



# KOPPERT

B I O L O G I C A L S Y S T E M S

# Partners with Nature

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## INTRODUCING KOPP

- History
- Disciplines
- Mission

## THRIPS

- General info
- Damage
- Biology
- Beneficials

## KOPPERT BIOLOGICAL SYSTEMS

- Founded in 1967
- >1100 employees worldwide
- Family owned company
- Started with spider mite control

Nowadays a more holistic or total approach is used in both horticulture and agriculture



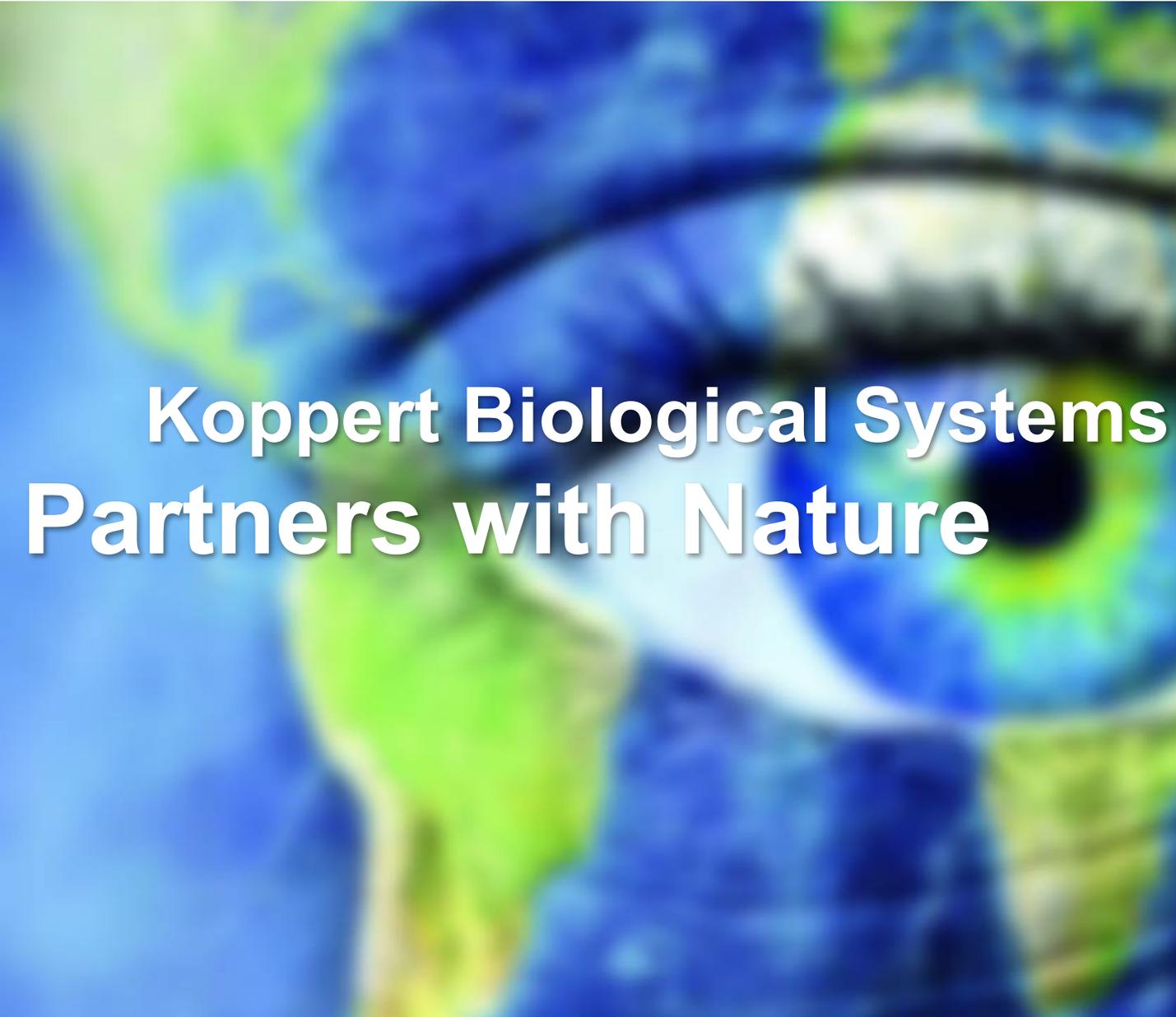
- Since 1967 the search for biological solutions has expanded
- Market leader in biological crop protection and natural pollination
- Koppert's solutions are successfully applied in more than 130 countries
- 27 offices worldwide



## KOPPERT'S CORE DISCIPLINES:

- Research and development
- Worldwide production and distribution of solutions
  - Resilient growth with NatuGro
  - Pest control
  - Natural pollination
  - Application techniques & monitoring
  - Seed treatment
- Know-how and knowledge sharing





**Koppert Biological Systems  
Partners with Nature**

**Koppert Biological Systems  
contributes to better health  
of people and the planet**

**In partnership with  
nature, we make  
agriculture  
healthier, safer and  
more productive**

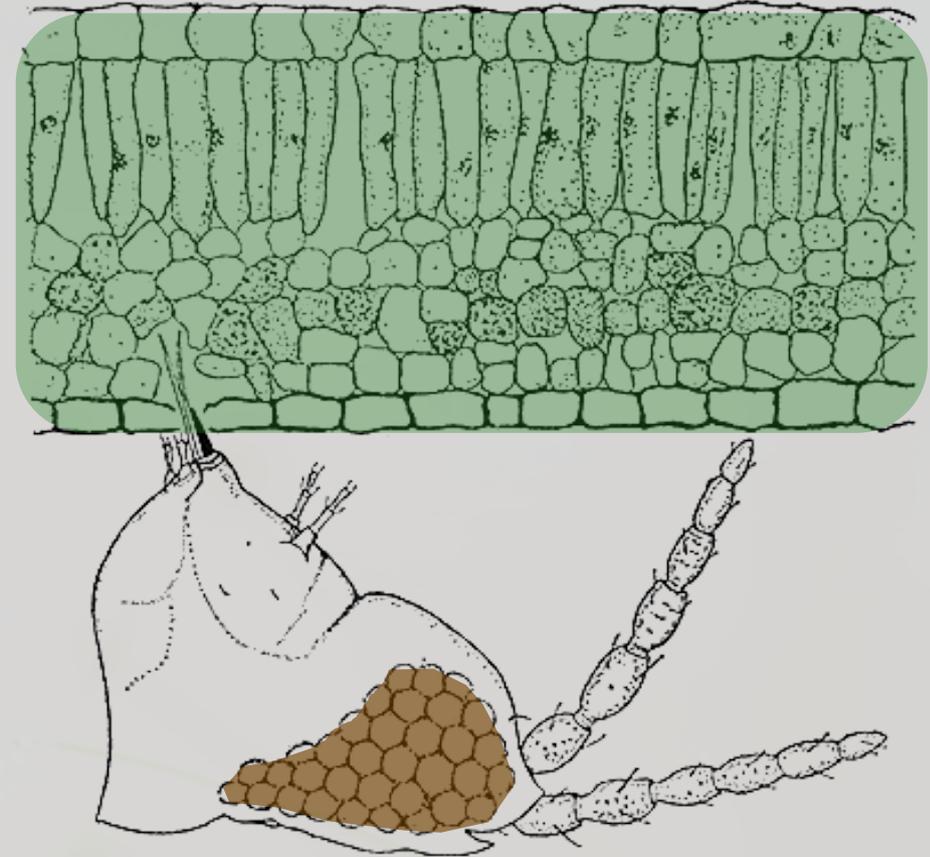
**We provide an integrated system of  
specialist knowledge and natural, safe  
solutions that improves crop health,  
resilience and production**

- Order Thysanoptera – ‘fringed wings’, thunderflies, stormflies
- Smallest winged insects (0,5 - 14 mm)
- > 5.000 known species
- Thripidae family cause most damage
- Polyphagous pest
- All over the world



## WHY IS THRIPS A PROBLEM?

- Sucking contents of leaves by piercing cells
- Silvery grey patches, later brown
- Black dots: excreta
- Reduced vigour of plants
- Misshapen leaves, flowers and fruits
- Vector of viruses: TSWV (tomato spotted wilt virus), INSV (impatiens necrotic spot virus)



# THRIPS DAMAGE IN FLOWERS



Edges damaged

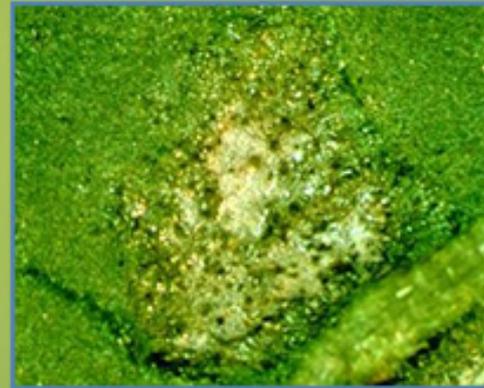


Discolouration



Misshapen

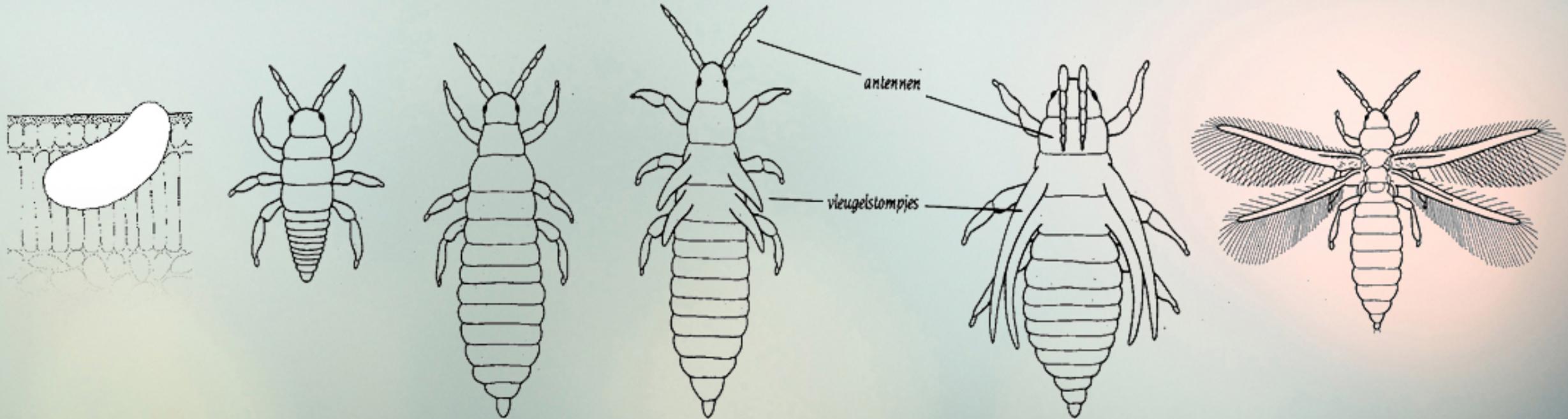
# LEAF DAMAGE OF THRIPS



## THRIPS DAMAGE IN BROMELIA



# THRIPS STADIA LIFE CYCLE



# RECOGNITION

A western flower thrips egg dissected out of the leaf

Egg

Larva

Pupa

Adult





- Total egg production 40 - 145 per female
- Optimum temperature for development 27-30°C
- <10°C and >35°C no development
- Overwintering in greenhouses
- Active in morning

# DEVELOPMENT IN DAYS @ DIFFERENT TEMPERATURES (°C) ON MUMS

	15	20	25	30	35
Egg	10,1	6,6	3,2	2,5	2,4
Larva 1	5,6	2,9	1,7	1,3	1,4
Larva 2	11,5	9,5	4,8	2,6	3,3
Prepupa	3,6	2,2	1,1	0,9	1,0
Pupa	8,6	5,1	2,7	2,0	1,9
Egg-Adult	39,4	26,3	13,5	9,3	10,0
PO-period*	6,4	2,1	1,7	1,6	1,4
Egg-Egg	45,8	28,4	15,2	10,9	11,4
# Mortality	13,7	13,2	8,9	10	27,1
Lifespan ♀	46,3	75,2	31,4	12,7	9,5
# Hatched eggs/♀	50,5	125,9	135,6	42,0	5,1

\*Pre-oviposition = time between becoming adult and first egg-laying

# POPULATION GROWTH - FRANKLINIELLA OCCIDENTALIS

144 eggs / female @25°C

Natural mortality 7%

Sex ratio : 66% ♀

1 <sup>st</sup> Generation	2 <sup>nd</sup> Generation
1 Thrips ♀ →	144 eggs
Mortality	10 eggs/L1
Adults	134 insects
Females	88



# MONITORING THRIPS: HORIVER STICKY TRAPS



- First visible damage
- Tapping of flowers
- Whole area
- Damage threshold
- Determine species



# NATURAL ENEMIES OF THRIPS – PREDATORY MITES

SWIRSKI-MITE - *Amblyseius swirskii*

MONTDO-MITE – *Transeius montdorensis*

LIMONICA - *Amblydromalus limonicus*

THRIPEX - *Neoseiulus cucumeris*

SPICAL - *Neoseiulus californicus*

ENTOMITE-M - *Stratiolaelaps scimitus (Hypoaspis)*

MACRO-MITE - *Macrocheles robustulus*



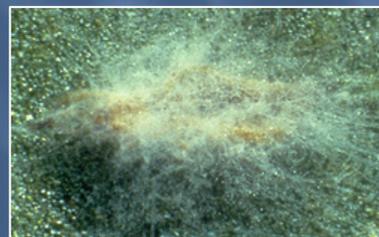


- Fully automated
- Suitable for 'lower' crops: cut flowers and bedding plants
- Labour saving
- Excellent distribution
- Repetition brings continuity

THRIPOR-L - *Orius laevigatus*



MYCOTAL - *Lecanicillium muscarium*

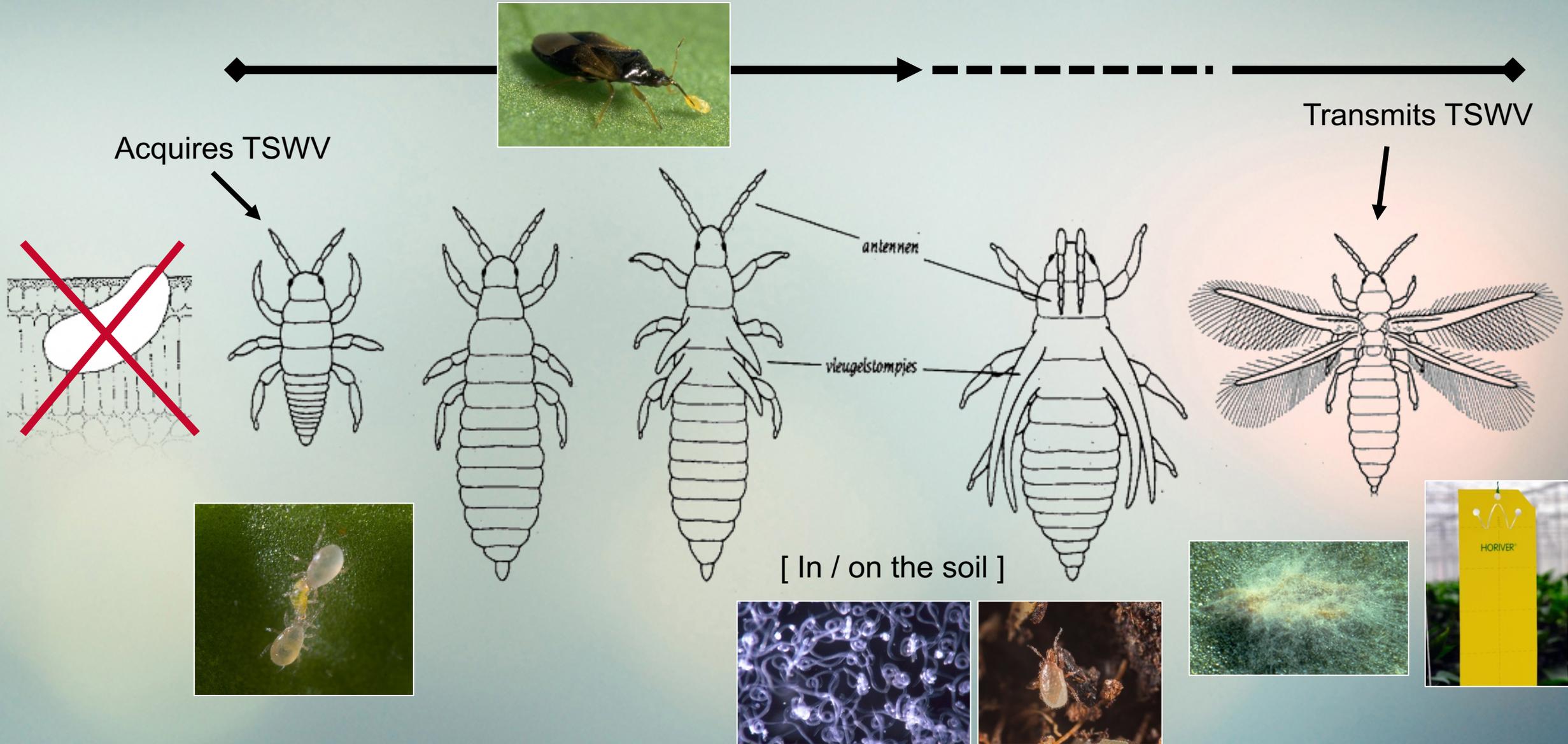


ENTONEM - *Steinernema feltiae*



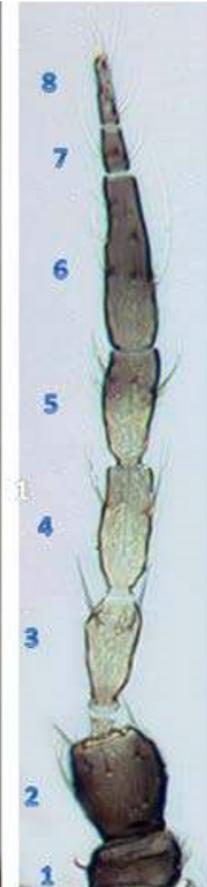
} Spray applications

# THRIPS STADIA + BENEFICIALS



# NEW THREATS

- *Echinothrips americanus*
- *Thrips setosus* – Japanese flower thrips
- *Hercinothrips femoralis* – Banded greenhouse thrips
- *Heliothrips haemorrhoidalis* – Black tea thrips
- ...



## NEW PRODUCT – ULTI-MITE SWIRSKI

- ULTI-MITE Swirski
- Compostable foil
- Low humidity conditions
- More mites
- Stronger hook
- Patented design
- New formulations expected
- Multiple pests





## KOPPERT

- Family owned company
- Multiple disciplines
- Know how
- New threats
- Solutions
- Opportunities

CLOSURE

THANKS!

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