Amblyseius swirskii

a new breakthrough
in biological control
in greenhouses

Karel Bolckmans, Yvonne van Houten, Hans Hoogerbrugge,
José Belda, Javi Calvo, Mireille Piron

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Biological control in greenhouses

- Commercial biological control with natural enemies started in 1967 in the UK and the Netherlands.
- *Phytoseiulus persimilis* against two-spotted spider mites in greenhouse cucumbers.
- Today around 30 different beneficial insects and mites are available.
Biological control in greenhouses

• Standard technique in greenhouse vegetables in North/Central Europe and North America.
• Increasingly used in greenhouse ornamentals.
• Developing in Mediterranean and Asia.
• Main pests: whiteflies, western flower thrips, two-spotted spider mites, aphids, leafminers + minor secondary pests.
Biological control of Thrips & Whiteflies

• Western Flower Thrips (*F. occidentalis*)
  - *Amblyseius cucumeris* (1985)
  - *Orius spp.* (1991)
  - *Iphiseius degenerans* (1994)

• Whiteflies (*T. vaporariorum, B. tabaci*)
  - *Verticillium lecanii*
  - *Eremocerus eremicus* (1994)
North vs. South Europe

Key contradiction =

Pest Pressure

vs.

Economics
Predation of Whiteflies by Phytoseiidae


WFT control in cucumbers

(Applied Plant Research, Gerben Messelink, Groenten & Fruit, November 2003)

Numerical response vs. predation capacity

![Graph showing numerical response vs. predation capacity for various treatments compared to A. cucumeris and F. occidentalis larvae.](image_url)
**Amblyseius swirskii**

- syn. *Typhlodromips swirskii*
- In 1966 described by Y. Teich to feed on whiteflies
- Coastal areas of Eastern Mediterranean
- Citrus, fruit trees, cotton, ...
- No diapause
- Unable to survive low winter temperatures
Sweet pepper: preventive release
the Netherlands, field trial

- 1 plot of 1.600 m², commercial greenhouse
- *T. swirskii* released in week no. 7 & 10, 2004
- \(20 + 15 = \frac{35}{m^2}\) in total
- NO release of *A. cucumeris, A. californicus or A. degenerans*
- Spider-mite pest-in-first, *O. laevigatus* and *M. caliginosus*
- Sulfur vaporized
Establishment on plant pollen

A. swirksii population on sweet pepper

Mean number per leaf

Week number

- Adults
- Nymphs
- Eggs
Sweet pepper: *F. occidentalis* control
the Netherlands, semi-field trial

- 4 cages of 3 m²

- 5 sweet pepper plants per cage
  - *A. cucumeris* (1N/leaf)
  - *A. cucumeris* (3x10N/leaf)
  - *T. swirskii* (1N/leaf)
  - Untreated control

- *F. occidentalis* released 3 times 2♀ per plant
Predatory mite population

A. cucumeris (1N)
A. cucumeris (3x10N)
T. swirskii (1N)
Untreated

Week number
Average number per leaf

15 16 17 18 19 20 21 22
Frankliniella occidentalis
larvae on the leaves

Week number

# F. occidentalis

<table>
<thead>
<tr>
<th>larvae per leaf</th>
<th>A. cucumeris (1N)</th>
<th>A. cucumeris (3x10N)</th>
<th>T. swirskii (1N)</th>
<th>Untreated</th>
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KOPPERT
BIological Systems
**Frankliniella occidentalis**

(mobile stages) in the flowers

Week number

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**# F. occidentalis per flower**

- A. cucumeris (1N)
- A. cucumeris (3x10N)
- T. swirskii (1N)
- Untreated
Sweet Peppers : Thrips + Whiteflies
Aguilas, Spain, semi-field trial

• Experimental tunnel with isolated walk-in cages
• 20 sweet pepper plants per cage
• 3 replicates, CRBD
• 3 treatments
  • Untreated Control
  • 25 A. swirskii/m2
  • 100 A. swirskii/m2
Trial Plan

- 6

Day

4 Thrips/pl
2 B. tabaci/pl

0

4 Thrips/pl
2 B. tabaci/pl

1

8

A. swirskii
25 T.s./m²
100 T.s./m²
Whitefly Population: Nymphs

Number / Leaf

- Control
- 25 AS
- 100 AS

Whitefly Population: Nymphs
Whitefly Population: Adults

Number / Leaf

S0 S1 S2 S3 S4 S5 S6 S7 S8

Control

25 AS

100 AS
Thrips Population (leaves)

Number / Leaf

S0  S1  S2  S3  S4  S5  S6  S7  S8

Control

25 AS

100 AS

Thrips Population (leaves)
Cucumbers: whitefly and thrips control
Spain, Semi-field Trial

- Date: March – April 2006
- 5 treatments @ 3 replicates (CRBD)
- Treatments:
  - CBT: 30 Bt/plant
  - CFO: 15 Fo/plant
  - ASBT: 75 As/m2 + 30 Bt/plant
  - ASFO: 75 As/m2 + 15 Fo/plant
  - MIX: 75 As/m2 + 30 Bt/plant + 15 Fo/plant
- Infestation 3 weekly releases: B.t (10 + 10 + 10) F.o. (5 + 5 +5)
B. tabaci
(Adults)
B. tabaci (Nymphs + Pupae)
Sweet Peppers: *B. tabaci* control
Spain, semi-field trial

- 3 replicates
- 2 treatments
  - *E. mundus*
  - *E. mundus* + *A. swirskii*
- *Bemisia tabaci*
  - 5 x 10 adults/plant
  - weekly intervals
- *E. mundus*:
  - 4 x 6/m2,
  - starting 1 week after 1st release of *B. tabaci*
- *A. swirskii*
  - 50/m2
  - 1 release, 1 week after 1st release of *B. tabaci*
Amblyseius swirskii

Ind / leaf

Week

E.m.  E.m. + A.s.

E.m.
Bemisia tabaci

Red = E. mundus (4x6/m2)
Grey = E. mundus (4x6/m2)
+ A. swirskii (1x50/m2)
Mass-rearing *A. swirskii*

1. Plant pollen (e.g. *Ricinus communis*)
2. Factitious rearing host:
   - *Carpoglyphus lactis* ("Sugar Mite", "Dried Fruit Mite")
   - PCT Patent Pending (submitted 31-12-2004)

The development of a cost-effective mass-rearing method was the key to large scale use.
Product Formulations
All about swirskii

On this website, you can read all about the new predatory mite, *Amblyseius swirskii*. Not that we know absolutely everything. On the contrary, we are learning more and more every day. But we are keen to share what we do know with you, because we believe that this predatory mite really offers something valuable that you as a grower can use.

We believe that this is a good example of how research and practice can go together. The information from both these fields can be found on this site.

This website is a translation of a website about swirskii that was previously launched in the Netherlands (www.allaboutswirskii.nl).
Conclusions

• **High numerical response** to availability of food.

• **Highly efficacious** against western flower thrips, greenhouse whiteflies and tobacco whiteflies. Also an effect on broad mites and two-spotted spider mites.

• In combination with standard beneficials

• **Establishment**
  - Good establishment in peppers and eggplants on pollen
  - Whiteflies in cucumbers, melons and ornamentals such as gerbera and hibiscus can play the role of pollen in peppers
  - No good establishment on tomatoes

• Good results in **North and South Europe**

• Not cold tolerant

• Will replace *A. cucumeris* and *A. degenerans*. 
Conclusions

• The development of *Amblyseius swirskii* is a good example of the role of universities, research stations and companies in the development of new biological control agents.

• Marketed in Europe, USA and Canada for sweet peppers, eggplants, cucumbers, melons, beans and several ornamentals.

• Inoculative release in vegetables. Requires very little technical support.

• Can be produced at lower cost than parasitoids and predatory bugs. PCT Patent Pending technology.

• Will play a key role in the development of economic and user-friendly biological control programs in summer plantings of peppers, eggplants, beans and cucurbits in the Mediterranean.
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