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RESEARCH & INNOVATION CENTRE

# Reducing disruptions to your IPM program

Michael Brownbridge

# Pesticide control of thrips… or "Nostalgia ain't what it used to be"

The good old days

- Insecticide applied every weekend because it was Saturday
- Twice a week in summer
- Pesticides worked….. most of the time
  - Against anything that moved

# Pesticide resistance:
## The final straw

- Prior to the 1980s, WFT was not a pest in its native range
- Pest status likely developed because of pesticide use to control other pests, now global
- **The failure of Success** – the ultimate oxymoron
- **Control failure** within 6 months of registration
- Created a massive shift towards biocontrol in the Ontario greenhouse flower industry (2007)
- Today >70% of Ontario flower growers use biocontrol

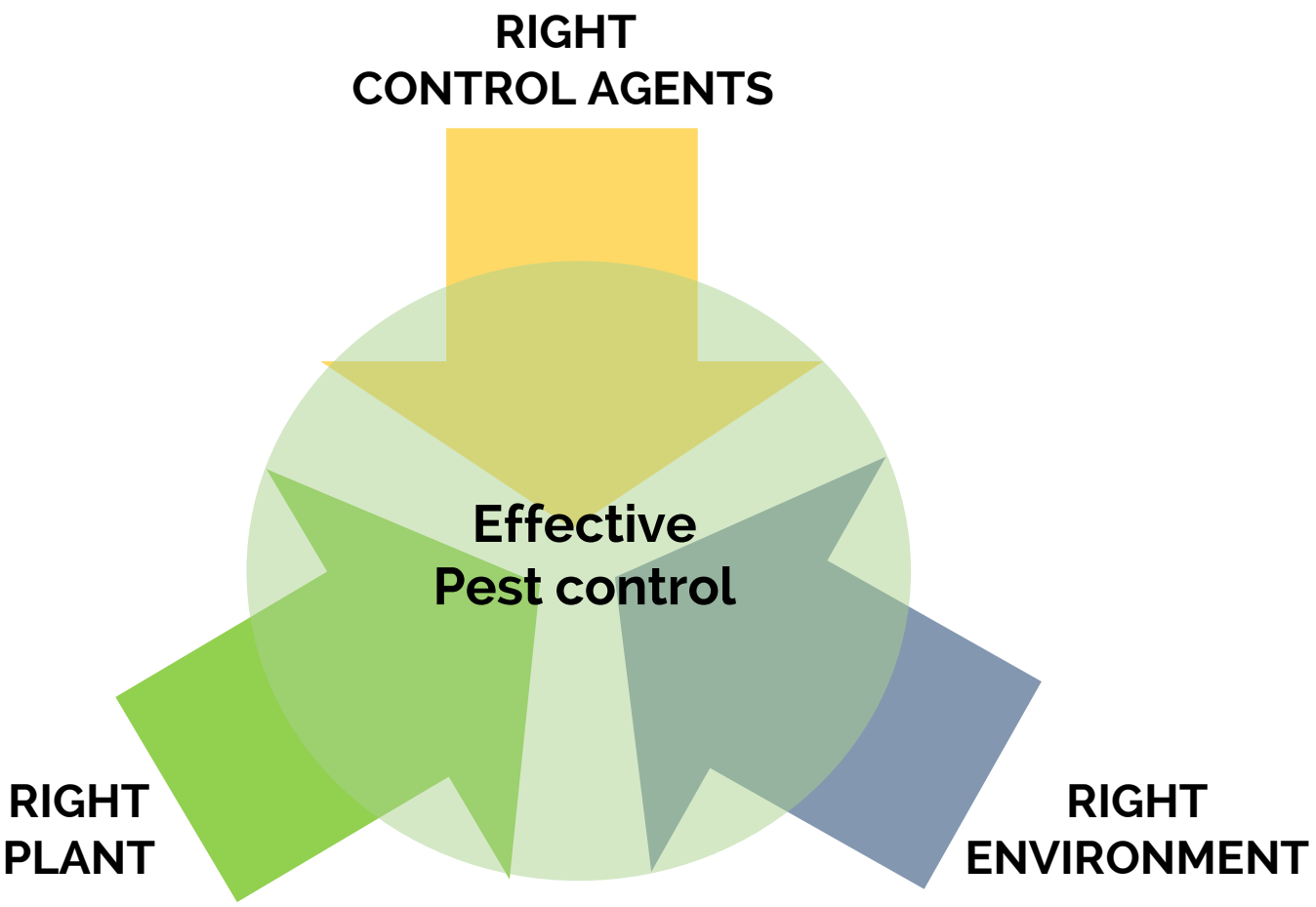
# Systems approach

Biocontrol-based IPM is:

- Preventative, long-term approach
- Where possible, design the production ecosystem to address underlying weaknesses that have allowed organisms to reach pest status

**Fixing a situation that is inherently flawed takes a lot of effort (and money)**

# Systems approach to IPM



# Today's session

Systems approach (to thrips IPM)

- Preparation phase
- Propagation phase
- Production phase

"If you can't control western flower thrips, you might as well stop growing flowers in greenhouses in Ontario."

Jamie Aalbers, Flowers Canada

# Preparation

## What do you know about the plants you will be growing?

Examples:

- Chrysanthemum cultivars show differences in susceptibility
  - Volatiles, flower colour
  - Feeding damage
  - Oviposition
- Do you have a choice?

# Attraction of thrips to other spring crops

## Sampled weekly

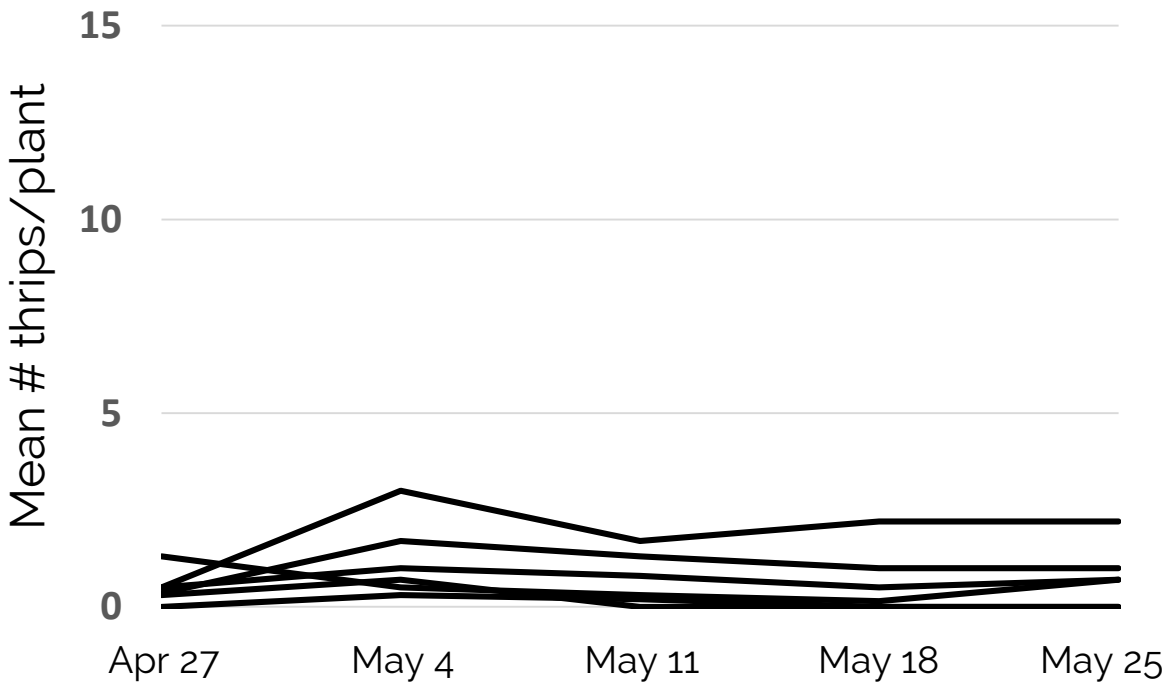
### 2-3 varieties each of

- Petunia
- Callibrachoa
- Verbena
- Bidens
- Lobularia
- Impatiens
- Dahlia
- Diascia
- Lantana
- Geraniums

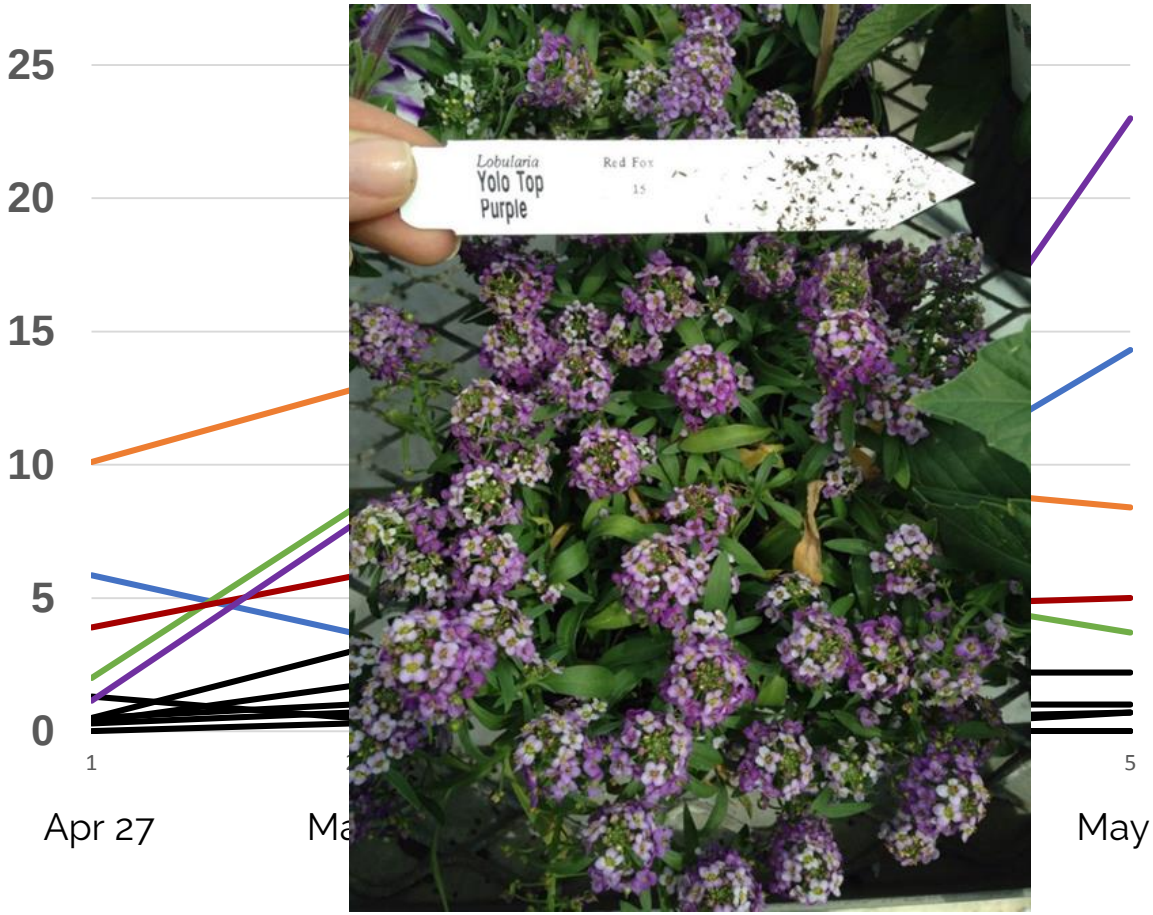
# Monitoring thrips in spring crops

## The good news…

- Most plants (>72%) had low thrips numbers
- < 5/plant on average



# BUT…
## Plants to keep an eye on

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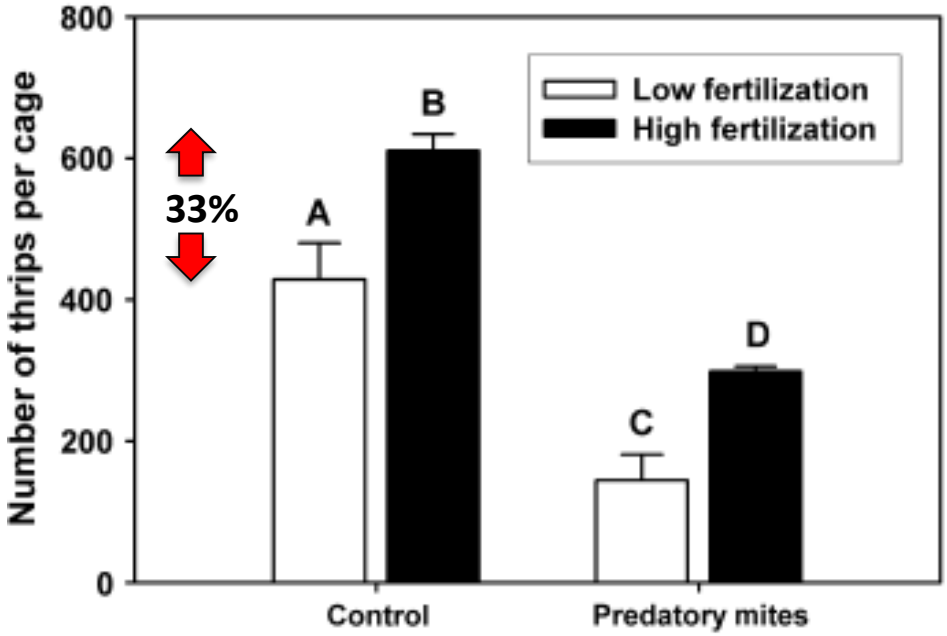
# Preparation

## Use this knowledge to your advantage

- Select ‘resistant’ cultivars
- Use to guide your scouting program
- Indicator plants
- Set up ‘trap plants’
- Focus for biocontrol


# Preparation

## Understand potential side-effects of production practices




- Reducing fertilizer can reduce pest abundance (esp. N)

# Food for thought…

- Most greenhouse crops are on high-fertilizer regimes

- Research suggests nutrient concentrations **can be reduced 50-75% without affecting the quality** of the finished crop

- **Other considerations:**
  - Increasing cost of fertilizers
  - Potential legislation regulating N and P run-off

# Preparation
## Exclusion/sanitation

### Sanitation

- Clean up crop residues
- No pet plants
- Disinfect benches, flood tables, drip lines, etc.
- Minimize weeds outside the greenhouse

### Exclusion

- Keep out intruders
- Screen vents

# Propagation

# Propagation

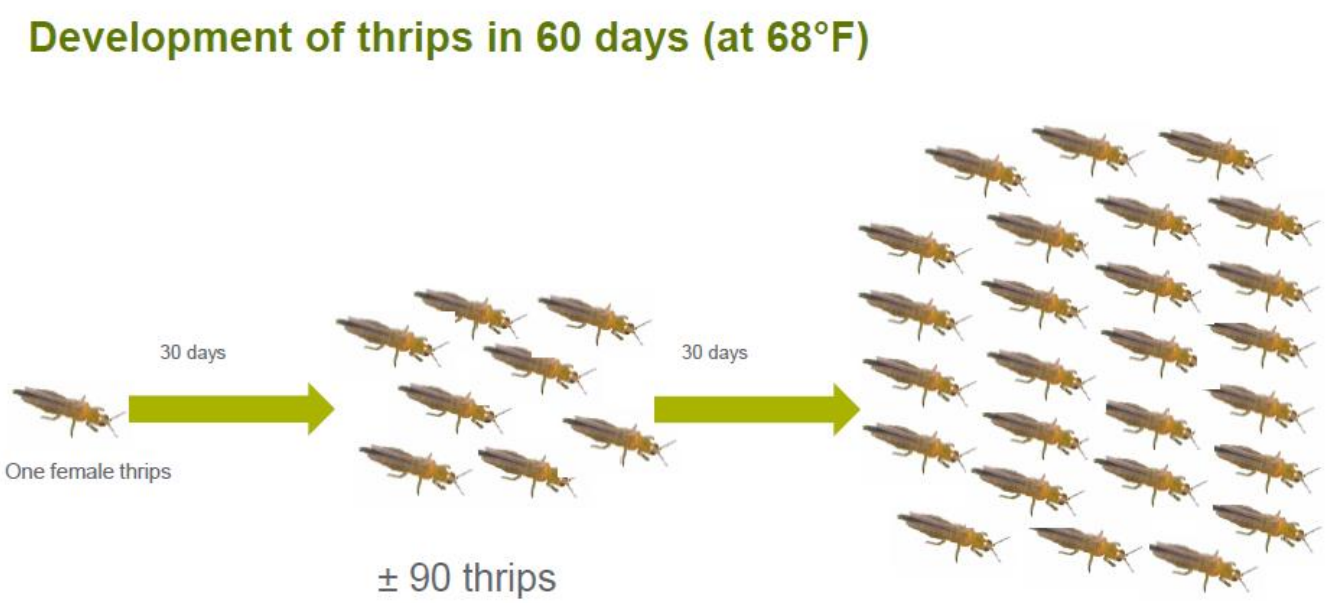
## Where do thrips* come from?

### Frequently arrive on imported cuttings

- Low numbers
- Hard to detect life stages
- Rapid life cycle
- Resistant
- **Residues**

*Insert: whitefly, spider mite, aphid, leaf-miner

# What happens if not controlled?




- Populations grow rapidly
- Biologicals cannot catch up
- Disruption of bio programs

Graphic courtesy of Ronald Valentin

# Options and actions

Scout incoming material

Assume propagative material will be infested

Mitigate early

Preventative options

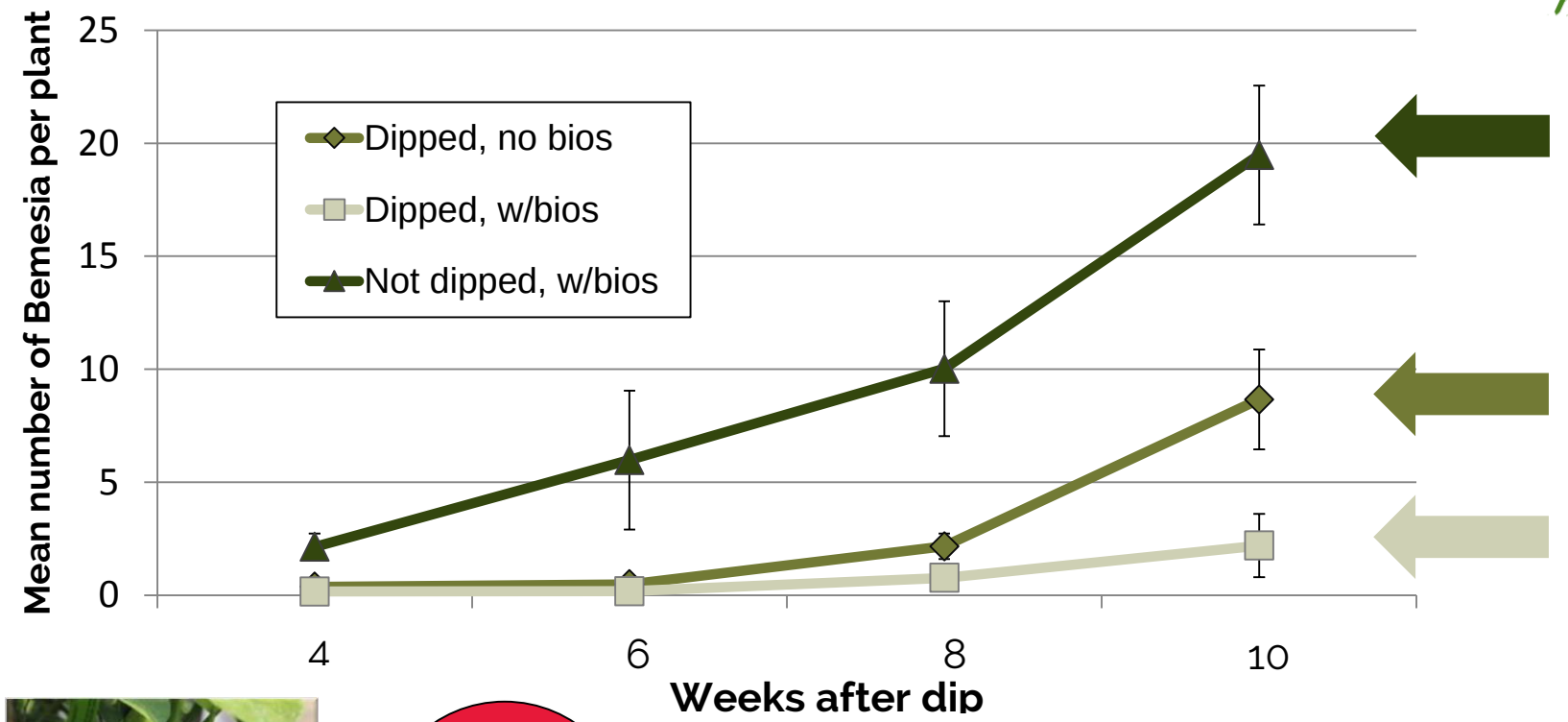
- Dipping
- 'Front-loading' a bio program

Follow up

- Monitor (traps with lures?)
- Esp. on susceptible cultivars

# Clean start – poinsettia cuttings

## BotaniGard WP/soap dip + *Eretmocerus eremicus*

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# Clean start:
## In-house propagation

Break the cycle

Focus on controls during propagation

- Better coverage on young plants
- Lower numbers

Sanitation

# Preparation and propagation

## Clean start

- Awareness, actions, prevention
- Early detection
- Know which are thrips- (or other pest) susceptible varieties
- Early action
- Follow up, monitor

# Production

# Production:
## A case study in chrysanthemum


Integrated use of biocontrol agents from propagation thru' finishing to shipping

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# Think PREVENTATIVE

## Start to finish

### Cuttings

- They will arrive with thrips
- Biologicals used immediately

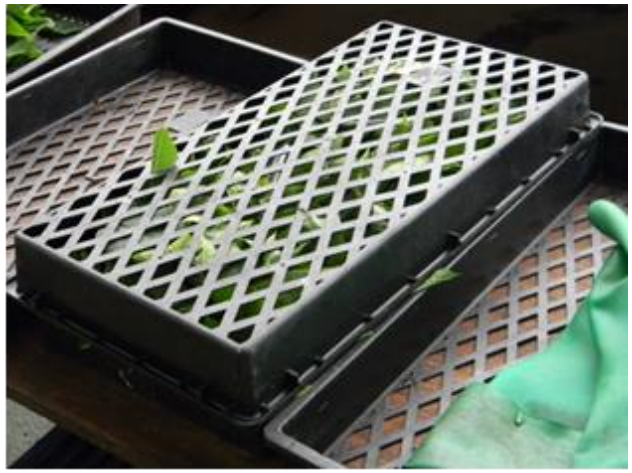
### Finishing

- Other pests will arrive
- Early intervention

# Propagation
## Dipping before sticking

### Cuttings immersed in

- Low risk (bio)pesticides
  - Insecticidal soap
  - Horticultural oil, e.g Suffoil®
  - BotaniGard
- Often combined with other products



# Misting and blackout stages

## BotaniGard® or Met52 EC

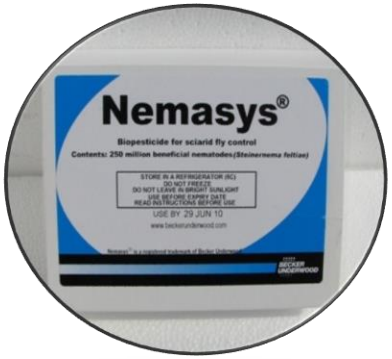
- Weekly sprays (3x)

## Nematodes (*S. feltiae*)

- Drench, weekly

## Predatory mites

- *N. cucumeris*
- Broadcast weekly (3x)





Mini Airbug

KOPPERT BIOLOGICAL SYSTEMS

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# Finishing
## Pots at final spacing, canopy not touching

### Predatory mites

- *N. cucumeris* mini-sachets
- 1 per pot

### Nematodes

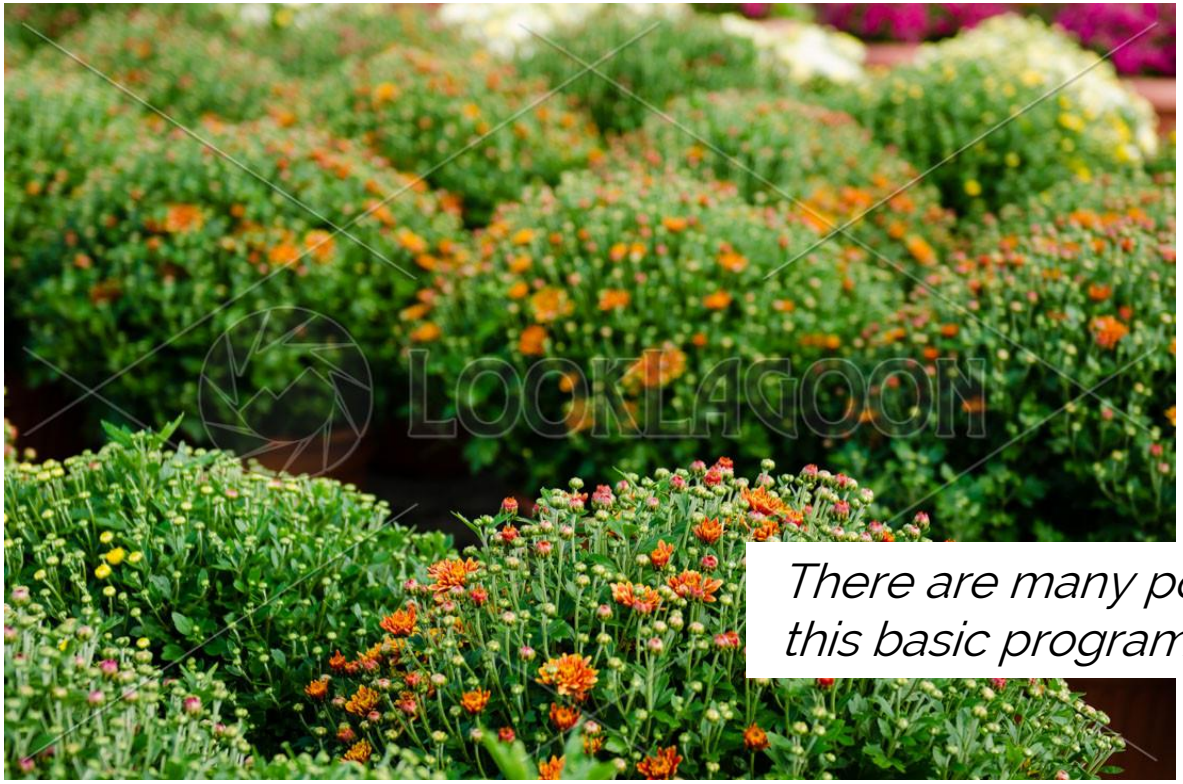
- Weekly until canopy closes

### Biopesticide sprays

- BotaniGard
- Met52 EC

# Finishing
## Canopy touching

- May want to **switch to swirskii** mini-sachets
- May be able to reduce sachets to 1 per 2-3 pots




*There are many possible variations on this basic program*

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# Use in other crop:
## Petunia

### Spring bedding / 4 inch crops:

- Not economical to do 1 sachet per pot
- Consider 3-4 mini-sachets per shuttle tray

# Using mites effectively
## Foliar predators

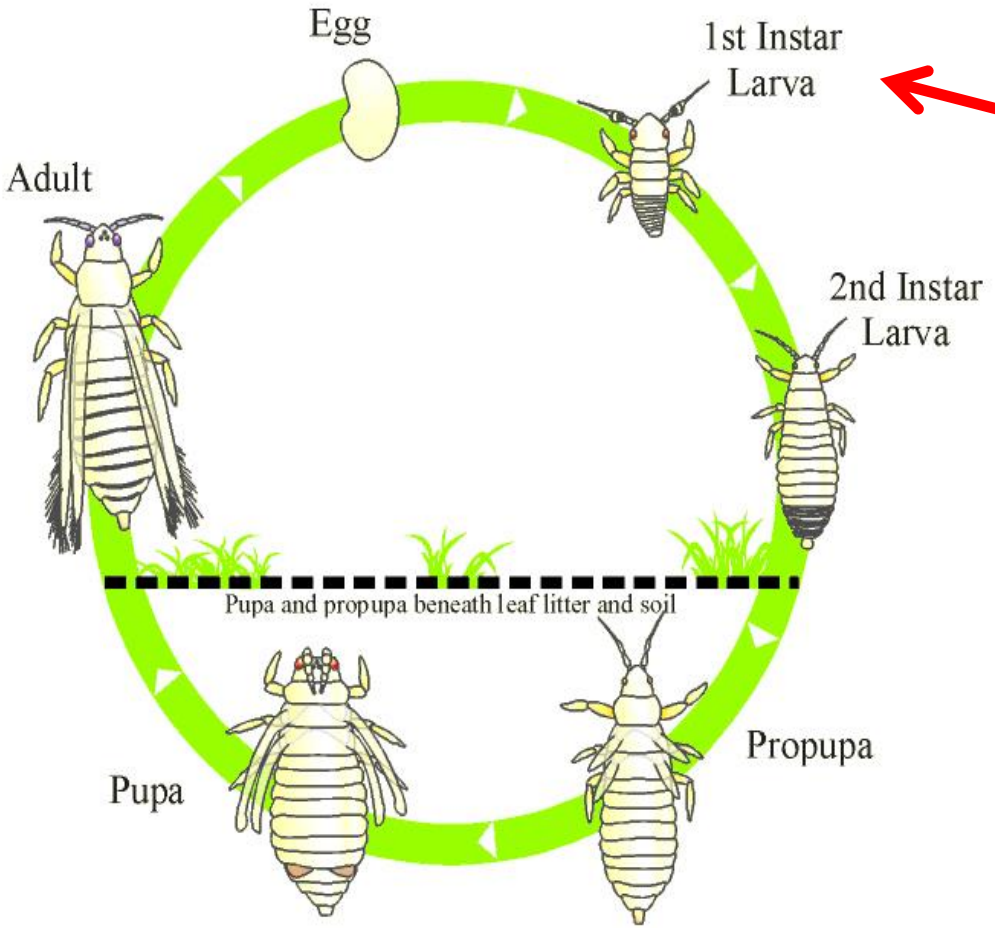
## So many choices!

**Which Predator?**
- cucumeris?
- swirskii ?
- limonicus?????

**Which Formulation?**
- Bulk Product
- Slow release sachets
- Mini sachets
- Continuous sachets
- etc.

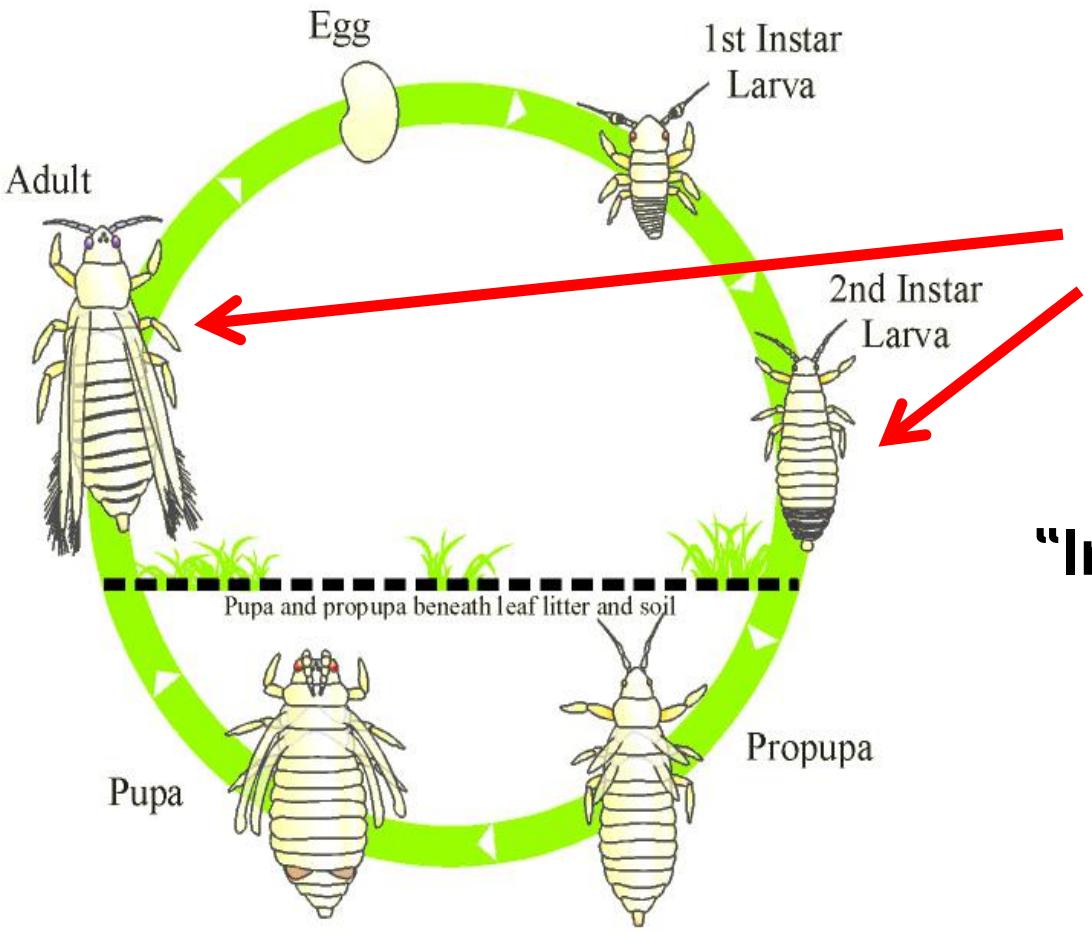
**When/how?**
- spring
- summer

# How they work:
## Consumption




Photograph by Steven Arthurs, University of Florida.

# How they work:
## Non-consumptive effects




**"Intimidation" reduces:**

- Feeding (-25%)
- Survival (-50%)
- Life span (-40%)
- Oviposition (-70%)

# Which predatory mite to use?

**The "old standby"**

Neoseiulus **cucumeris**

**The "rock star"**

Amblyseius **swirskii**

**The "enigma"**

Amblydromalus **limonicus**

**Cost:** 2-3x 2-3x

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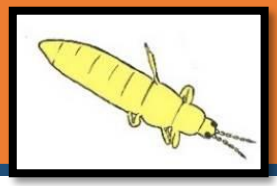
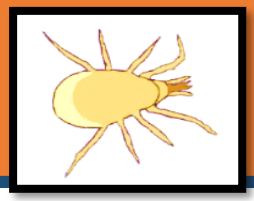
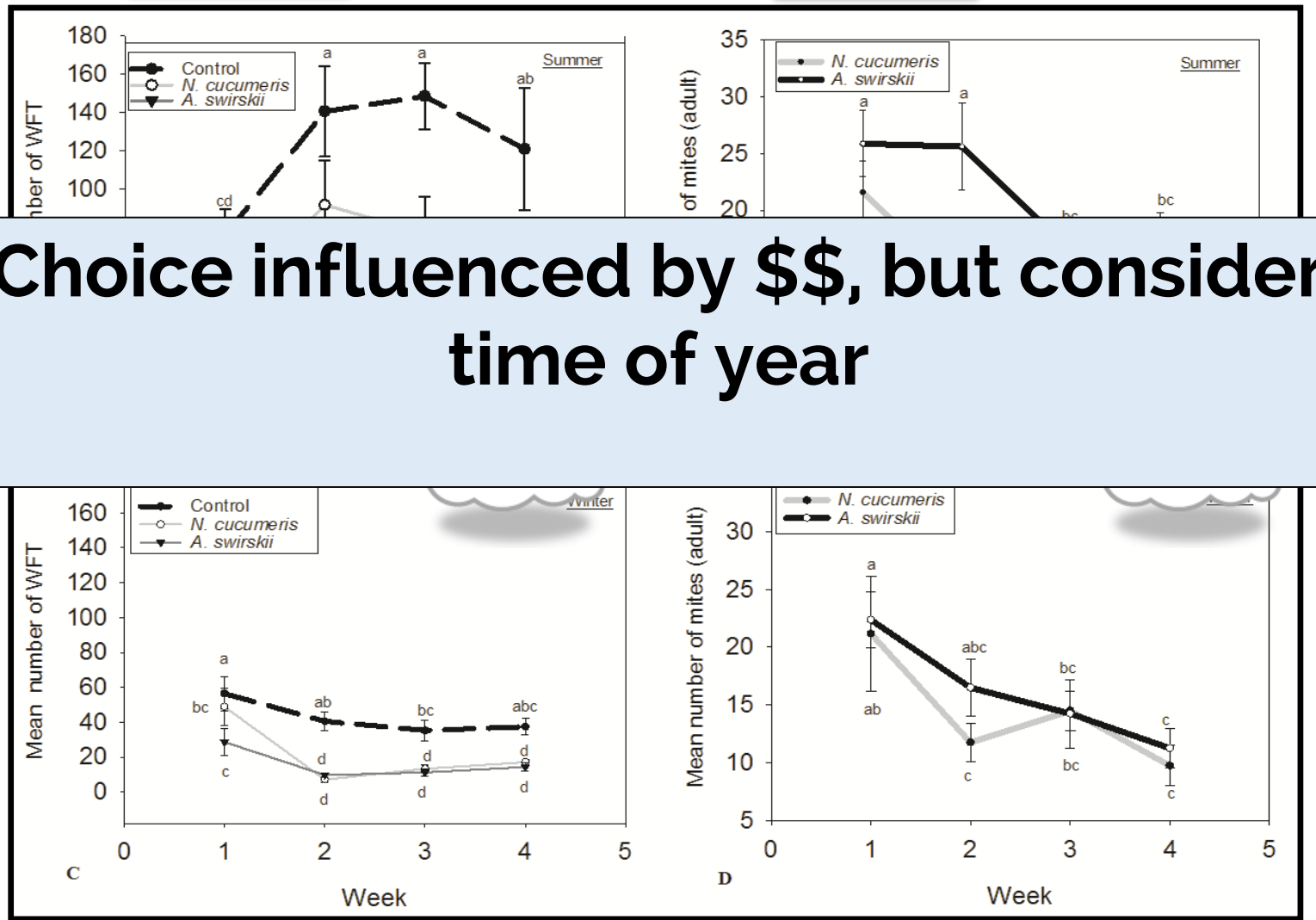
# Swirskii vs. cucumeris





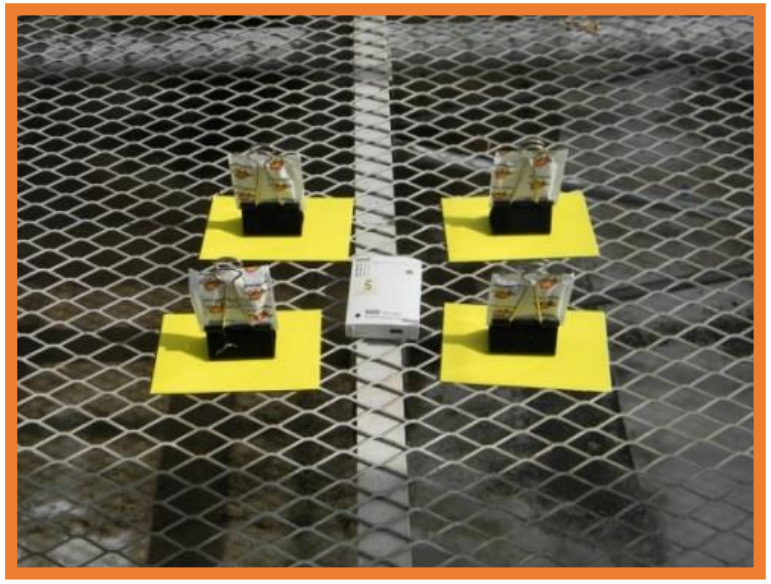



**Choice influenced by $$, but consider time of year**

g. temp &
:25 ° C,
% RH

g. temp &
: 18° C,
35% RH

# Using mites effectively:
## Sachet placement



- High temps. **speed up** mite development
- Low RH **decreases** oviposition

**!! Place sachets in shade, protected from the sun !!**

# Using foliar predatory mites effectively

## Propagation

**cucumeris**
- Cheaper for broadcasting
- Better at beginning of crop (when **temps. are cooler**)

## Spacing

**cucumeris or swirskii mini-sachets**
- **80% of product** wasted if applied by broadcasting
- Ca. 10¢/pot

## Finishing

**swirskii mini sachet**
- Better at end of crop (**temps. warmer**)
- Generally a **better thrips predator** – important now that pollen is available

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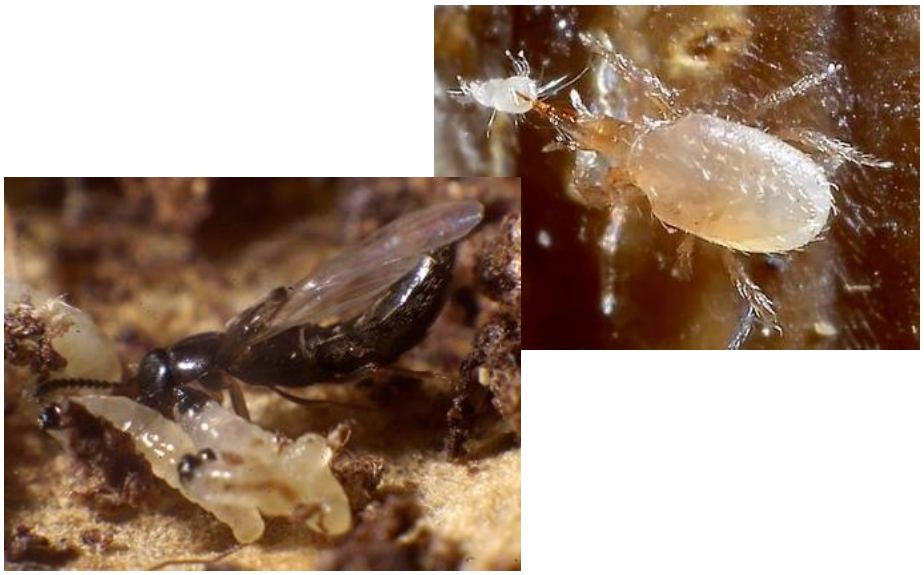
# Soil-dwelling predators:
## Supporting role

- **Soil-dwelling mites, Dalotia (Atheta) persist well**
- Apply once for a short-term crop.
- Can be distributed manually soon after planting, or on the planting line



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# Integration with biopesticides

BotaniGard 22WP (spray)

Met 52 EC (sprench/spray) or Met52 granular




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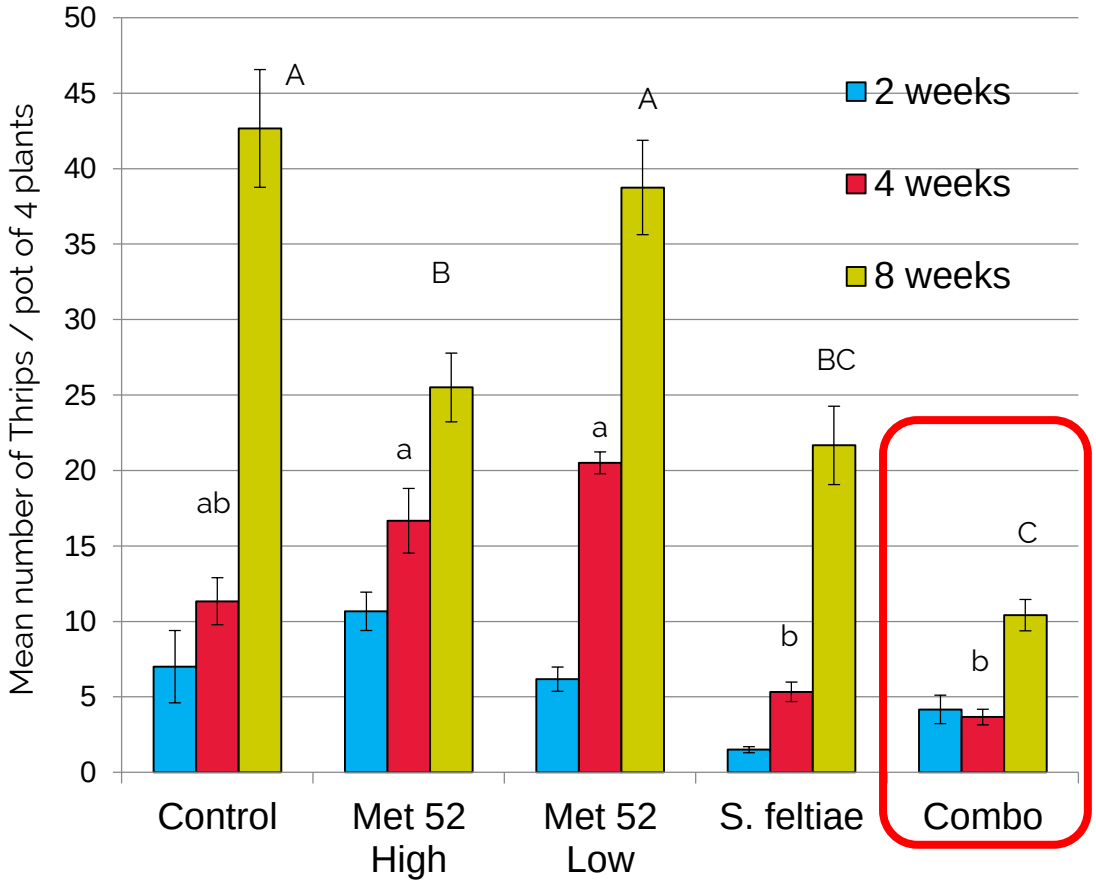
# Met52 granules plus nematodes

- Met 52/nematode combination suppressed thrips population
- Better than Met 52 high rate (3x the low rate)
- Also suppressed thrips after the nematode application ceased at 6wks

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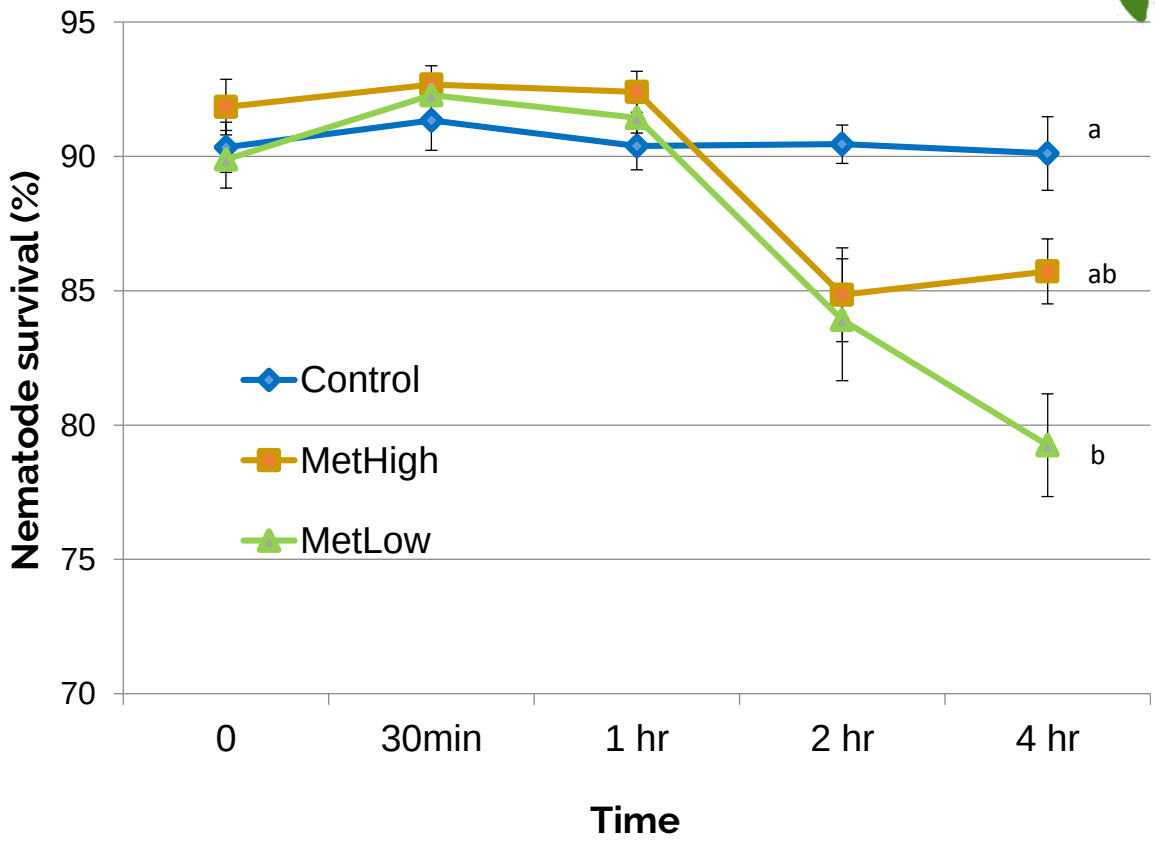
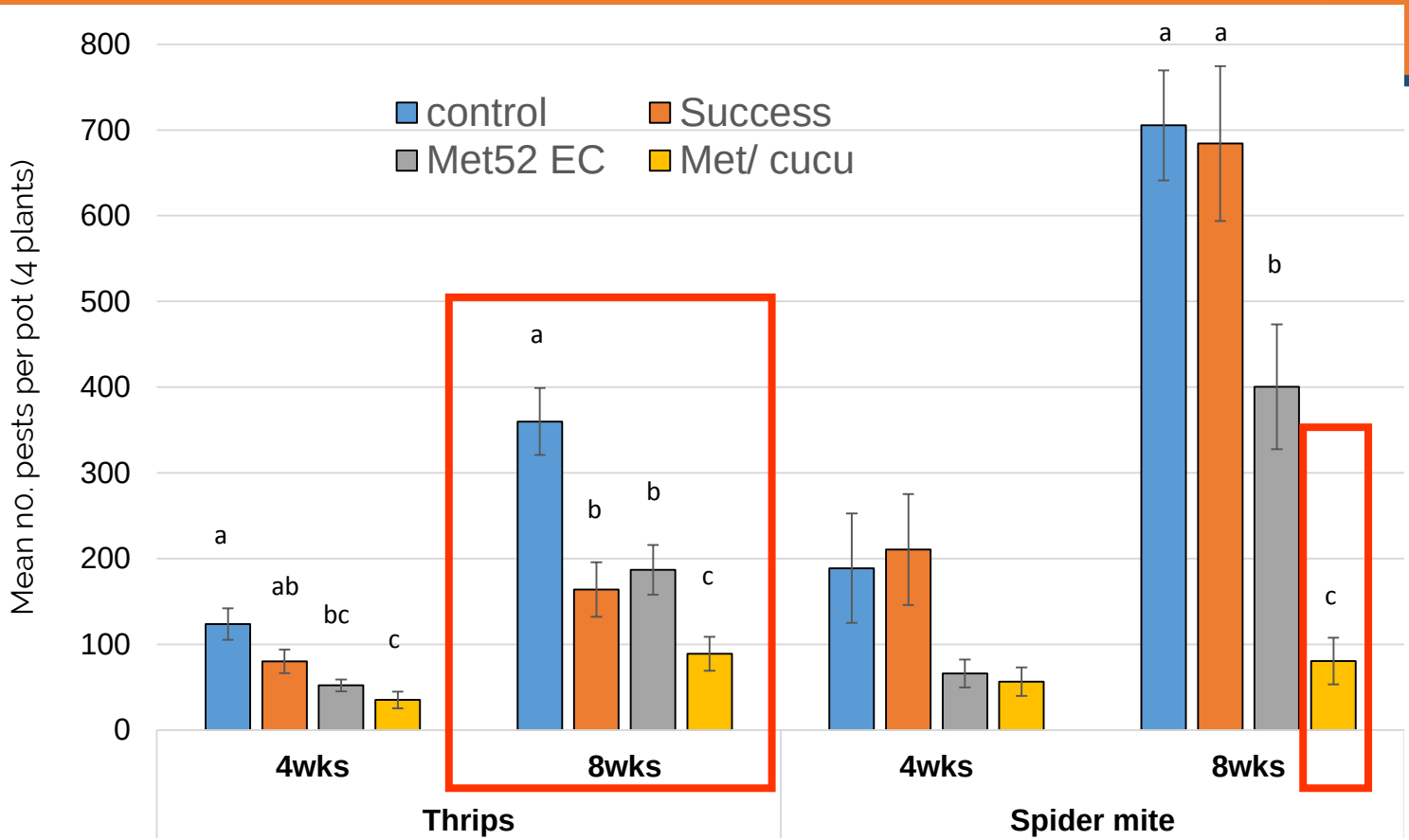
# Met 52 EC and nematodes:
## Tank mix compatibility

- Nemasys suspended in Met52 EC
- Nematode survival started to fall after 1hr.
- If tank mixing, prepare right before application



# Met52 EC foliar spray plus *A. cucumeris*




- Met52 EC compatible with *cucumeris,* excellent control of WFT
- Combination also supressed TSSM
- Out-performed 'Success' treatment (at label rate)

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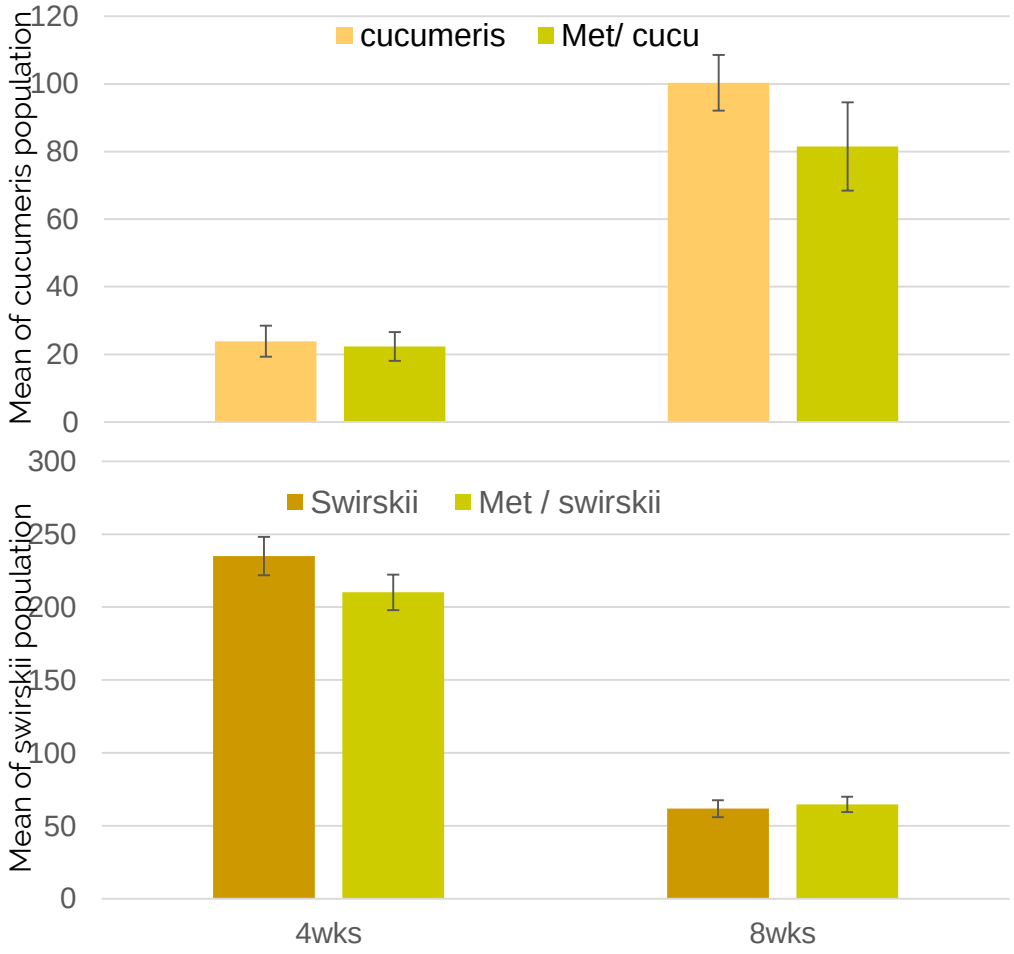
# Compatibility:
## Met52EC foliar spray and mites

- No difference in cucumeris /swirskii populations
- Compatible!
- In general, use of fungi enhances thrips control when used with predatory mites

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# Pesticides

## May be needed when:

- Pest pressures are too great
- Other pests arrive
- Where biocontrol is not working
  - Need to understand why it is not working
  - Will pesticides work any better?
  - What will be the wider implications?

## Need to ensure:

- Compatibility
- Impact on biocontrols understood
- See side-effects guides (incl. PGRs)

# Acknowledgements


- Rose Buitenhuis, Sarah Jandricic, Graeme Murphy, Taro Saito
- Technical crew and growers – too numerous to mention
- All our industry partners and funders


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