THE POWER OF SYNTHETICS

The Safety & Sustainability of Biologicals

VESTARON

Vestaron is Leading a Peptide-based Insecticide Revolution in Crop Protection

We are committed to providing growers with novel, effective chemistries that address proven neuromuscular targets. Our peptides overcome existing resistance issues while offering a desired safety profile for workers, beneficials, and the environment.

Our Revolution Is Needed

Synthetic chemical pesticides may provide good efficacy, but can also have downsides:

- Environmental damage
- Harm to beneficial insects
- Safety issues for consumers and field labor

Growing difficulties in commercializing new chemical active ingredients:

- Rising development costs
- Late-stage failures
- Increasing regulatory hurdles

Existing solutions are facing resistance challenges resulting in fewer insect control solutions for growers:

- Vestaron is overcoming these challenges with new revolutionary peptide-based insecticide solutions

Corporate Profile

- >90 Employees
- Incorporated in 2005
- Headquarters in RTP, NC
- Research site in Kalamazoo, MI
- Backed by leading AgTech and Life Science investors

anterra capital · ARGONAUTIC · CGC · CULTIVIAN SANDBOX · Endeavor 8 · FORTISTAR · GROSVENOR · iSELECTFUND · Northpond Ventures · novo holdings · OPENPRAIRIE · PANGAEA · syngenta · WILBUR-ELLIS

THE SCIENCE

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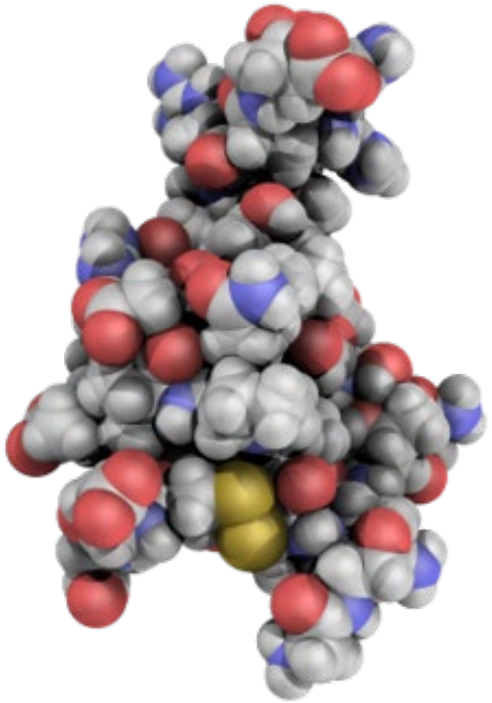
Peptides – What are they?

- Peptides are very **small proteins.**
- They are short, linear sequences of amino acids, one of the main building blocks of life.
- Peptides are present in all living organisms.
- Vestaron's SPEAR® insecticide has a specific amino acid sequence and shape giving it unique insecticidal properties.
- Peptides break down into amino acids.

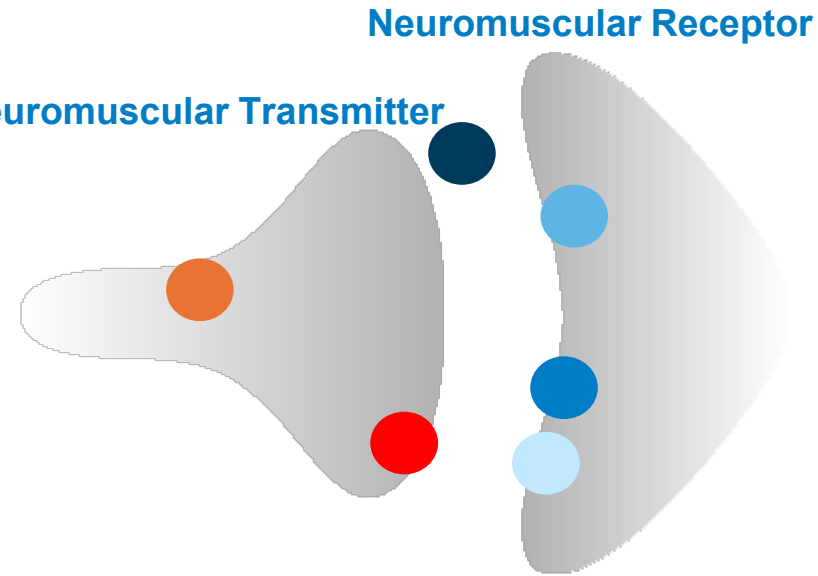


SPEAR contains the peptide:
Omega/Kappa Peptide
MW 4,571
Inhibitory Cystine Knot (ICK) Peptide

Vestaron's Peptide Focus

Focused on the 6 most frequently targeted neuromuscular receptors in insects

Receptor Type	Insecticide Target Site	Vestaron Presence
Nicotinic Acetylcholine Receptor	Neonicotinoids, Spinosyns	● ●
Acetyl Cholinesterase	Carbamates, Organophosphates	●
Voltage Gated Sodium Channel	Pyrethroids, DDT, Oxadiazines	● ●
Ryanodine Receptor	Diamides	●
Glutamate Gated Receptor	Avermectins, Milbemycins	
Gaba Gated Receptor	Cyclodienes, Fiproles	



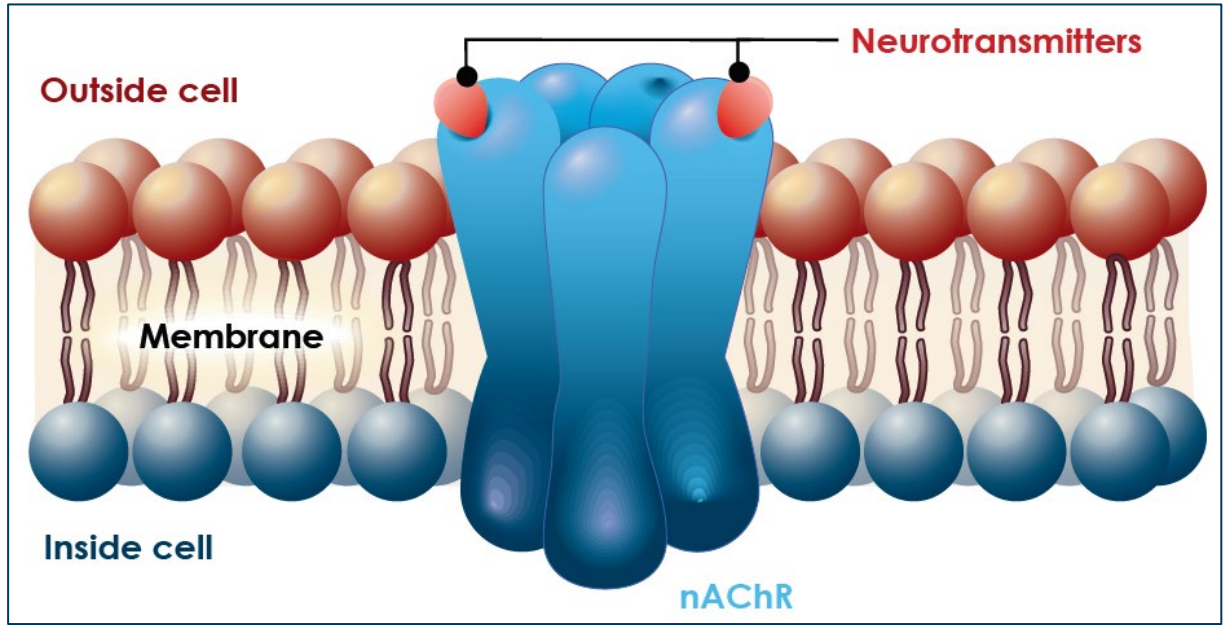
Vestaron can "reset" all the known neuromuscular targets even if resistant AIs have occurred.

SPEAR® Attributes:
Target site specificity
- -New IRAC Group 32
- -Unique binding site
- -SPEAR controls insects that are resistant to Diamides, Spinosins, and Neonicotinoids

Spear Mode of Action

Target site specificity

- Nicotinic Acetylcholine Receptor Allosteric Modulators - Site II
- Binding site different from spinosyns and neonicotinoids
- Awarded new IRAC Group 32 in Nov 2018
- The 14th neuromuscular IRAC group
- Unique binding site allows Spear to control insects resistant to diamides, Spinosins, and neonicotinoids



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THE PORTFOLIO

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Vestaron family of products

SPEAR®-LEP

Specialty crops

SPEAR®-RC

Row crops

SPEAR®-T

Soft-bodied insects
Contact activity

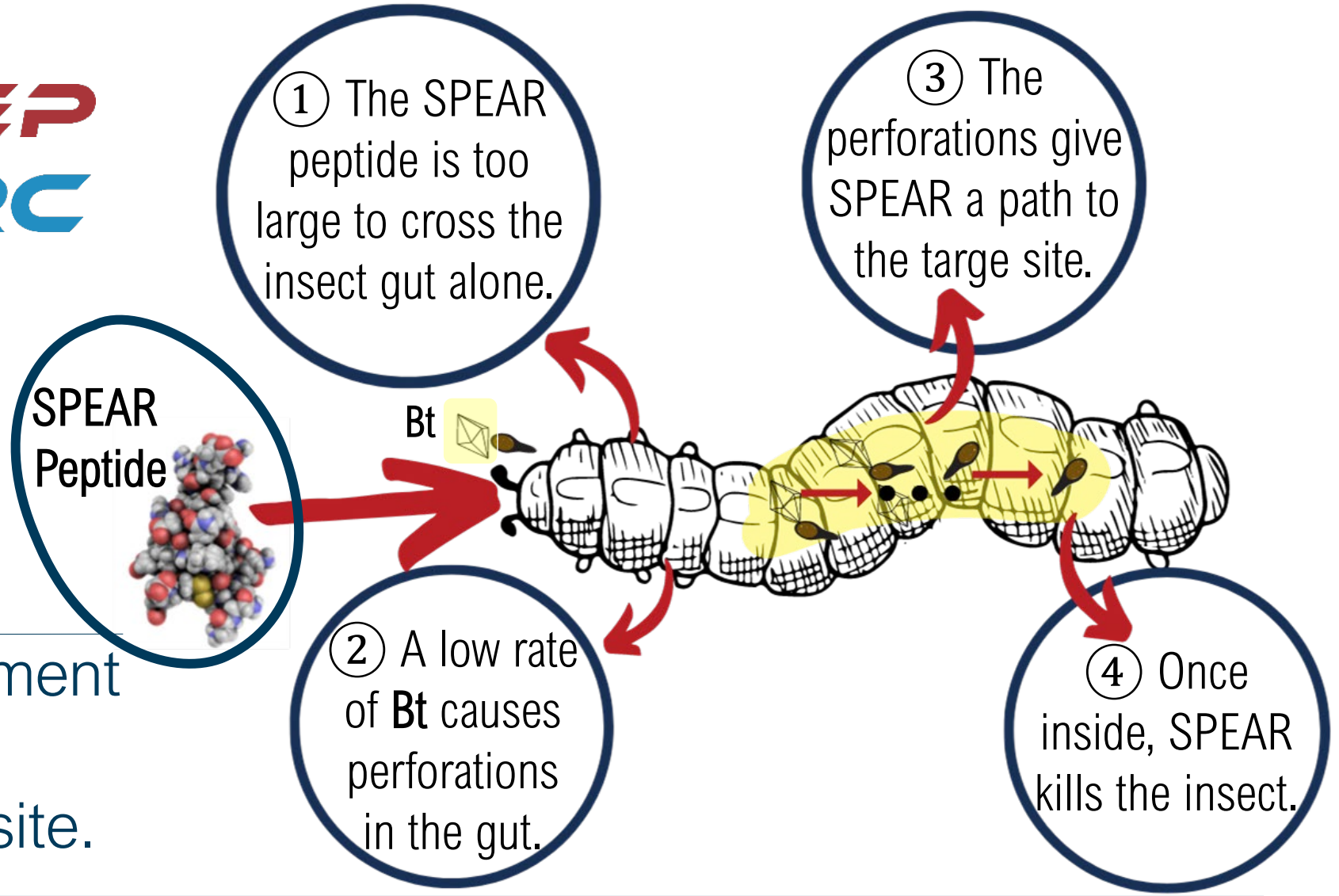
LEPROTEC®

Liquid Btk
facilitator

Bt is a facilitator to improve bioavailability when ingested

SPEAR®-LEP

SPEAR®-RC



Ingestion

Bt facilitates the movement of SPEAR to the neuromuscular target site.

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Current Product Portfolio

	DESCRIPTION	RECEPTOR	IRAC CODE (MOA)	ROUTE OF ENTRY	PESTS	CROPS	US LAUNCH	CANADA LAUNCH	POTENTIAL EU FULL LAUNCH
SPEAR-LEP	Vestaron's leading bioinsecticide product family targeted to Lepidopteran pests in high-value field crops/row crops and soft-bodied insects/mites in greenhouse/ field applications	Nicotinic Acetylcholine Receptor	32	Oral Ingestion	Lepidoptera (e.g. Caterpillars, Loopers, Worms)	Fruits Vegetables Nuts	2020	Registered 2023	2026
SPEAR-RC						Row Crops (eg. Soy, Cotton, Rice)	2023		
SPEAR-T				Topical Contact	Soft-Bodied Insects & Mites (e.g. Thrips, Aphids)	Greenhouse Field Orchard	2020	Registered 2023	
BASIN FLEX	Vestaron's next bioinsecticide to provide a rotation partner for Spear-Lep		TBD	Oral Ingestion	Lepidoptera (e.g. Caterpillars, Loopers, Worms)	Fruits Vegetables Nuts	2024		2027

SPEAR®-T

Registered Crops:

- APPLES
- BRASSICAS
- BULB & TUBER CROPS
- BUSH & CANE BERRIES
- CITRUS
- CUCURBITS
- FRUITING VEG
- GRAPES
- HOPS
- LEAFY VEG
- LEGUMES
- ONIONS
- PEAR
- STONE FRUIT
- STRAWBERRY
- TOBACCO
- TREE NUTS
- HEMP
- ORANAMENTALS

Packaging Specifics:

- Package size of Spear T = 1 gallon
- Case configuration = 4 X 1 gallon
- Does not need Bt/ contact activity only

Profile:

TARGET	RATE	SURFACTANT	PHI	REI	MRL	IRAC GROUP	CATEGORY
Aphids Whitefly Thrips Mites Spotted wing Drosophila	1-3 gallon per acre	Use with a NIS or spreader/ sticker at 0.125% v/v	0-day	4-hr	Exempt	New MOA IRAC Group 32	Insecticide

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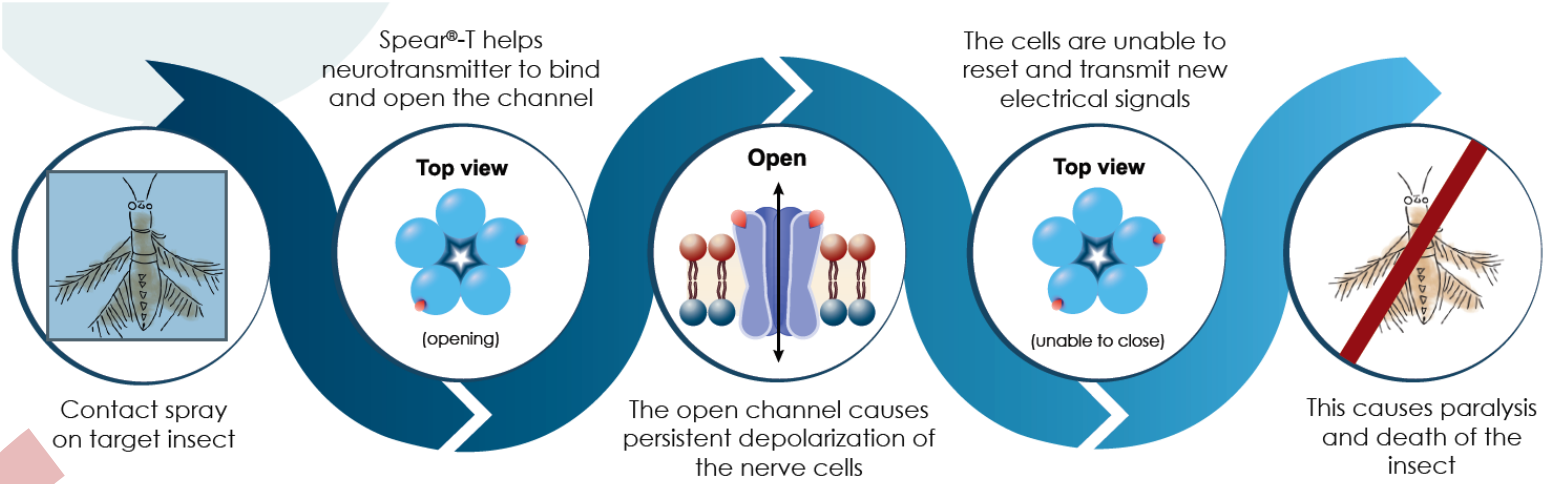
SPEAR® T: Route of Entry Through Contact

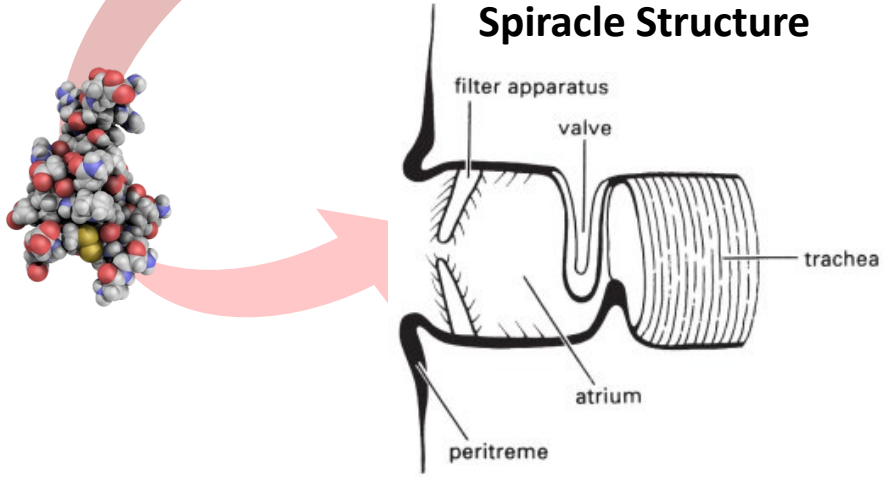
Contact activity result when SPEAR enters the insect through the spiracles. This **does not** require the use of Bt.

SPEAR®-T

Soft Body Insects:

- Mites
- Whiteflies
- Thrips
- Others (see label)





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SPEAR® T Label

FIELD USES

Crops	Insect/Mite Pests
Field Vegetables: **Vegetable, Root and Tuber (Group 1),** such as Beet, Carrot, Potato, Radish, Sugarbeet **Vegetable, Bulb (Group 3),** such as Garlic, Leek, Onion (Green and Bulb) **Vegetable, Leafy Except Brassica (Group 4),** such as Celery, Endive, Lettuce, Parsley, Spinach **Vegetable, Brassica Leafy (Group 5),** such as Broccoli, Brussels Sprouts, Cabbage, Cauliflower, Chinese Cabbage, Collards, Kale, Kohlrabi, Mustard Greens **Vegetable, Legume (Group 6),** such as Bean, Lentil, Pea, Soybean **Vegetable, Fruiting (Group 8),** such as Eggplant, Pepper, Tomato **Vegetable, Cucurbit (Group 9),** such as Cucumber, Melon, Squash, Watermelon	**Plant-feeding Mites,** such as Broad Mite, Lewis Mite, Twospotted Spider Mite **Psyllids,** such as Potato Psyllid **Thrips,** such as Onion Thrips, Tobacco Thrips, Western Flower Thrips **Whiteflies,** such as Sweetpotato Whitefly
Field Fruit and Berries: **Fruit, Citrus (Group 10),** such as Grapefruit, Lemon, Lime, Orange **Fruit, Pome (Group 11),** such as Apple, Pear **Fruit, Stone (Group 12),** such as Cherry, Nectarine, Peach, Plum, Prune **Berry (Group 13),** such as Blackberry, Blueberry, Grape, Raspberry, Strawberry	**Plant-feeding Mites,** such as Broad Mite, Citrus, Rust Mite, Twospotted Spider Mite **Psyllids,** such as Asian Citrus Psyllid, Pear Psylla **Spotted-wing Drosophila** **Thrips,** such as Western Flower Thrips
Tree Nuts (Group 14-12)	**Plant-feeding Mites,** such as Broad Mite, Twospotted Spider Mite
Hemp	**Aphids,** such as Cotton/Melon Aphid, Green Peach Aphid **Plant-feeding Mites,** such as Broad Mite, Twospotted Spider Mite **Thrips,** such as Onion Thrips, Tobacco Thrips, Western Flower Thrips
Hops	**Plant-feeding Mites,** such as Broad Mite, Lewis Mite, Twospotted Spider Mite
Tobacco	**Aphids,** such as Green Peach Aphid **Thrips,** such as Tobacco Thrips

USE SPEAR®-T LIQUID CONCENTRATE ON THE FOLLOWING CROPS:

GREENHOUSE AND NURSERY USES

Insect/Mite Pests
uch as Green Peach Aphid, Cotton/Melon Aphid **ding Mites,** such as Broad Mite, Lewis Mite, Twospotted Spider Mite **wing Drosophila** ch as Onion Thrips, Tobacco Thrips, Western Flower Thrips **s,** such as Greenhouse Whitefly, Sweetpotato Whitefly
Crops
use Vegetables: **le, Root and Tuber (Group 1),** such as Beet, Carrot, Potato, Radish, Sugarbeet **le, Bulb (Group 3),** such as Garlic, Leek, Onion (Green and Bulb) **le, Leafy Except Brassica (Group 4),** such as Celery, Endive, Lettuce, Parsley, Spinach **le, Brassica Leafy (Group 5),** such as Broccoli, Brussels Sprouts, Cabbage, Cauliflower, e Cabbage, Collards, Kale, Kohlrabi, Mustard Greens **le, Legume (Group 6),** such as Bean, Lentil, Pea, Soybean **le, Fruiting (Group 8),** such as Eggplant, Pepper, Tomato **le, Cucurbit (Group 9),** such as Cucumber, Melon, Squash, Watermelon
use/Nursery Flowers and Ornamental Plants, such as Bedding Plants, Container Stock, Cut Flowers, ental Flowers, Ornamental Plants
use Herbs and Mint (Group 25), such as Basil, Chive, Cilantro, Dill, Mint, Parsley, Rosemary, Sage,
use Fruit **us (Group 10),** such as Grapefruit, Lemon, Lime **ne (Group 12),** such as Cherry, Nectarine, Peach, Plum, Prune **oup 13),** such as Blackberry, Blueberry, Grape, Raspberry, Strawberry
id Tobacco

20 minutes.
then continue

SPEAR-T PERFORMANCE

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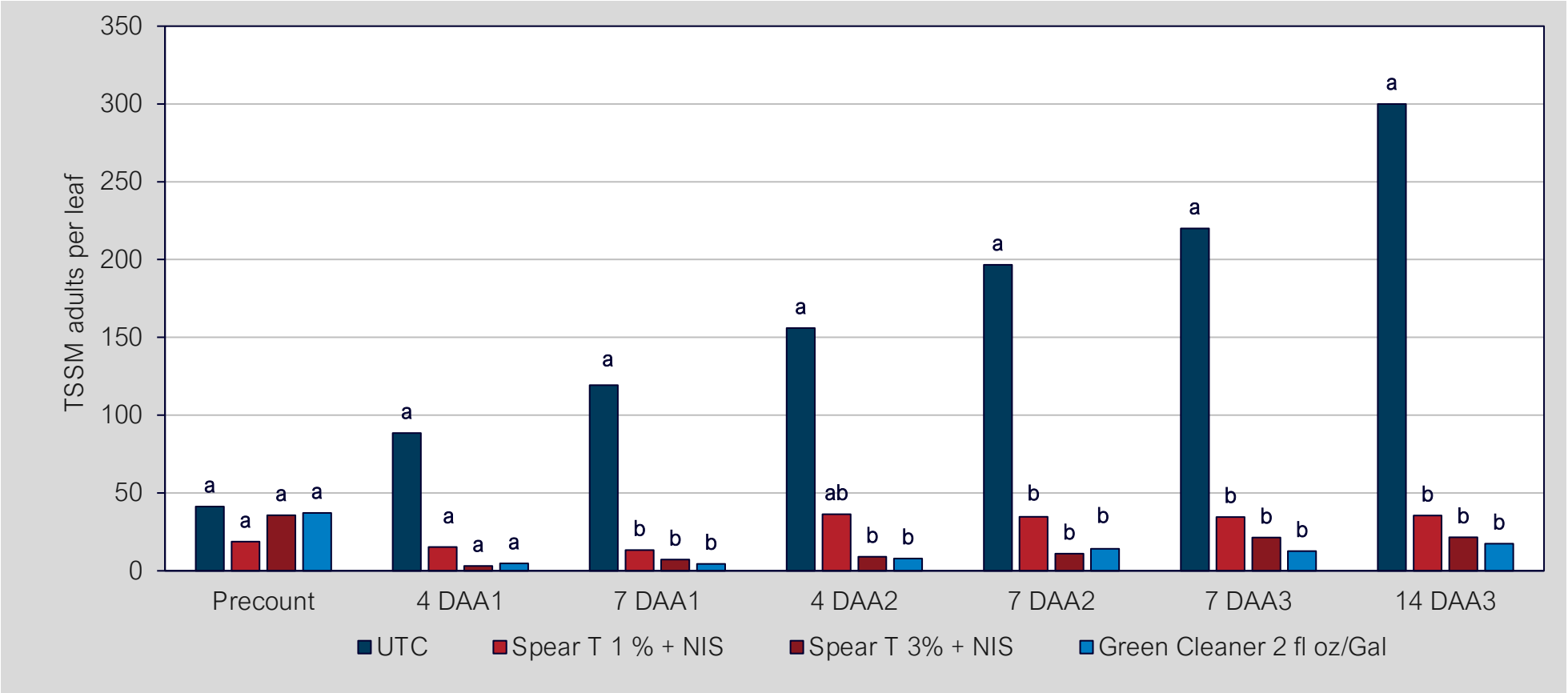
Twospotted Spider Mite in GH Hemp

TSSM adult population after application



Trial Outcomes

- Spear-T @ 1 and 3 % reduced the number of TSSM adults in this trial
- Mite counts at end of the 5-week trial (14 DAA3) showed equal performance by Spear-T and Green Cleaner

Trial Summary

Design:

- RCBD
- 5 replicates

Treatments:

- Spear T @ 1 and 3 gal/100 gal
- Green Cleaner (soybean oil, EPA exempt) @ 2 fl oz/gal

Applications:

- 3 at 7-day intervals
- Spray volume 30 gal/A
- 0.125% NIS (Preference)

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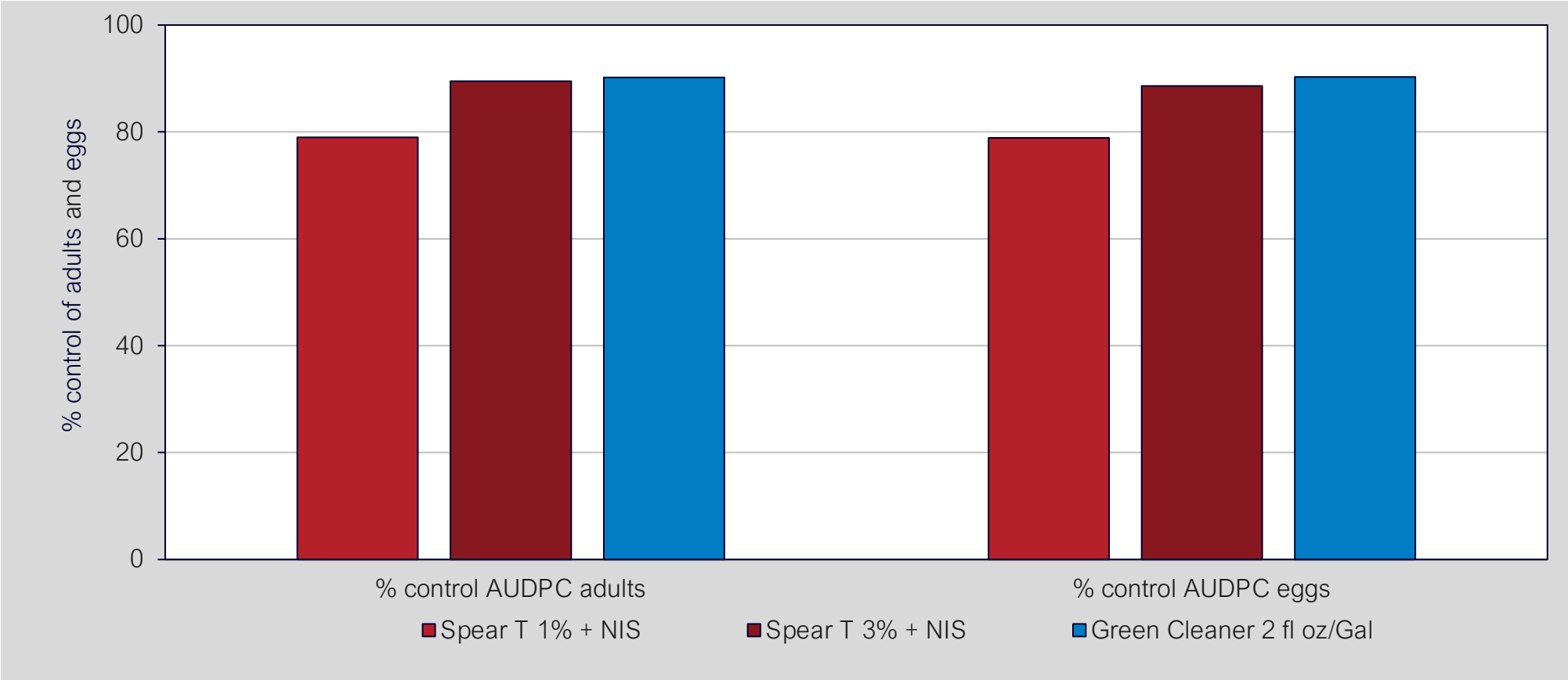
Twospotted Spider Mite in GH Hemp

Control of TSSM relative to untreated



Trial Outcomes

- Spear-T @ 1 and 3% demonstrated similar performance to Green Cleaner in percent control compared to the UTC

Trial Summary

Design:
- RCBD
- 5 replicates

Treatments:
- Spear T @ 1 and 3 gal/100 gal
- Green Cleaner (soybean oil, EPA exempt) @ 2 fl oz/gal

Applications:
- 3 at 7-day intervals
- Spray volume 30 gal/A
- 0.125% NIS (Preference)

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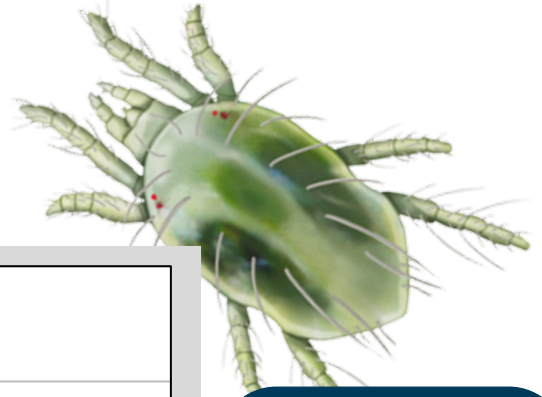
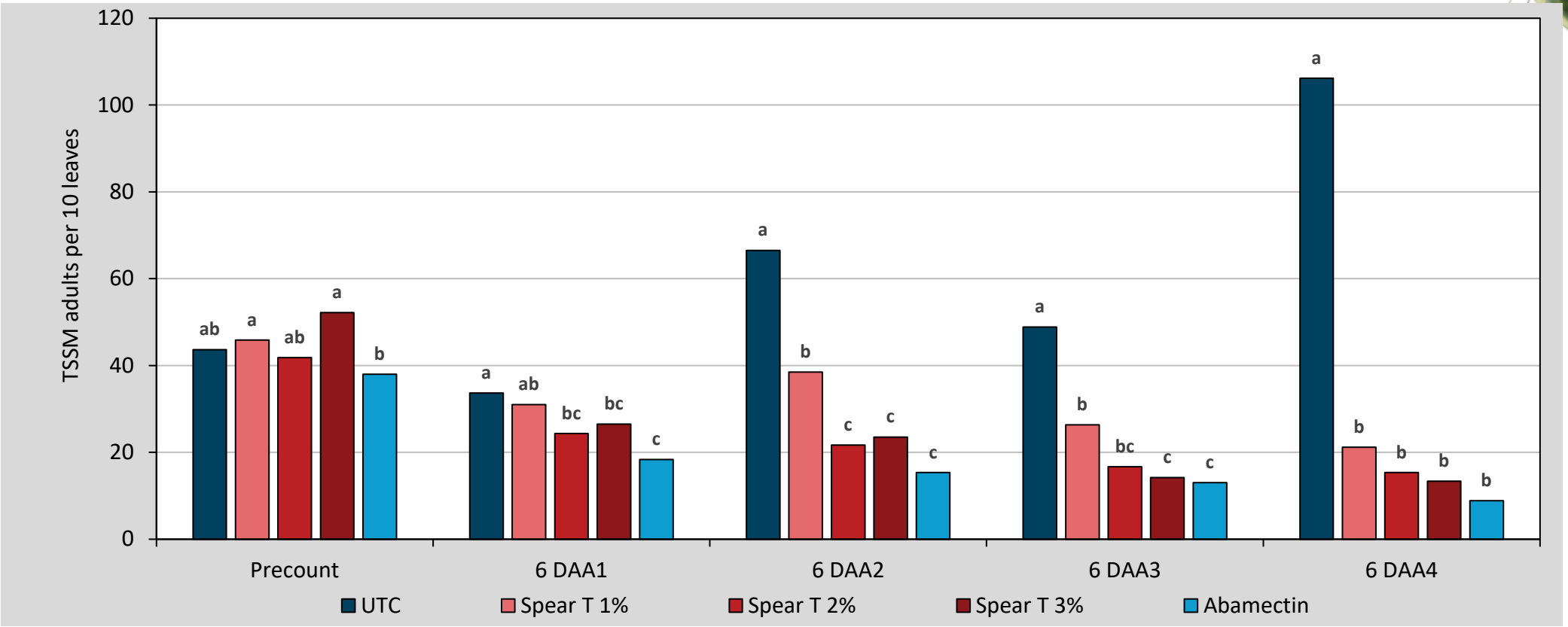
Twospotted Spider Mite in GH Tomato



TSSM adult population after application



Trial Outcome

- Spear-T @ 2-3% provided control equivalent to the commercial standard on all rating dates against TSSM eggs

Trial Summary

Design:

- RCBD
- 6 replicates
- 10 plants/plot

Treatments:

- Spear T @ 1, 2, 3 gal/100 gal
- Abamectin (Avid 0.15 SC) @ 3.8 fl oz/100 gal

Applications:

- 4 at 7-day intervals
- No surfactant added
- Spray volume 100 gal/A

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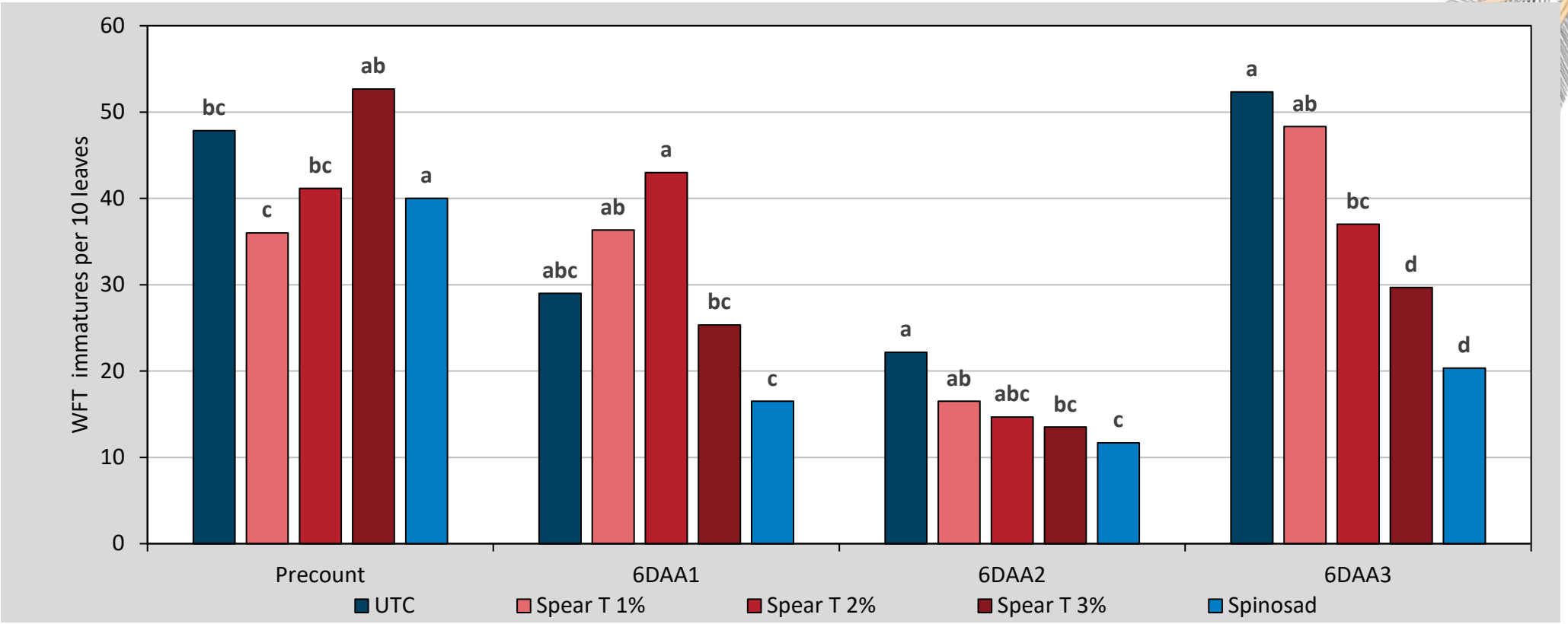
Western Flower Thrips in GH Tomato

WFT immature population after application



Trial Outcome

- Spear T @ 3% concentration provides control equivalent to Spinosad against WFT immatures

Trial Summary

Design:

- RCBD
- 6 replicates
- 10 plants/plot

Treatments:

- Spear T @ 1, 2, 3 gal/100 gal
- Spinosad (Success) @ 6.4 fl oz/100 gal

Applications:

- 4 at 1-wk-intervals
- No surfactant added
- Spray volume 100 gal/A

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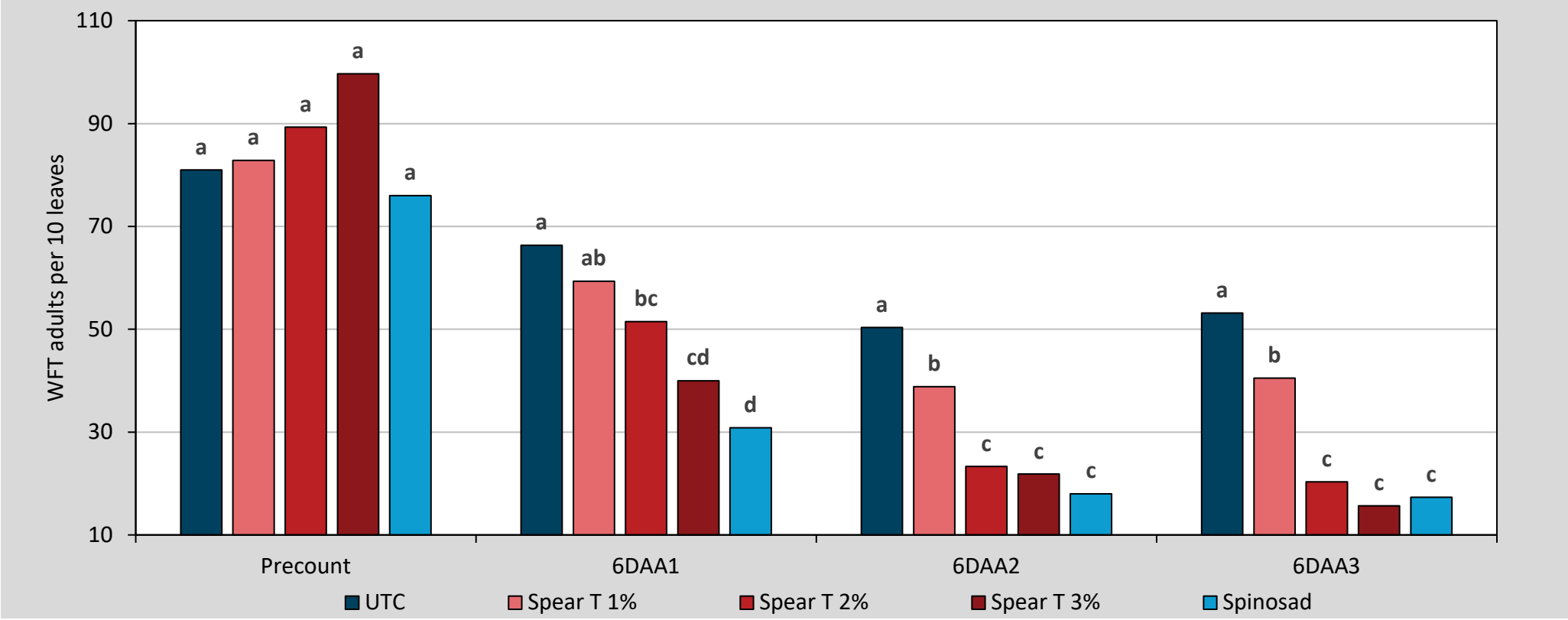
Western Flower Thrips in GH Tomato

WFT adult population after application



Trial Outcome

- Spear T @ 2-3% provides control equivalent to Spinosad against WFT adults

Trial Summary

Design:

- RCBD
- 6 replicates
- 10 plants/plot

Treatments:

- Spear T @ 1, 2, 3 gal/100 gal
- Spinosad (Success) @ 6.4 fl oz/100 gal

Applications:

- 4 at 1-wk-intervals
- No surfactant added
- Spray volume 100 gal/A

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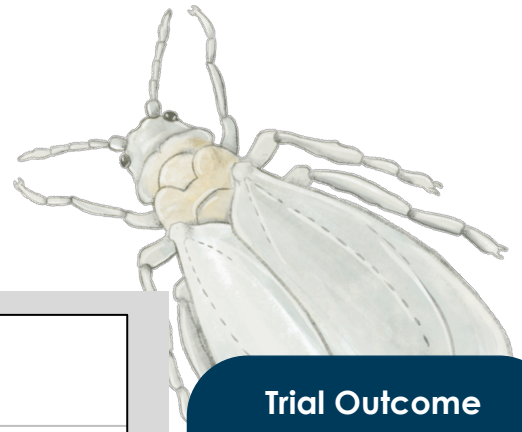
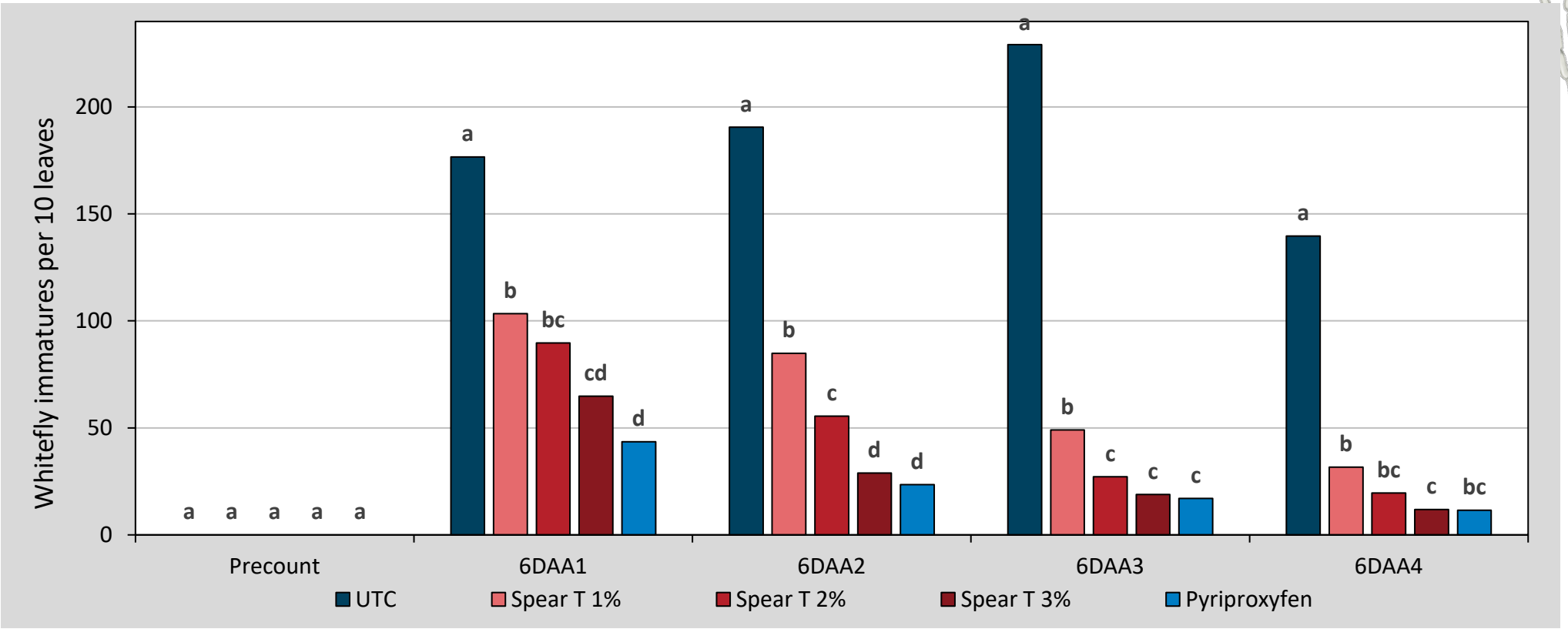
Silverleaf Whitefly in GH Tomato



SLWF immature population after application



Trial Outcome

- Spear T at 2-3% provides control equivalent to the commercial standard against whitefly immatures

Trial Summary

Design:
- RCBD
- 6 replicates

Treatments:
- Spear T @ 1, 2, 3 gal/100 gal
- Pyriproxyfen (Distance)

Applications:
- 4 at 1-wk intervals
- No surfactant added

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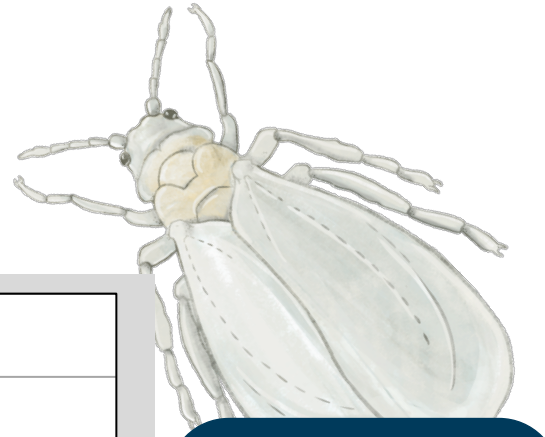
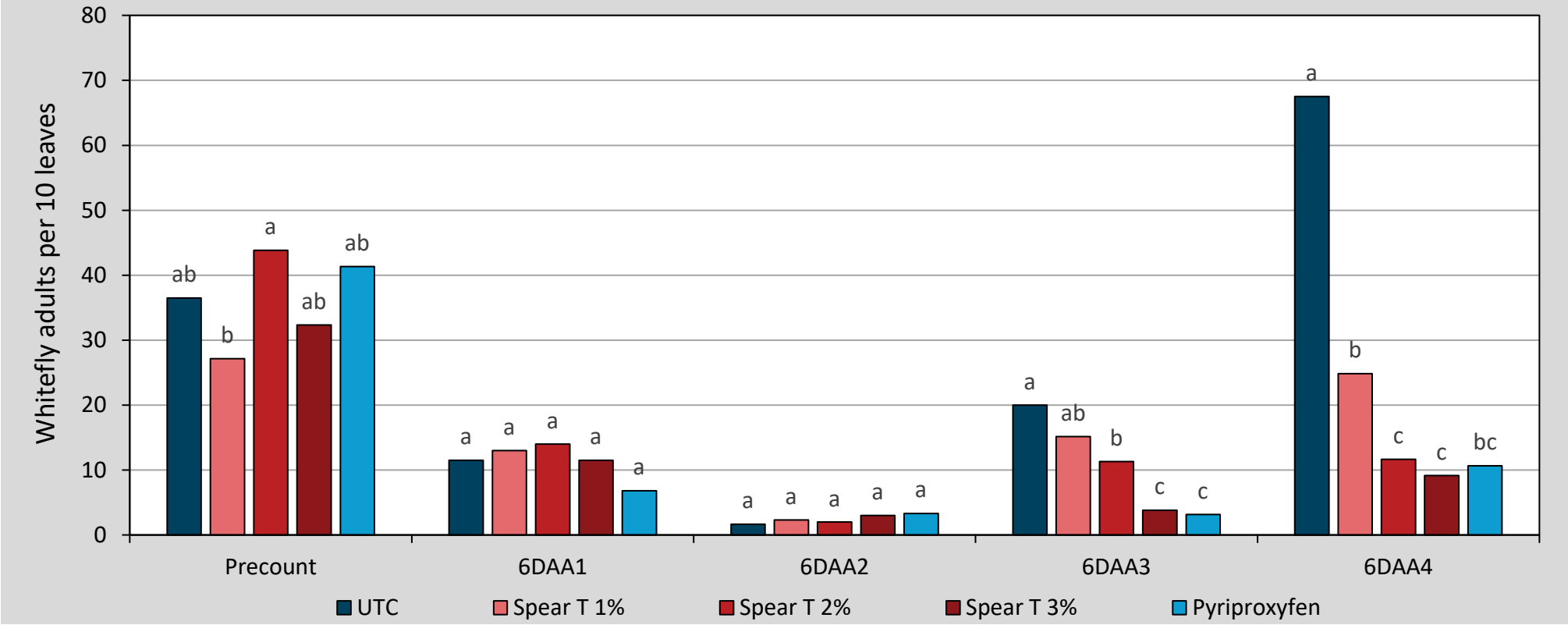
Silverleaf Whitefly in GH Tomato



SLWF adult populations after application



Trial Outcome

- Spear T at 2-3% provides control equivalent to the commercial standard against whitefly adults

Trial Summary

Design:
- RCBD
- 6 replicates

Treatments:
- Spear T @ 1, 2, 3 gal/100 gal
- Pyriproxyfen (Distance)

Applications:
- 4 at 1-wk intervals
- No surfactant added

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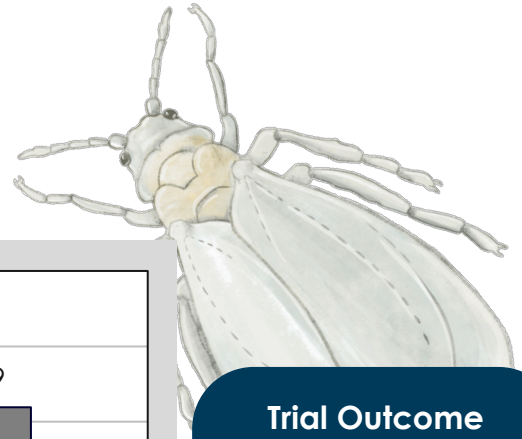
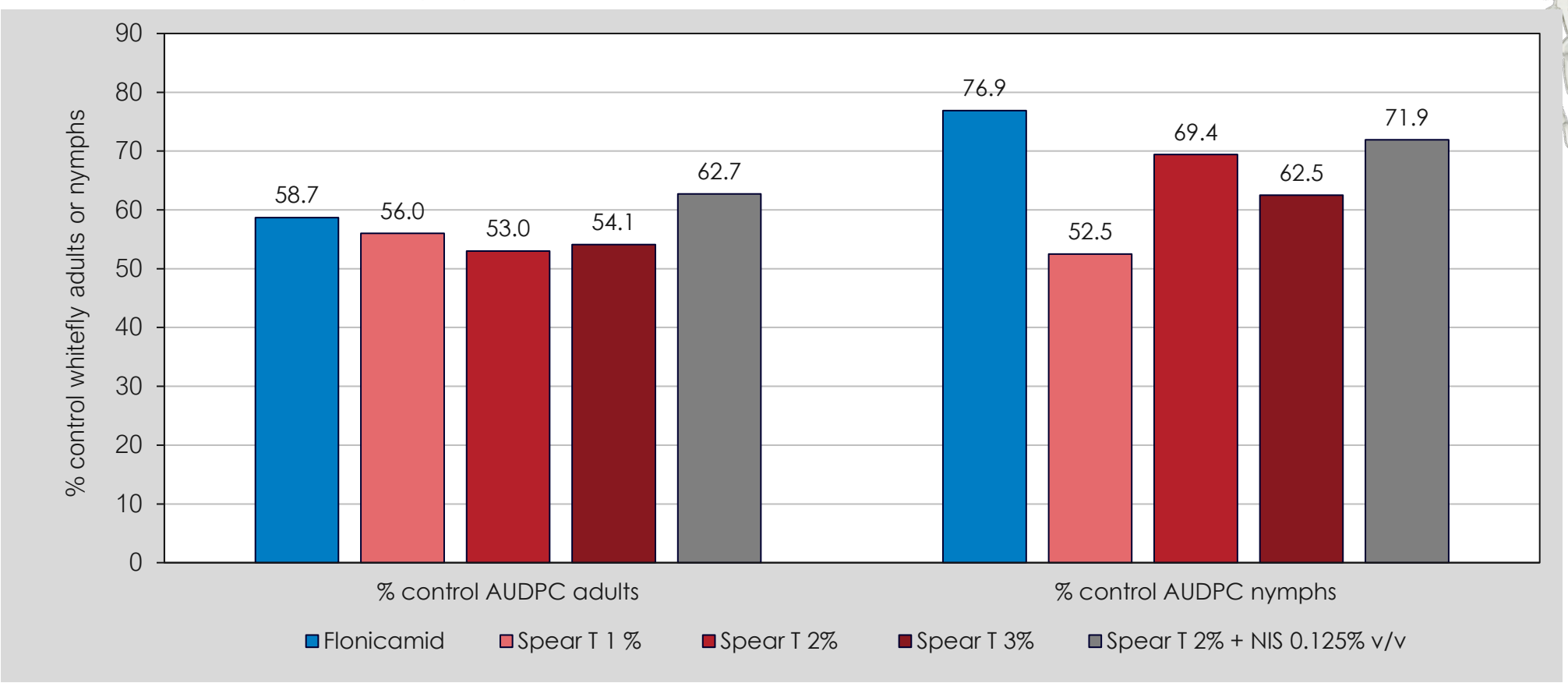
Silverleaf Whitefly in GH Cucumber



Control of SLWF adults and nymphs



Trial Outcome

- Including an NIS in a Spear T application increases efficacy against SLWF adults and nymphs

Trial Summary

Design:

- RCBD
- 6 replicates

Treatments:

- Spear T @ 1, 2, 3 gal/100 gal
- Spear T @ 2 gal/100 gal + DW80 NIS @ 0.125% v/v
- Flonicamid (Beleaf 50SG) @ 4.28 oz/acre

Applications:

- Spear T: 4 at 7-day intervals
- Beleaf: 2 at 7-day intervals
- Rating: count per 5 leaves per plot

VESTARON

Christopher Gee, Ph.D.
Field Development Manager, Northeast
(607) 227.8028
cgee@vestaron.com

THANK YOU FOR YOUR TIME!

QUESTIONS?

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