IPM for Soft Fruit 2010

Neil Helyer; IPM Specialist, Fargro Ltd

Look at IPM, aphids, whitefly, spider mites, Botrytis and vine weevil

Pest control strategy

- Identification of problem (P & or D).
- Monitoring and record keeping.
- When and how best to apply.

Clean-up and rescue sprays

- Chess works very well when mixed with Dynamec and sprayed in spring, allow 7 – 10 days before introducing Biologicals.
- SB Plant Invigorator can be used at any time, 1 day HI.
- Calypso can be mixed with Dynamec: apply end of season.
- Decis can be mixed with Calypso: apply mid to late October.
- Pyrethrum: broad spectrum but short persistence.

Strawberry aphids

Myzus persicae	**Peach-Potato Aphid**	***Aphidoletes aphidimyza***
Aphis gossypii	**Melon & Cotton Aphid**	***Adalia bipunctata***
		Chrysoperla carnea
Macrosiphum euphorbiae	**Potato Aphid**	***Aphidoletes aphidimyza***
Aulacorthum solani	**Glasshouse-Potato Aphid or Foxglove Aphid**	***Adalia bipunctata***
		Chrysoperla carnea
Chaetosiphon fragaefolii	**Strawberry Aphid**	***Aphidoletes aphidimyza***
		Adalia bipunctata
Acyrthosiphon rodgersii	**Minor pest, virus transmision**	***Chrysoperla carnea***

Strawberry aphid *Chaetosiphon fragaefolii.*

- Common strawberry aphid; note small knobbed hairs, adult up to 1.6 mm in length, predatory control good, specific parasitoid *Aphidius ervi*.

Raspberry aphids

Large Raspberry aphid *Amphorophora idaei* (top) and small Raspberry aphid *Aphis idaei.* Parasitoid wasp *A. ervi.*

Whitefly control

Trialeurodes vaporariorum

(glasshouse whitefly)

- wide host plant range.
- high numbers extremely damaging to plants.

Bemisia tabaci (cotton whitefly)

- notifiable pest due to wide host range and virus transmission.

Honeysuckle whitefly; *Alyerodes lonicerea*

NATURALIS-L Bioinsecticide

B. bassiana (white Muscardine fungus) is active against most developmental stages of the host: over 700 pest species.




Whiteflies, Two-spotted spider mites, Mealybug, Thrips, Wireworms



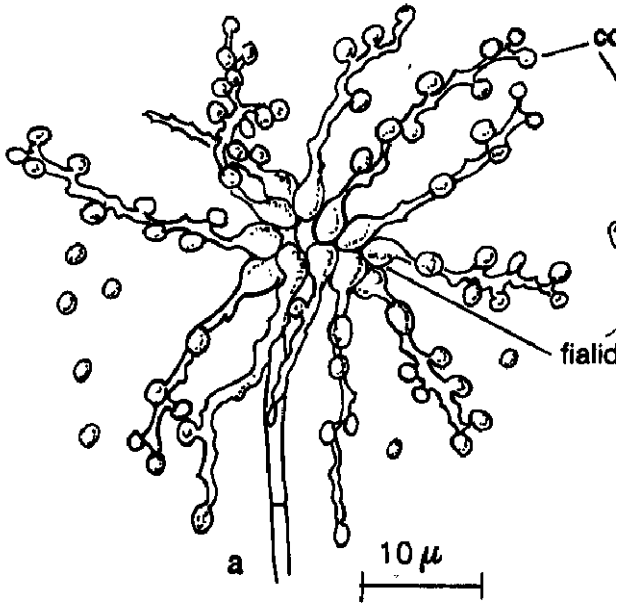
Aphids, Tingids, Leafhoppers

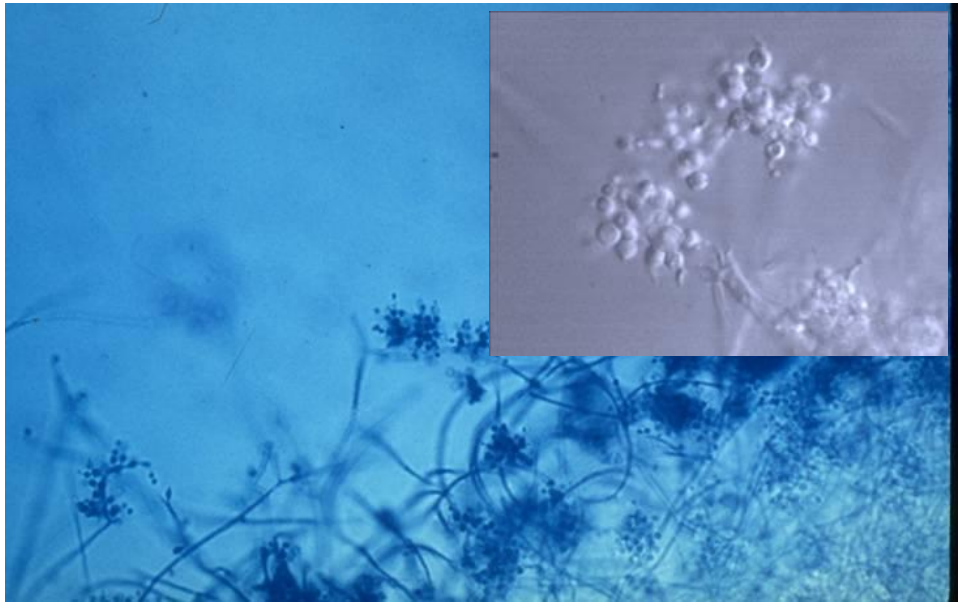



Hazelnut/chestnut weevil, Tephritid flies

Beauveria bassiana

In 1835, Agostino Bassi discovered a fungal silkworm disease caused by the entomopathogenic Deuteromycete *Beauveria bassiana*, and showed that this disease can be transmitted from one insect to another.





Microbial biocontrol was born

NATURALIS-L®

Development / Environment

Temperature

Growth & infection range
10°C-37°C

T. urticae

Humidity

Growth & infection range
50-100% RH

Sporulation
> 80% RH

Trialeurodes

UV light

High UV irradiance from the Sun can reduce spore viability

F. occidentalis

NATURALIS-L®

Label details & advice

Maximum No. treatments:	5 per crop
Timing:	*First signs* of pest activity > *Corrective*
Frequency:	At 5 day intervals
Latest time of application:	No harvest interval
Time of day:	Apply in the late afternoon/early evening
Spore preparation:	Pre-soak for 3 hours
Tank mixes:	Can be mixed with SBPI and other insecticides.

NATURALIS-L®

How safe are fungicides ?

SAFE : **can be tank mixed**

boscalid	copper oxychloride	
fosetyl-aluminium	propamocarb hydrochloride	
sulphur	thiophanate-methyl	quinoxyfen

SLIGHTLY HARMFUL : Apply Naturalis-L **2 days before or after** the fungicide treatment

Bacillus subtilis	iprodione	maneb
myclobutanil		

HARMFUL : Apply Naturalis-L **4 days before or after** the fungicide treatment

azoxystrobin	bupirimate	captan	chlorothalonil
cyproconazole	cyprodinil + fludioxonil	dimethomorph	fenhexamid
kresoxim-methyl	mepanipyrim	penconazole	pyrimethanil
spiroxamine	tebuconazole	trifloxystrobin	

NATURALIS-L®

SAFETY TO BENEFICIALS

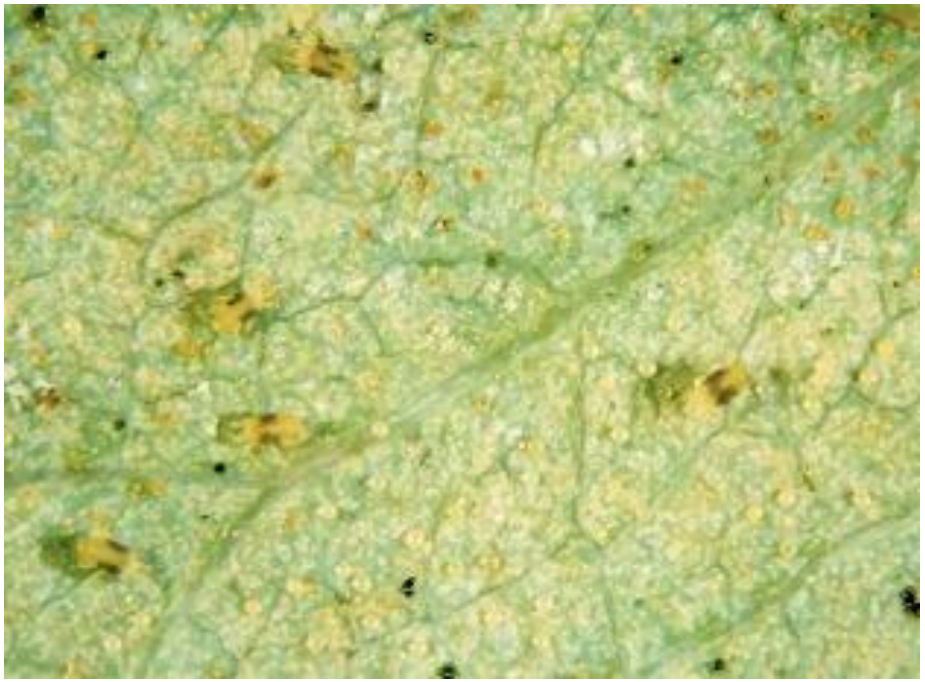
Naturalis-L is “non-toxic” (<25% mortality) to the following:

***Amblyseius* species**	***Anthrocoris nemorum***
Aphidius colemani	***Chrysoperla carnea***
Diglyphus isaea	***Encarsia formosa***
Macrolophus caliginosus	***Orius leavigatus***
Phytoseiulus	***Steinernema* Nemasys**

Leave a 2-day gap between a spray application & new releases

Naturalis-L is Harmful to *Aphidoletes aphidimyza*

Spider mites



BORNEO®

INTERFARM (UK) Limited

SUMITOMO CHEMICAL

Physical Properties

Activity on plant	Contact. Non-systemic. Translaminar
Mode of action	Inhibits the development of eggs and larval stages of mites. Inhibits chitin biosynthesis. Has sterilising effect on adult females. Best performance if used at first appearance of the first mobile stages of spider mites.
Resistance	No cross resistance with existing acaricides.
Pests controlled	Controls many species of phytophagus mites eg Tetranychus, Panonychus spp.
Beneficials	No adverse effects reported on beneficials. Not toxic to predatory mites. Relatively non-toxic to bees.
Residual activity	45 – 60 days

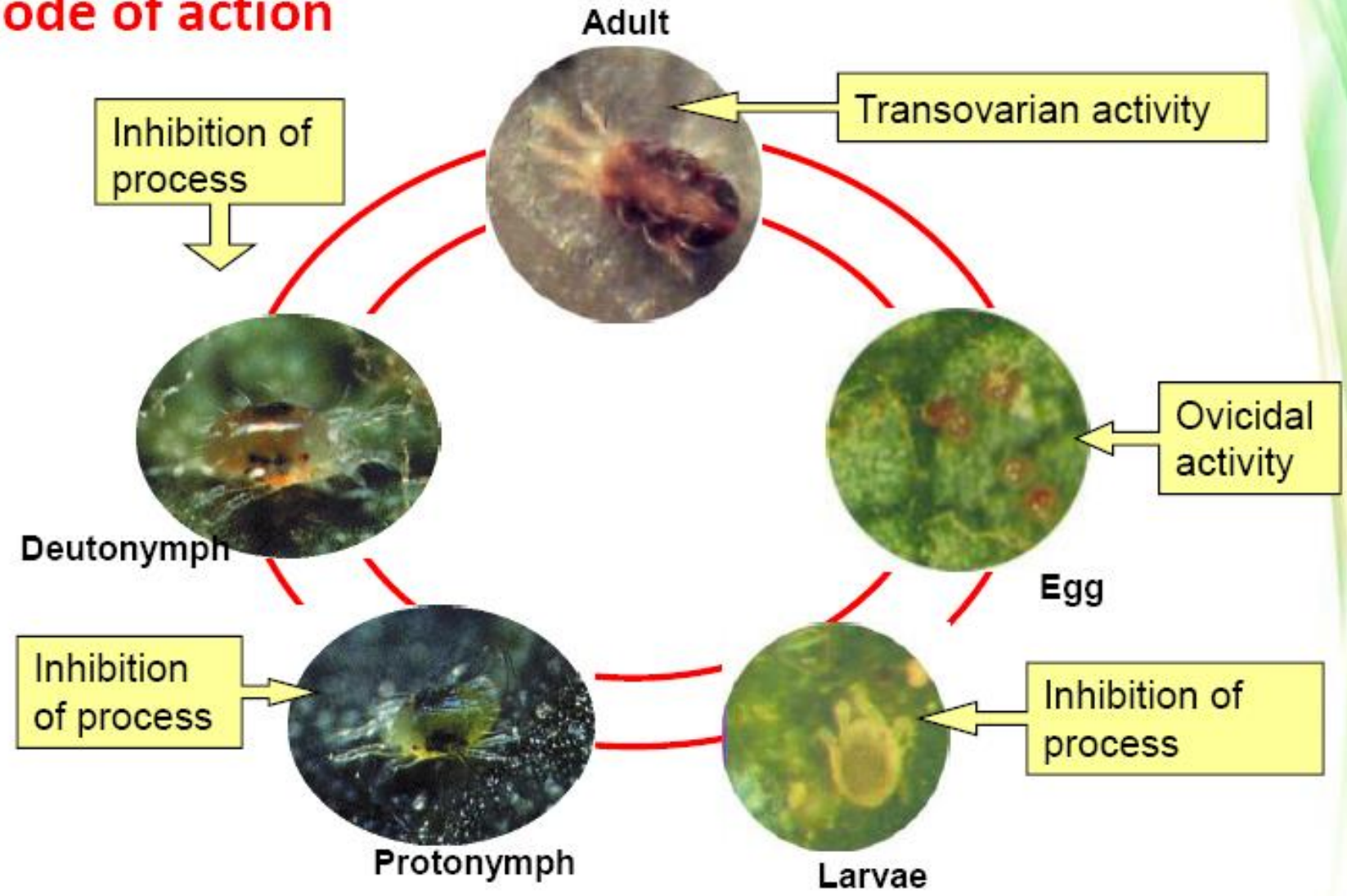
Strawberry, SOLA 24002009, 3 day HI, 1 per crop

BORNEO®

INTERFARM (UK) Limited

SUMITOMO CHEMICAL

Mode of action



Marigold

A contact plant extracts based Insecticide effective on mites and sucking pests (whitefly, mites, aphids, thrips).

Active ingredients : Tagetes oil 0.6% and Thyme oil 0.6%
Co-formulants : Canola oil

New active substances,
currently under EU Review (RMS: UK) Submission by Plant Impact

Marigold

Overview

- BugOil is a novel insecticide:
  - Synergistic mixture of natural oils
  - Strong fit for use in major vegetable and fruit crops
  - No crop injury at 10x rate

- Organic crop product:
  - Residue free – exempt of MRL's
  - Reduced environmental impact
  - Organic acceptable
  - Meet demands of European Substitution principle
  - Well adapted to Integrated Pest Management programmes

- Developped and supported at EU level by Plant Impact. AII dossiers supported by Arysta LifeScience who have exclusive worldwide rights to BugOil/Marigold for professional agricultural and horticultural use.

Vine weevil control

- *Metarhizium anisopliae* 'Green Muscardine fungus'.
- Compost incorporation, at least 1 year activity.

- Irish registration PCS No: 92397

- for all edible and ornamental crops.

fargro®
Ask the Specialists!

What is *Met 52*?

- ***Metarhizium*** **is a broad-spectrum, contact bio-insecticide with no chemical residue and little potential for resistance.**

- ***Metarhizium*** **is a naturally occurring fungi, not genetically modified. Spores germinate and hyphae invade and kill susceptible insects.**

- ***Metarhizium anisopliae*** **is on Annex 1 (highest level of EU regulatory procedure).**

- ***Metarhizium*** **is registered as an insecticide in several countries including Ireland & Holland and will be introduced into the UK in 2010.**

Metarhizium – target pests

Protected Edible and Ornamental crops

Lawn and Landscape

Acari

Blattaria

Coleoptera

Diptera

Hemiptera

Isoptera

Hymenoptera

Lepidoptera

Orthoptera

Thysanoptera

Apiculture

Agriculture

Forestry

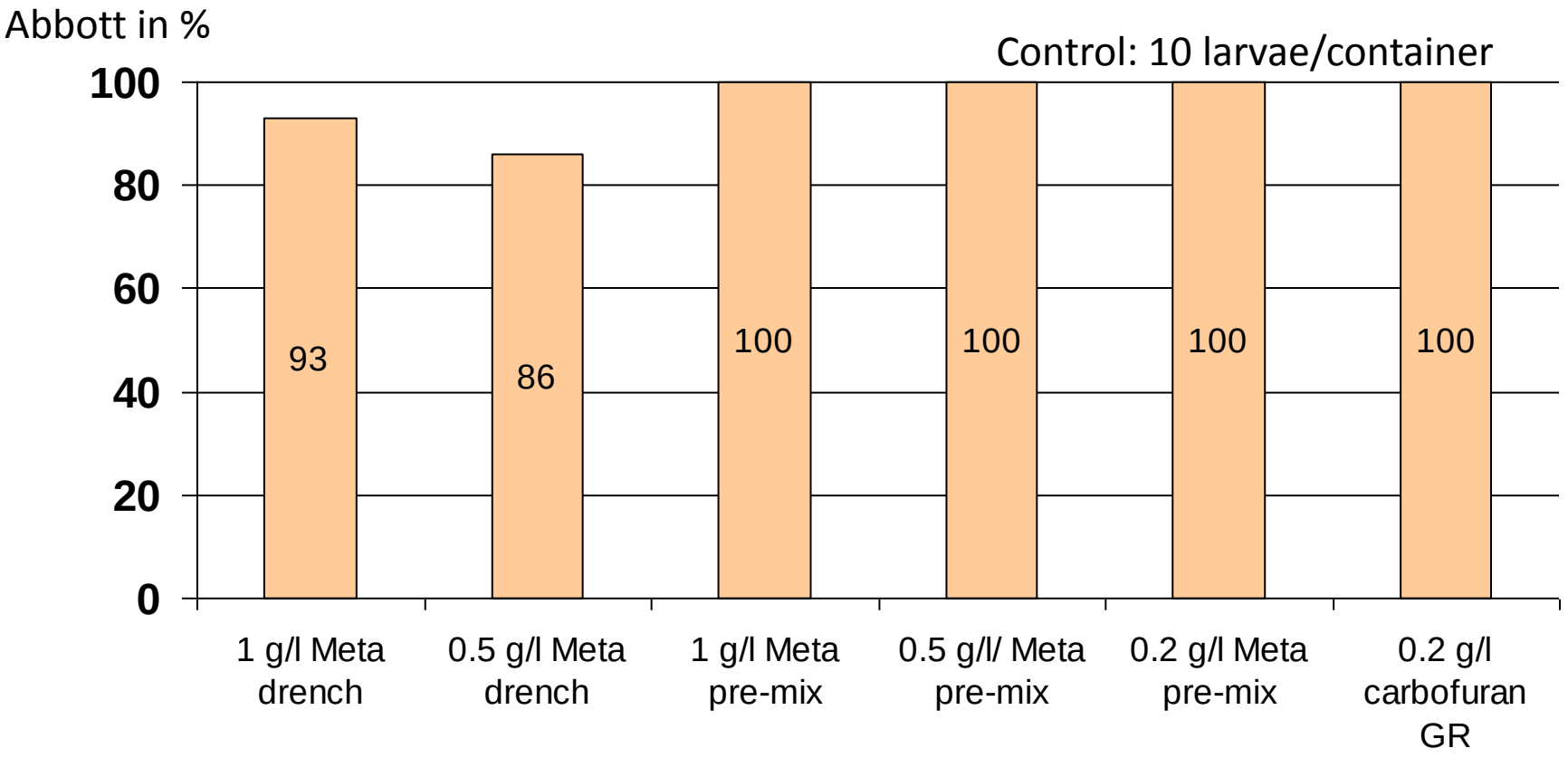
fargro® Ask the Specialists!

novozymes® Rethink Tomorrow

Metarhizium – initial target pests in UK market

	Black Vine Weevil	Thrips	
Susceptibility	Larvae	All stages, esp. pupae	
Application	In containers and in soil	Foliar or soil	
Environment	< 15° C slows activity	> 32° C slows activity	
Speed	Slow but minor root feeding acceptable	Slow so early monitoring is essential, virus concerns	
Resistance	Extremely unlikely	Extremely unlikely	
Pest Life Cycle	Long, high reproduction	Short, high reproduction	
Persistence of *Metarhizium*	High in soil – up to 2 years	High in soil, lower foliar; greenhouse > outdoor	

Metarhizium* trial on *Euonymus

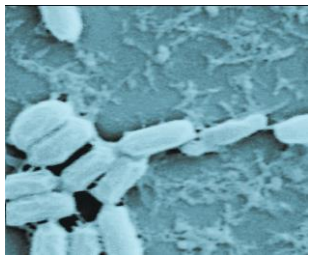


Crop: *Euonymus*. Artificial infection with eggs

Dosage in g per liter potting soil.

Applications at planting: 26 June. Assessment: October

SERENADE®



- SERENADE is a highly **effective**, **contact fungicide and bactericide** with multiple modes of action for a **broad spectrum of control** with **little potential for resistance**.

- Based on the proprietary active ingredient, ***Bacillus subtilis* QST 713**, a naturally occurring, rod shaped, aerobic, motile bacterium, not genetically modified.

- ***B. subtilis* QST 713** is **unique** in its production of both anti-fungal and anti-bacterial compounds and is patented.

- US - EPA Registration – July 2000; **EU inclusion annex 1** – Feb 2007, UK approval Nov 2008, SOLA's Jan 2009,
- Ireland April 2009 PCS No: 03847.

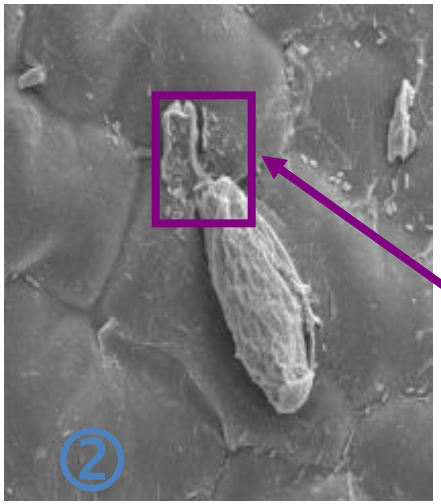
Spectrum of Activity: Major global crops and their diseases

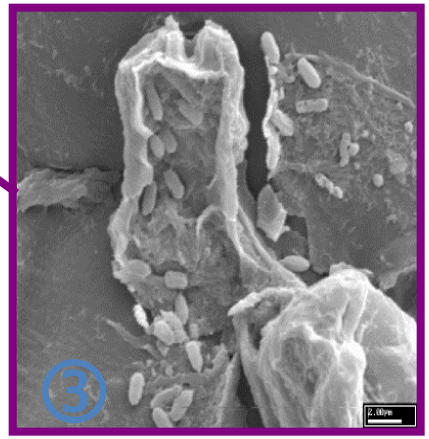
CROP	DISEASE
Grape Vine, table	*Botrytis*, sour rot, Powdery mildew
Tomato, pepper, eggplant	*Botrytis*, Early blight (*Alternaria*), Powdery mildew (*Leveillula*) Bacterial leaf spot (*Xanthomonas*)
Cucumber, Melon, squash,	Powdery mildew, *Botrytis*, Downy mildew
lettuce	Leaf drop (*Sclerotinia*)
Strawberry, Soft fruits,	*Botrytis, Anthracnose*
Pome fruit	Apple scab (*Venturia*), Fire blight (*Erwinia*), Powdery mildew
Stone fruit	Monilia, Bacterial spot (*Xanthomonas*)
Beans, Onions, garlic Potato, asparagus, carrots.	White mold (*Sclerotinia*), Neck rot (*Botrytis*)
Ornamentals Roses, Chrysanthemums	Bacterial leaf spots (*Erwinia, Xanthomonas, Pseudomonas*). Bacterial wilt (*Ralstonia*)
Citrus	Canker
Banana	Black sigatoka (*Mycosphaerella*)
Mango	*Anthracnose*, Powdery mildew

Fungicidal Metabolites – Lipopeptides

◂ **Spore of a pathogen, intact and in germination on a leaf surface**

Pathogen spore attacked by SERENADE ▸





▸ **Pathogen spore destroyed and multiplication of *B. subtilis* cells**

Serenade Vs Beneficials

Serenade & Beneficials

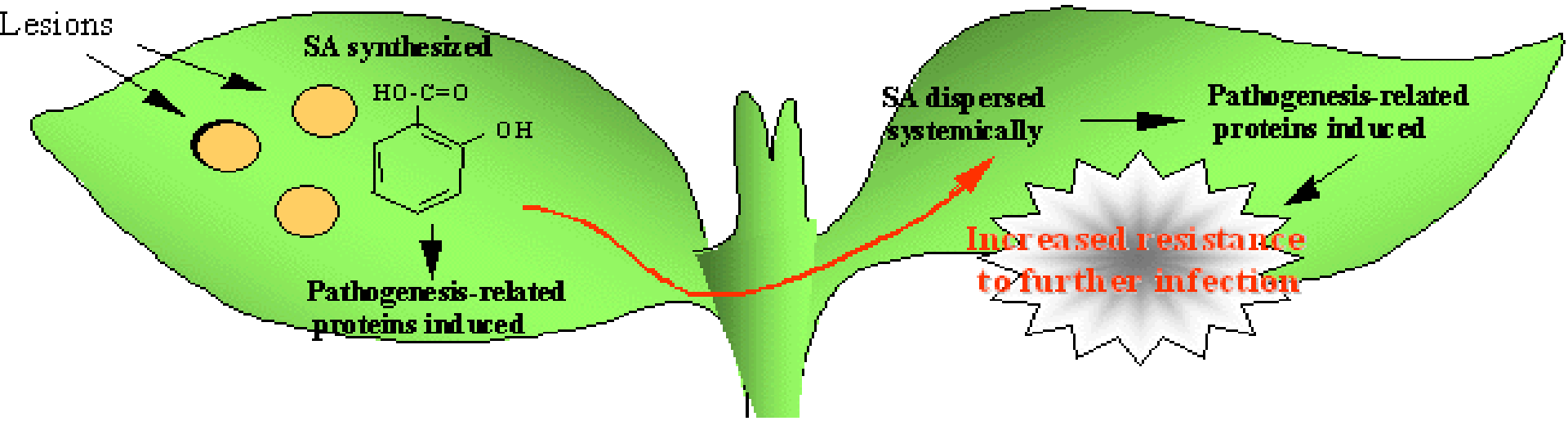
Large amount of data on Beneficials has been generated in several countries.

All the studies revealed no negative effect on all the tested beneficials.

IOBC classification 1 for most beneficial organisms.

Inducer of Systemic Resistance (ISR)

Classical model for induced systemic resistance based on the dispersal of salicylic acid (SA).



Developed originally by Malamy *et al.*, (1990) Metraux *et al.*, (1990).

Vine weevil control

- chemical sprays and traps for adults.
- Met 52 for larvae (prevention).
- natural enemies include ground beetles, birds, etc
- biological control of larvae with Nemasys L containing (***S. kraussei***) min 6^{o}C can be used as curative, if required.

Steinernema kraussei is the only cold-active nematode for the control of BVW and manufactured solely by Becker Underwood. It was isolated as part of a Horticultural Research Institute (HRI) project in the UK which was co-funded by Becker Underwood.

-*Phasmarhabditis hermaphrodita* is the only mollusc killing beneficial nematode commercially available and patented for use against slugs.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