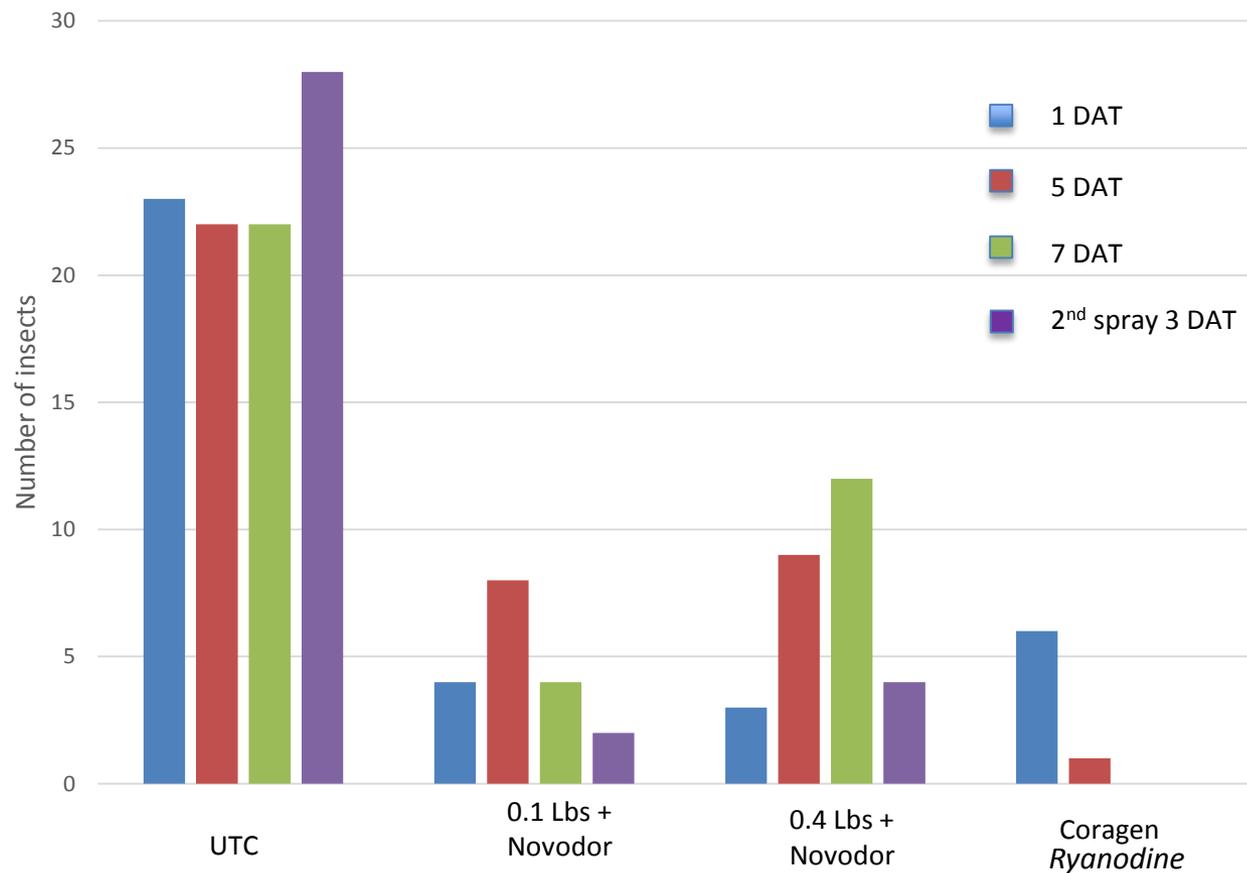
Colorado Potato Beetle - NY

Novodor SC + VST 006330 EP CPB Efficacy vs Leverage 2.7



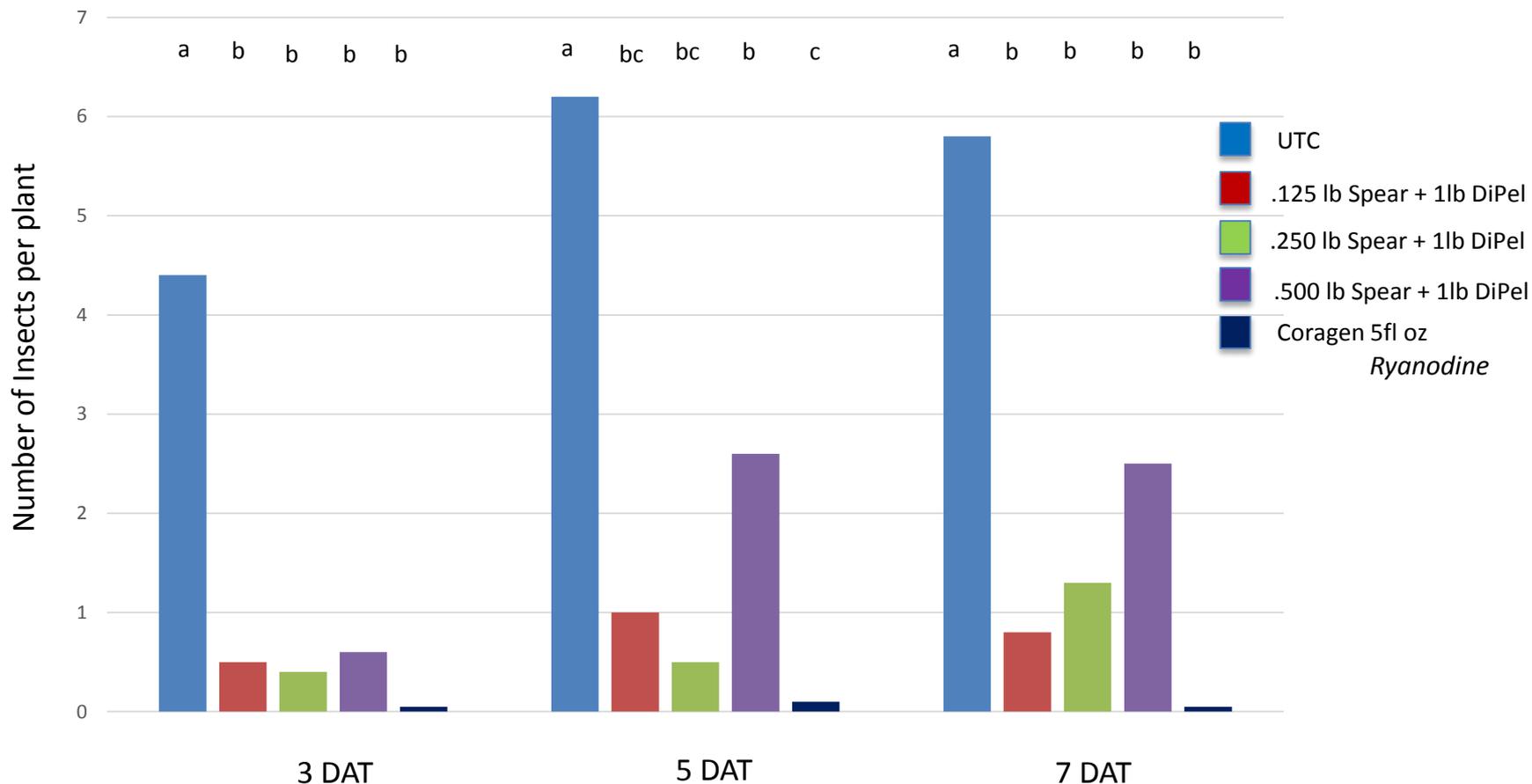
Colorado Potato Beetle - Canada

Ontario Canada CPB Trials



Cabbage Trial- Cabbage Looper

Cabbage Trial – Sanger, CA



Product Comparison

	Bt Alone	SPEAR™	SPEAR™ + Bt
Spectrum	Leps, Coleop & Diptera	Thrips, Whiteflies	Leps, Coleop & Diptera
%Control	70-80%	>95%	>95%
Instars	1 st	All	Up to 3 rd
Exposure	Oral	Contact	Oral & Contact
Duration	1-3 days	7 days	7-10 days
Resistance	Emerging	None	None
Application	Spray	Fogging	Low to ULV spray
Re-entry	4hrs	4hrs	4hrs
Pre-harvest Int.	0 day	0 day	0 day
OMRI	Some	No	No

First A.I. – Multiple SPEAR™ Products



SPEAR™ - Three Biopesticide Sprays

- SPEAR-T™ – greenhouse thrips and whiteflies
- SPEAR-P™ – w/ Bt_t - Colorado potato beetle
- SPEAR-C™ – w/ Bt_k - Broad Lepidopteran control

Transforming the R&D Model for Insecticides MOA by MOA

- Single technology platform for multiple MOAs
 - Peptides for Na⁺, Cl⁻, Neonic, Ca⁺⁺, etc
- Safety at first stage gate – No late stage product attrition
- Proven modes of action with restart on resistance clock
- Manufacturing, formulation and regulatory path largely solved

Why would anyone spend \$300M and wait 10 years for a synthetic, when you could spend \$10M over 5 years for an equivalently effective and yet safer product platform?

VESTARON CORPORATION'S SPEAR™

*Transforming Insecticide Development
MOA by MOA*

www.vestaron.com

*Robert M. Kennedy, PhD
Chief Scientific Officer
269-544-3007*

Extras