Een “standing army” voor biologische bestrijding in de glastuinbouw

Gerben Messelink, Wageningen University & Research

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Slotevent Biotract, 4 december 2023

1

Biologische bestrijding in kassen: waar staan we en hoe verder?

- Als sinds de Jaren 70-80 met succes toegepast, maar het wordt steeds ingewikkelder:
  - Steeds minder middelen, secundaire plagen worden primaire plagen
  - Steeds meer plagen door invasies exoten
  - Minder correctiemiddelen achter de hand
- Meer verschuiving naar preventieve bestrijding “standing army” met generalisten en bijvoeren
- Meer aandacht voor functionele diversiteit van natuurlijke vijanden

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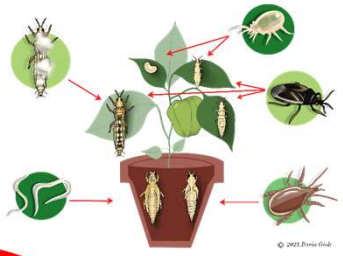
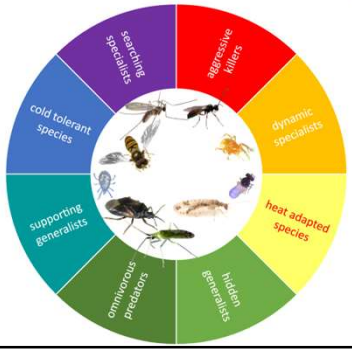
Redenen voor meer diversiteit van natuurlijke vijanden

- Minder kwetsbaar systeem
- Verbeterde plaagbestrijding door complementariteit
  - Bestrijden verschillende stadia plagen
  - Verschil in activiteit gedurende de dag
  - Positie in de plant
  - Verschil in klimaatvoorkeuren
- Functionele diversiteit: Team building!





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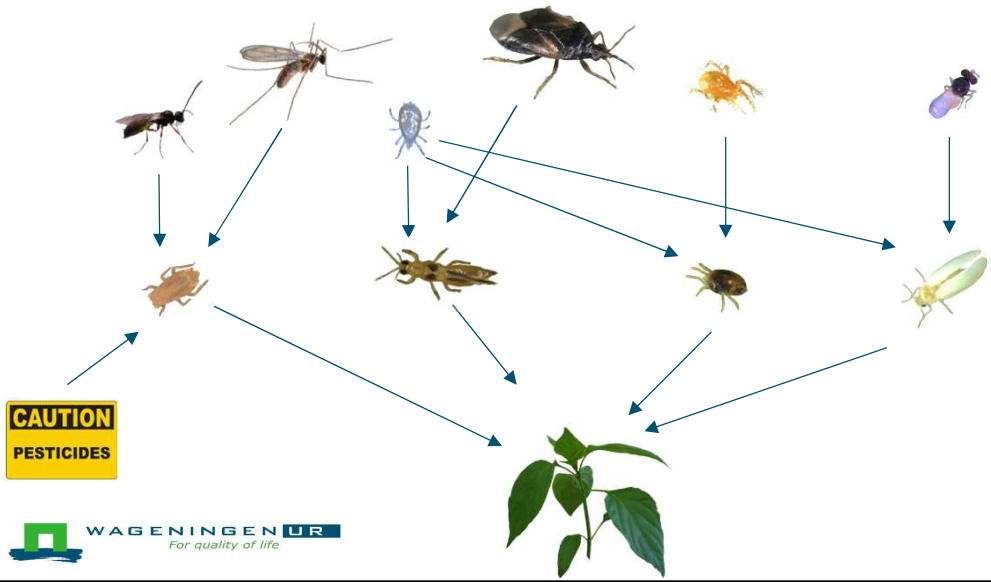
Biologische bestrijding in paprika: 2000-2010



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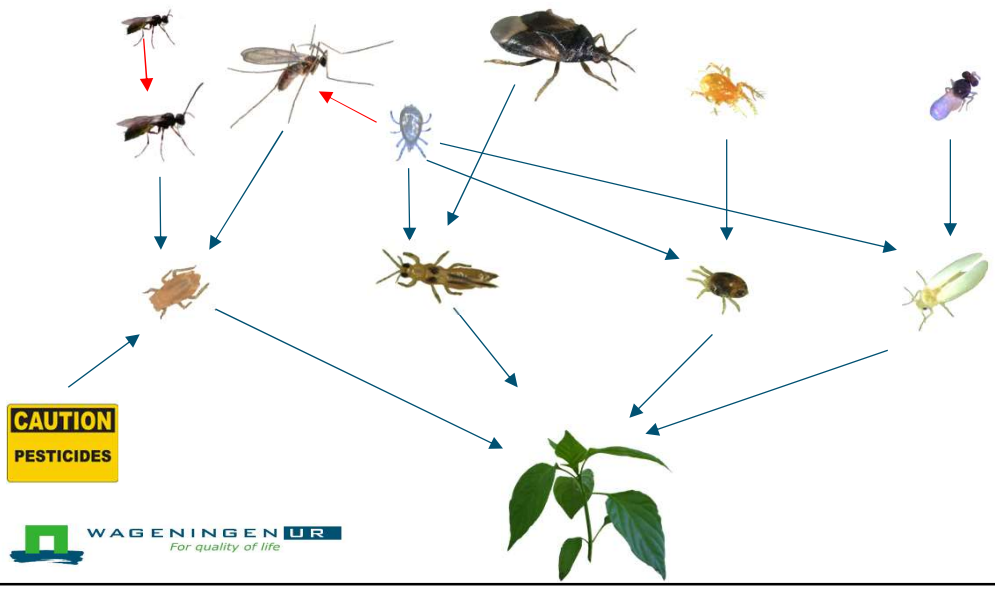

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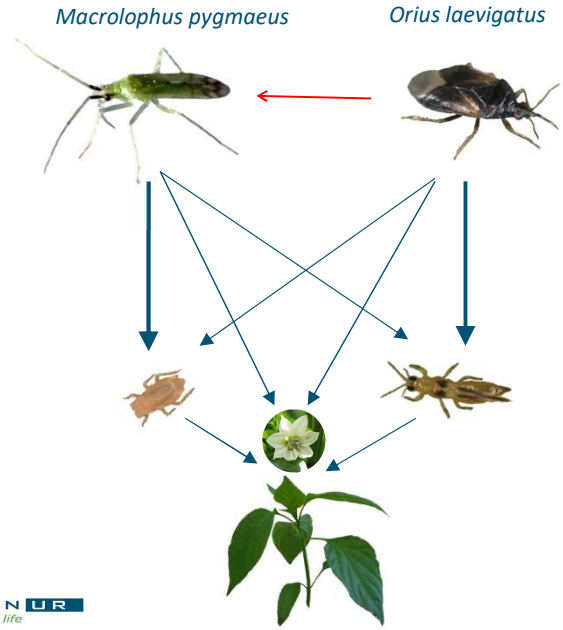
Macrolophus pygmaeus *Orius laevigatus*



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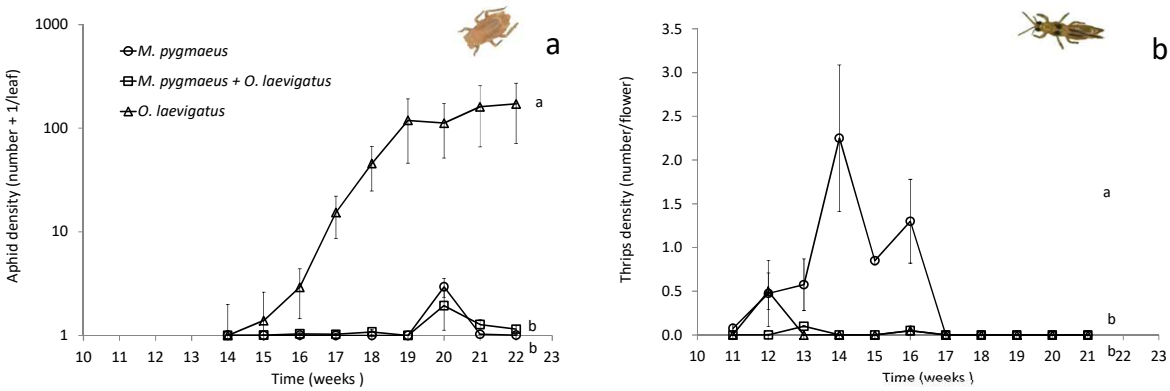
Standing army met 2 generalisten



Best control of thrips and aphids when both predators are present

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Messelink & Janssen, Biological Control 2014

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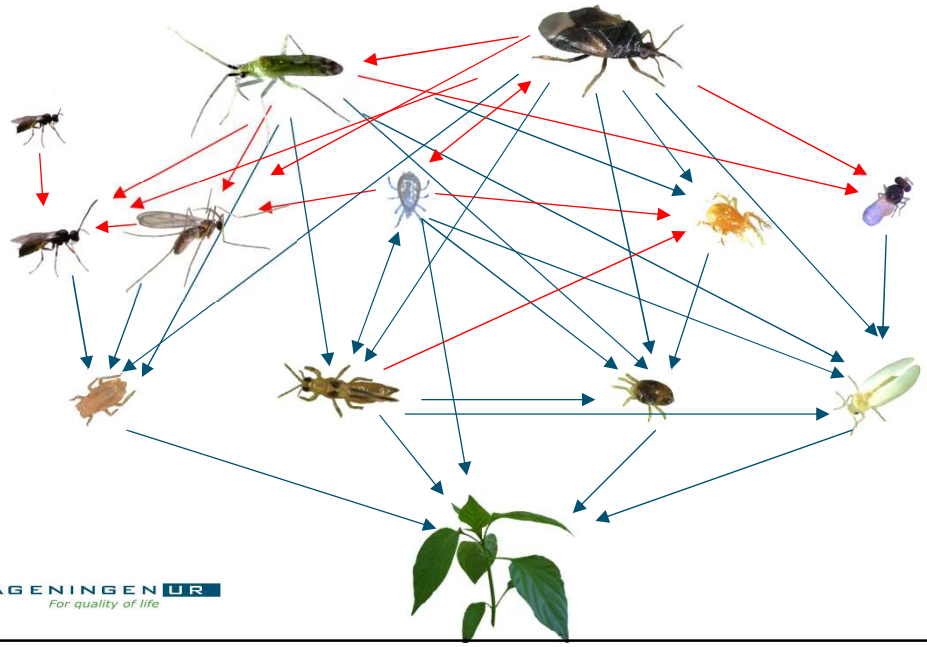
Een nieuw voedselweb: probleem opgelost?



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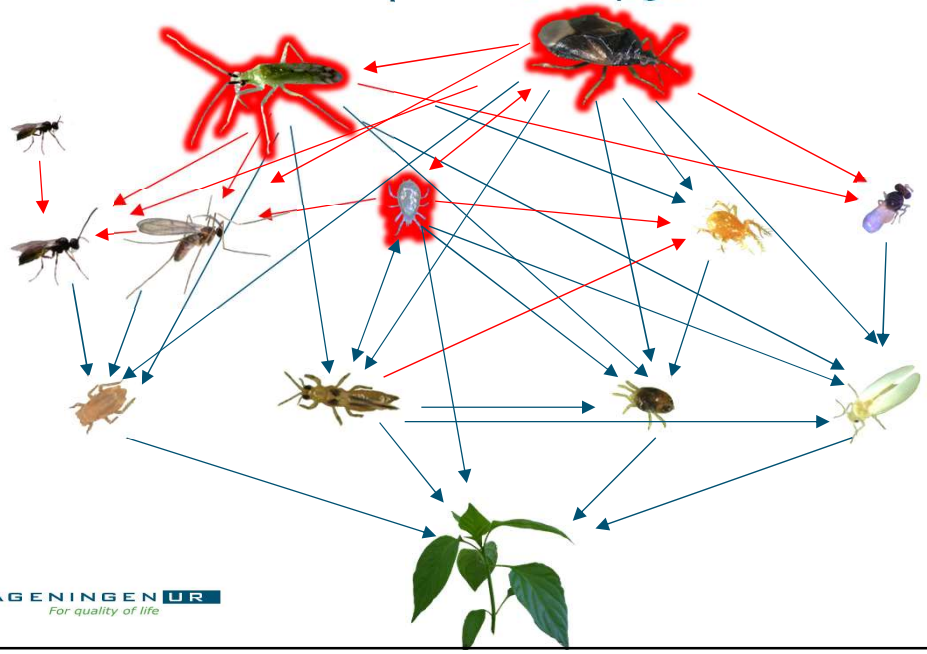

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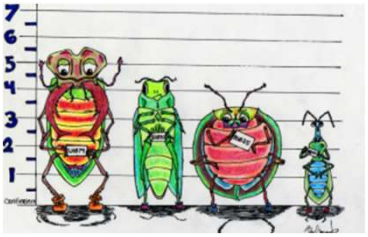
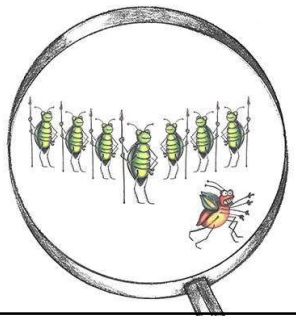
Op zoek naar complementaire soorten





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Candidate 1

Scymnus interruptus

Biological Control
Volume 51, Issue 2, November 2009, Pages 323-335

Review

Coccinellids in diverse communities: Which niche fits?

William E. Snyder

Journal of Pest Science (2021) 94:321–333
https://doi.org/10.1007/s10340-020-01265-z

ORIGINAL PAPER

Aphid predators in citrus crops: the least voracious predators are the most effective

J. P. R. Bouvet[1,2] · A. Urbaneja[2] · César Monzó[2]

Received: 12 July 2019 / Revised: 10 July 2020 / Accepted: 18 July 2020 / Published online: 30 July 2020

- Native species
- Small size (micro) 1.5-2mm
- Less voratious than macrococcinellids
- Arrives at low aphid densities

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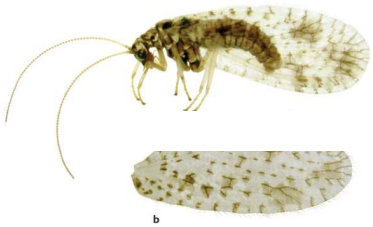
Candidate 2

Micromus variegatus



b

JOURNAL OF APPLIED ENTOMOLOGY

Original Contribution | Open Access

Combining lacewings and parasitoids for biological control of foxglove aphids in sweet pepper

M. Rocca, G. J. Messelink

First published: 22 September 2016 | https://doi.org/10.1111/jen.12355 | Citations: 16

- Native species
- Little knowledge but already available as BC agent in Canada
- Recorded in low aphid infestation
- Adults feed on aphids

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Objectives

1. Evaluate the survival of *Scymnus interruptus* and *Micromus variegatus* on alternative food sources to improve their early establishment in the crop, prior to aphid infestations.

2. Assess their effectiveness as preventive biocontrol agents for aphid control.



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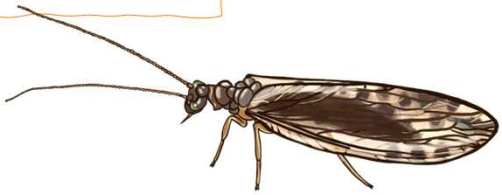
Materials and methodology

- 5 Diets: **Pollen →** Corn, Sweet pepper, *Typha latifolia*
  Artemia cysts
  Ephestia kuehniella
  Sweet pepper nectar+pollen (flowers)
  +2 control treatments *(with or w/o aphids)*
- 48h mated females. n=10
- 30 days



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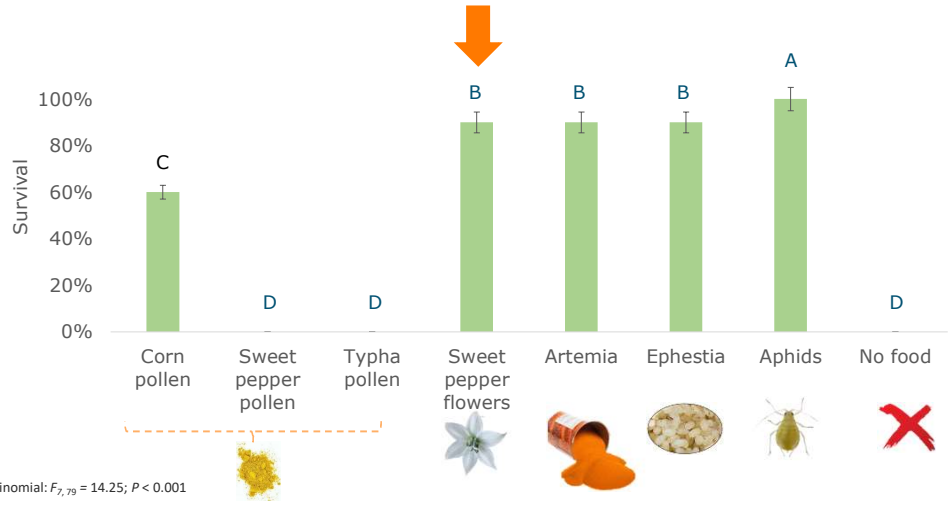
Survival after 30 days



GLM quasibinomial: $F_{7,79} = 14.25$; $P < 0.001$

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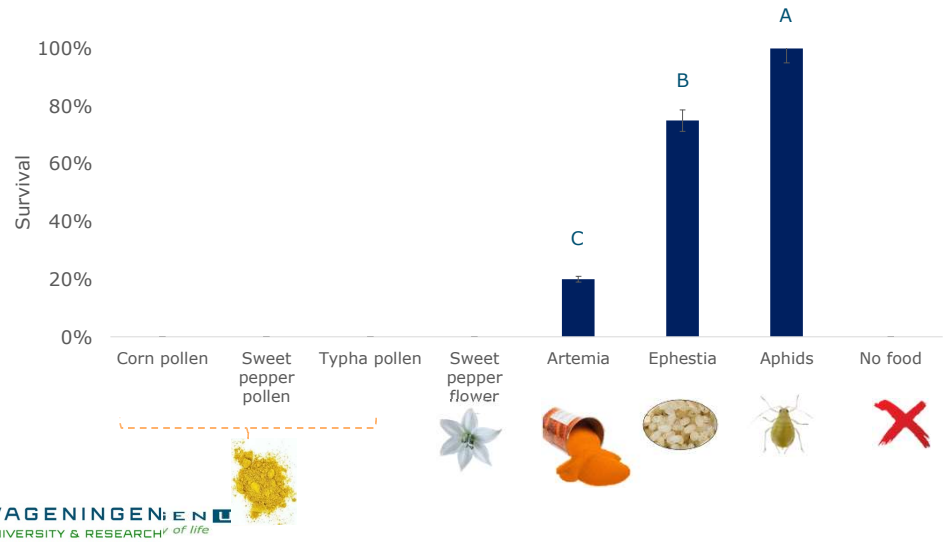
Survival after 30 days



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Greenhouse trial

- Margrethe cultivar. 8 weeks old. 3 stems per plant
- 16 walk-in-cages - 4 cages per treatments and 4 plants per cage
- TOTAL= 64 plants

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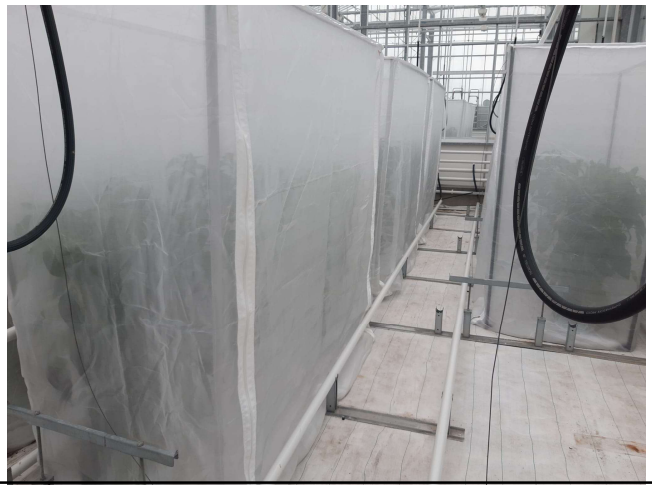
Materials and methodology

- 4 Treatments: *Micromus variegatus*
  Scymnus interruptus
  M. variegatus + S. interruptus
  Control (no n.e)



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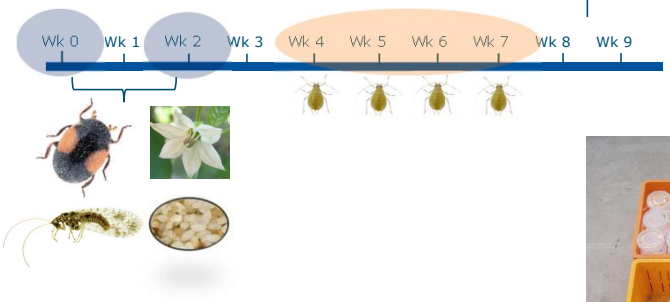
Materials and methodology

- Preventive releases: 12 couples of *Scymnus interruptus*
  6 couples of *Micromus variegatus* + *Ephestia*

NO APHID INFESTATION

2nd introduction 2 weeks later



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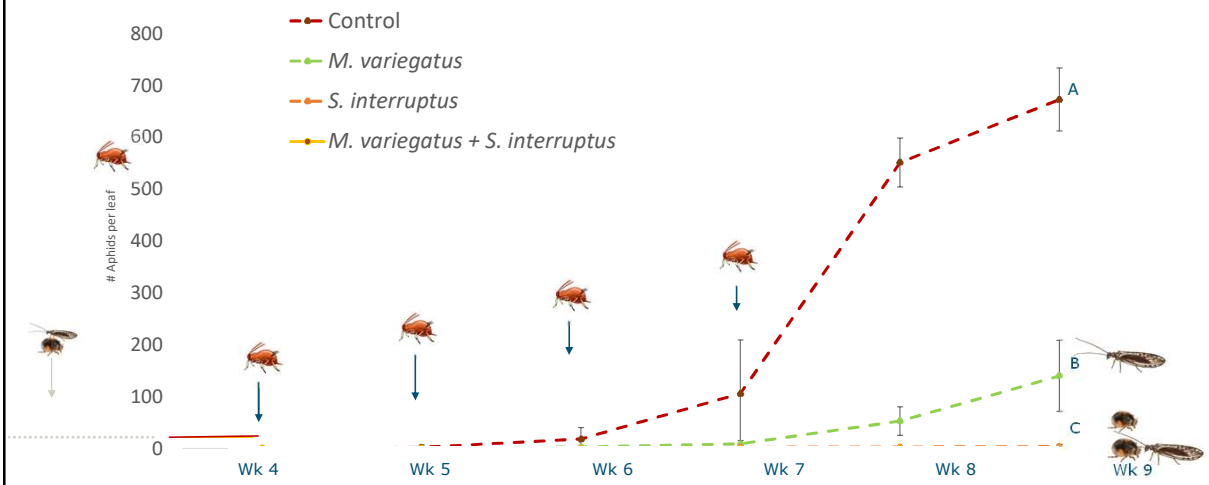
Results



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GLMM Poisson: $\chi^2 = 25.69$; $P < 0.0001$

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Good establishment of *Scymnus interruptus*

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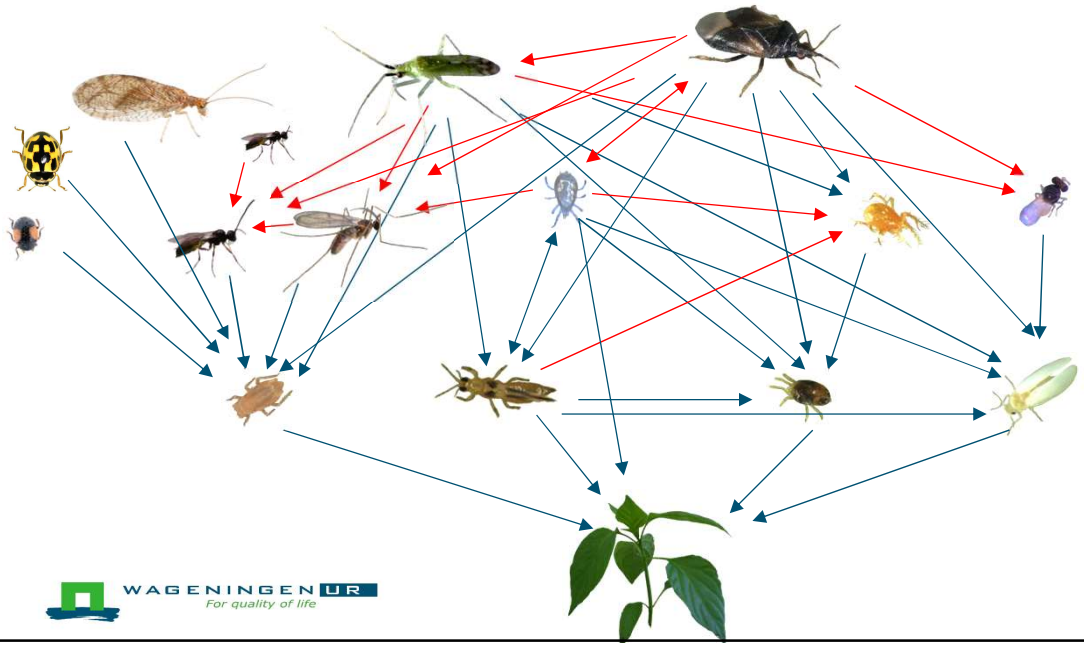
Voedselweb met aanvullende bladluisbestrijders



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Hoe houd je al die natuurlijke vijanden in stand?

Probleem "Competitive exclusion principle":

- Soorten die concurreren om exact dezelfde bronnen kunnen niet naast elkaar bestaan, tenzij er sprake is van nichedifferentiatie
- Variatie is niches en meer habitatcomplexiteit reduceert verstorende interacties
  - Dus meer variatie in voedsel en schuilplekken!

Biological Control 135 (2019) 73–82

Contents lists available at ScienceDirect

Biological Control

journal homepage: www.elsevier.com/locate/ybcon

Give predators a complement: Conserving natural enemy biodiversity to improve biocontrol

William E. Snyder[a,b,*]

[a] Department of Entomology, Washington State University, Pullman, WA 99164, USA
[b] Department of Entomology, University of Georgia, Athens, GA 30609, USA

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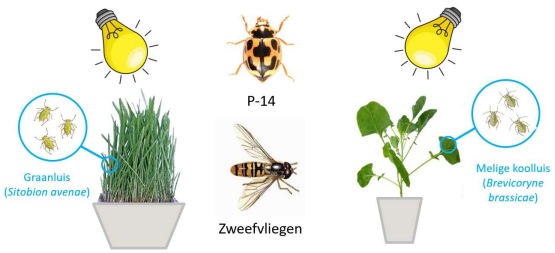
Bijvoorbeeld met bankerplanten



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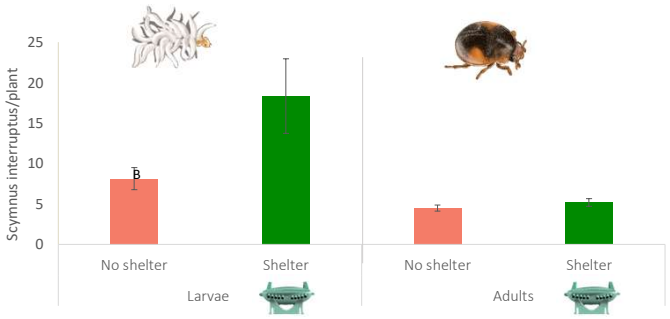
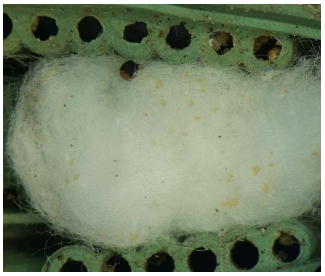
Of schuildoosjes: verhoogde eileg Scymnus interruptus





Pérez-Rodríguez & Messelink, 2023. *Biological Control*

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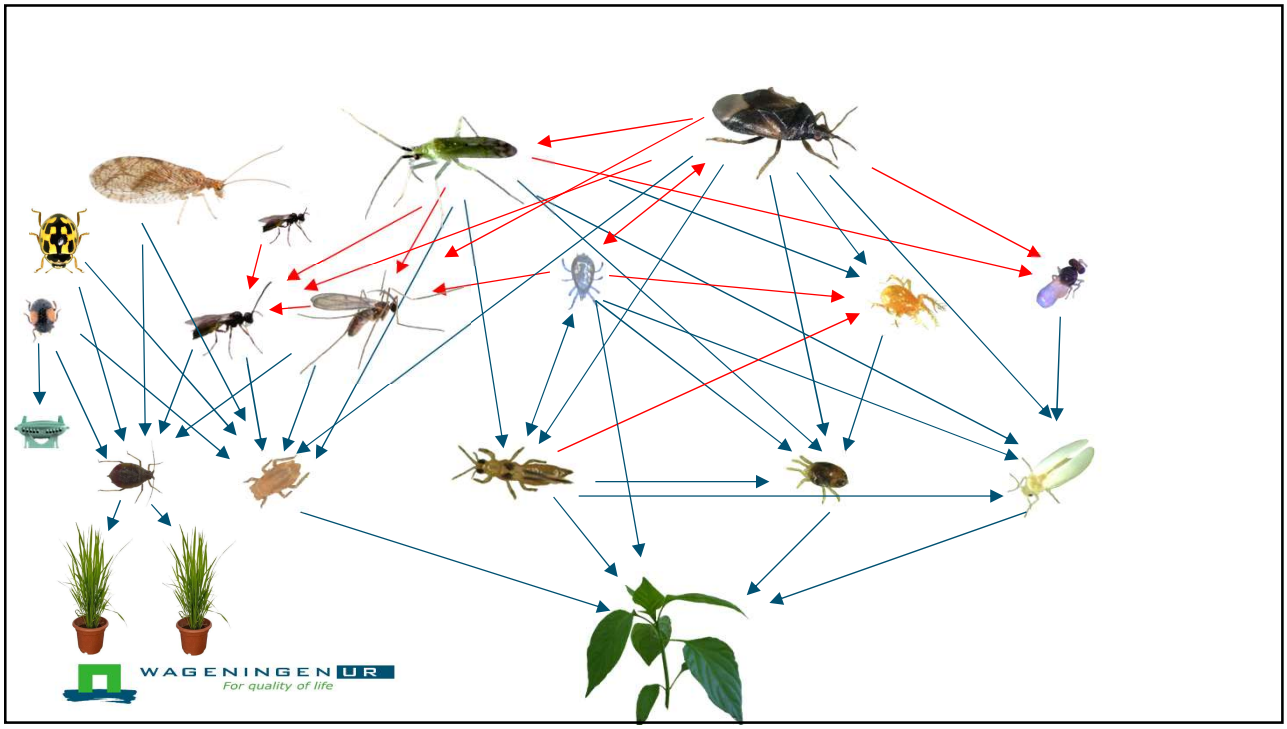

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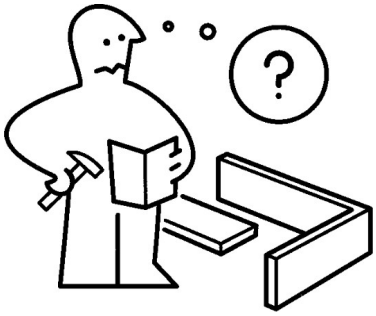
Hoe verder?



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Biologische bestrijding wordt ecosysteemmanagement!

- natuurlijke vijanden die passen bij het gewas, elkaar zoveel mogelijk aanvullen en ondersteund worden met voedsel en schuilplekken
- Belangrijk interacties te begrijpen en verstorende interacties te beperken met niche-differentiatie

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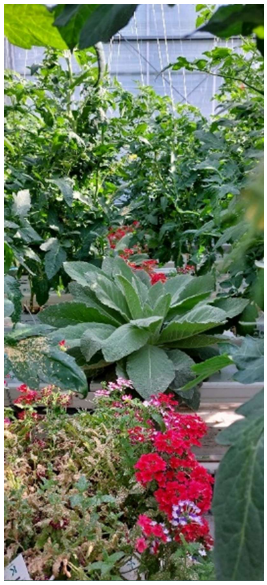
Lopend onderzoek: herontwerp teeltsystemen

- *Kennisimpuls Groene gewasbescherming en Bestuivers*
  - Casus aardbei, tomaat en potplanten
  - Hoe kan het teeltsysteem worden aangepast voor verhoogde weerbaarheid?
    - variatie in voedsel, schuilplekken, habitat
    - variatie in natuurlijke vijanden



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Ministerie van Landbouw, Natuur en Voedselkwaliteit

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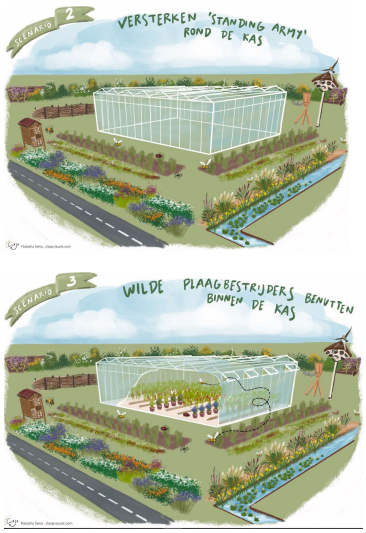
Nieuwe PPS Biodiversiteit in en om de kas



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Dank voor de aandacht!

Stichting Kennis in je Kas

Glastuinbouw Nederland
morgen groeit vandaag

TOPSECTOR TUINBOUW & UITGANGSMATERIALEN

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Viridaxis

BIOPLANET

KOPPERT
BIOLOGICAL SYSTEMS

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