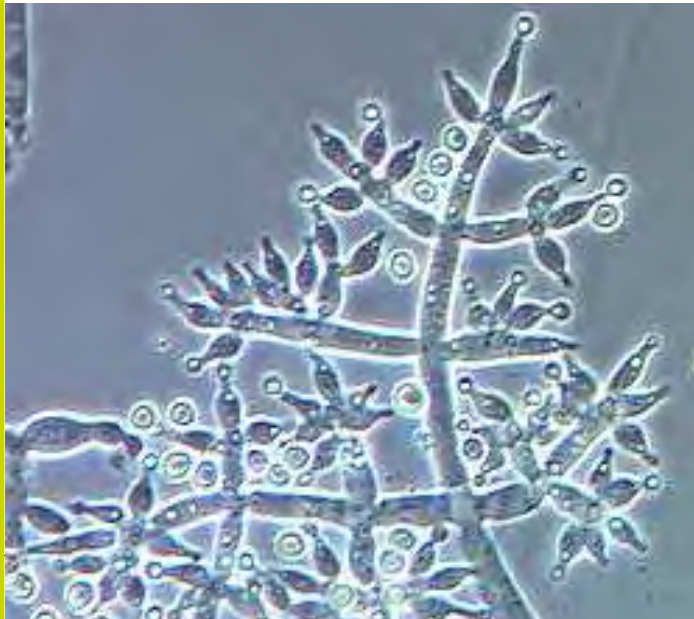


Alternatives to pesticides: effective solutions for Polish farmers

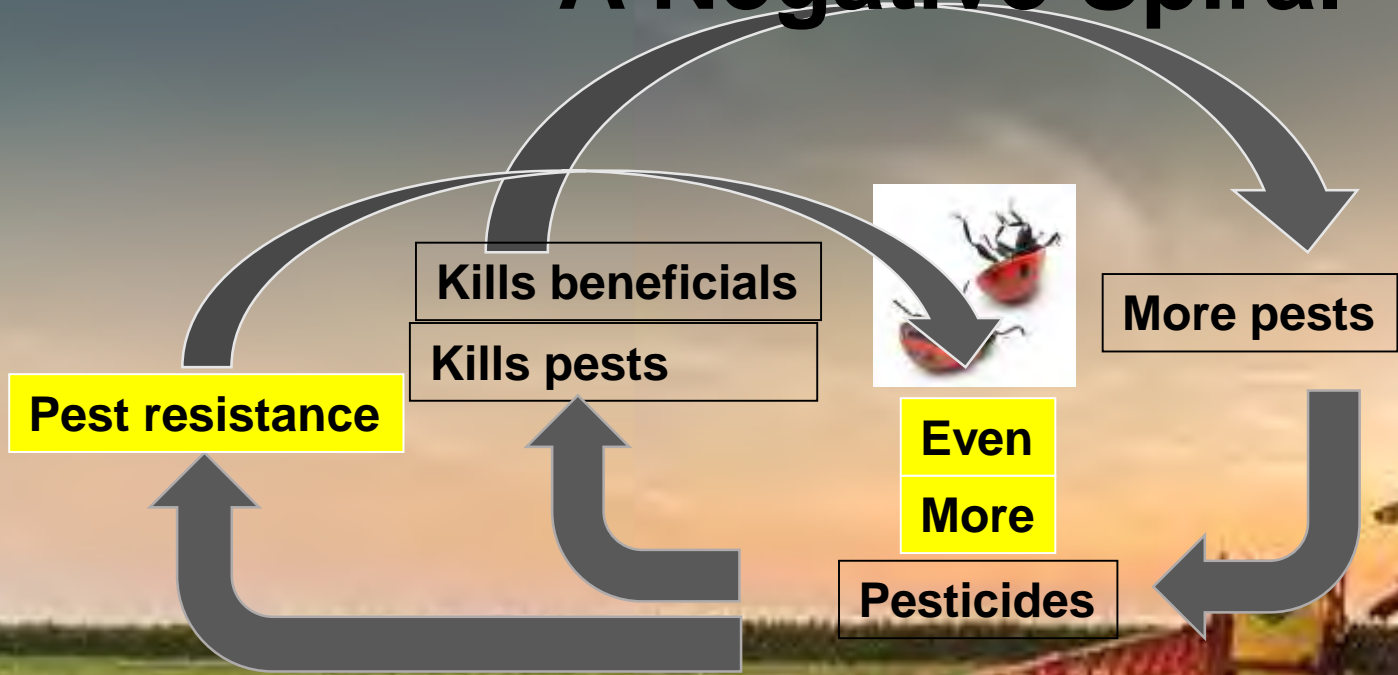
Felix Wäckers

Dir R&D BiobestGroup

Prof Insect-Plant Interactions, Lancaster University



A Negative Spiral



Pest resistance

Kills beneficials

Kills pests

More pests

Even
More

Pesticides

Even
More

Surface water (Drift/Run-off) Groundwater



One ninth of the world's population does not have enough food.



To feed our growing population, we need to produce food sustainably.

#AgFuture
#FarmingTheBiggestJobOnEarth
#Feeding10billion



THE WORLD POPULATION IS GROWING



Today...
1 in 9 people is undernourished

-  Every day, the world population increases by more than 180,000 people
-  But land available for farming is limited
-  Smallholder yields are low



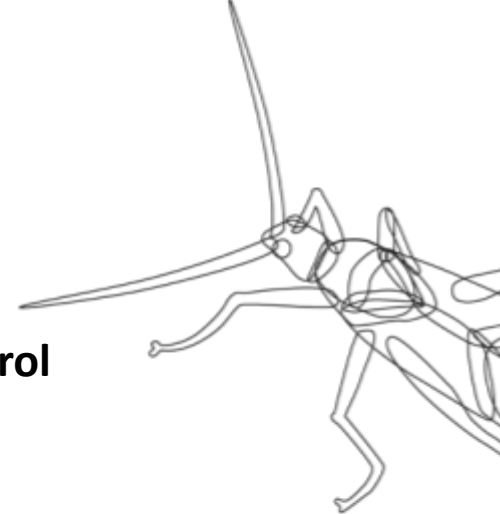


Highest yields are achieved
In systems using
no or minimal pesticides

Alternatives Exist



IMPROVING THE EFFECTIVENESS OF INTEGRATED PEST MANAGEMENT OF WINTER OILSEED RAPE IN LINE WITH THE EUROPEAN GREEN DEAL



Biologicals used in disease control

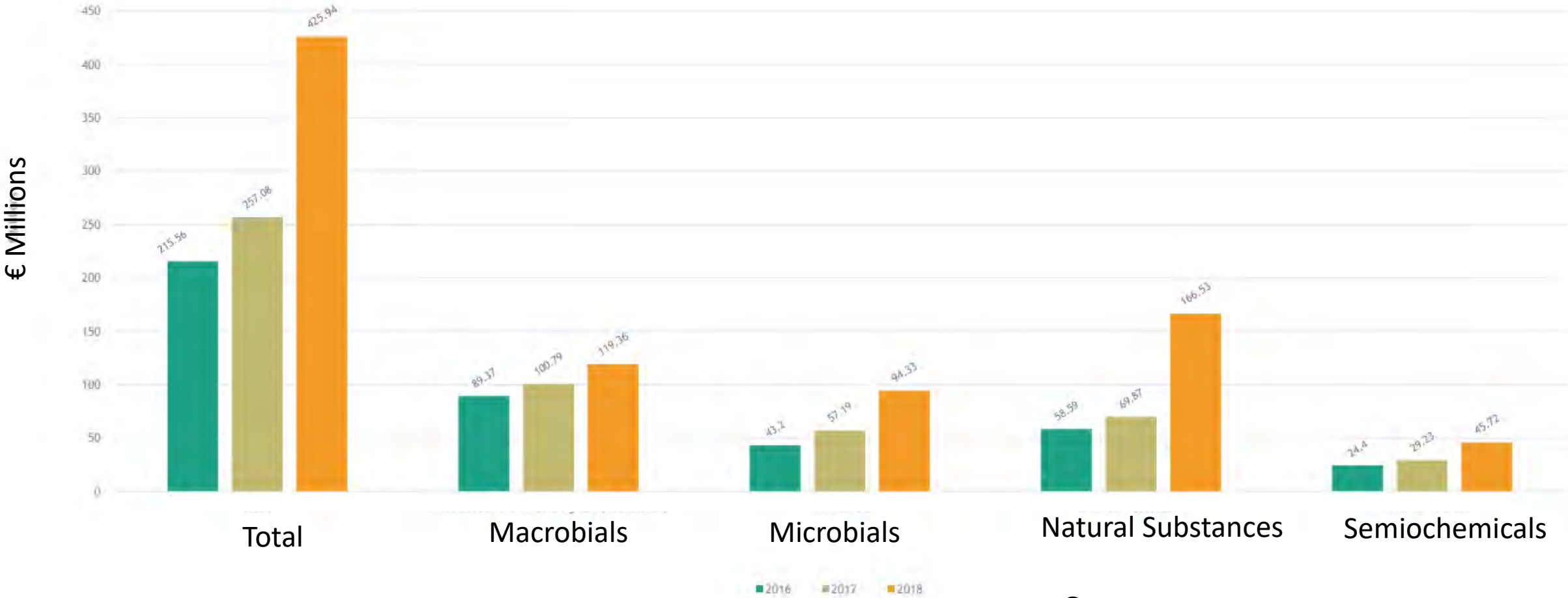
Bacteria

Bacillus (Serenade, Sonata)
Pseudomonas
Streptomyces

Fungi

Ampelomyces (AQ 10)
Aureobasidium
Trichoderma
Clonostachys

Sales of Biologicals and Natural Products (2016-2018; 38% of IBMA members)



Source: IBMA member survey 2020

Sales of Biologicals and Natural Products (2016-2018; 38% of IBMA members)

In 2018, the European Biocontrol Market was €1.015bn, representing 6% of the €16bn crop protection market.

> 1000 biologicals and natural products available across different European member states.

> 140 products in the authorisation process across Europe and a further 120 new products not yet submitted to the authorisation process.

Source: IBMA member survey 2020



Four Examples of Existing Effective Alternatives



Example 1: Using bumblebees (Flying Doctors) for targeted application of biopesticides





Biobest “Flying Doctors[®]” System

- Easy introduction of product in replaceable trays



- When bumblebees exit through the dispenser, the product adheres to their legs and hairs.



- The bumblebees then transport and deposit the product on flowers during pollination.

Biobest “Flying Doctors”[®] System



Advantages

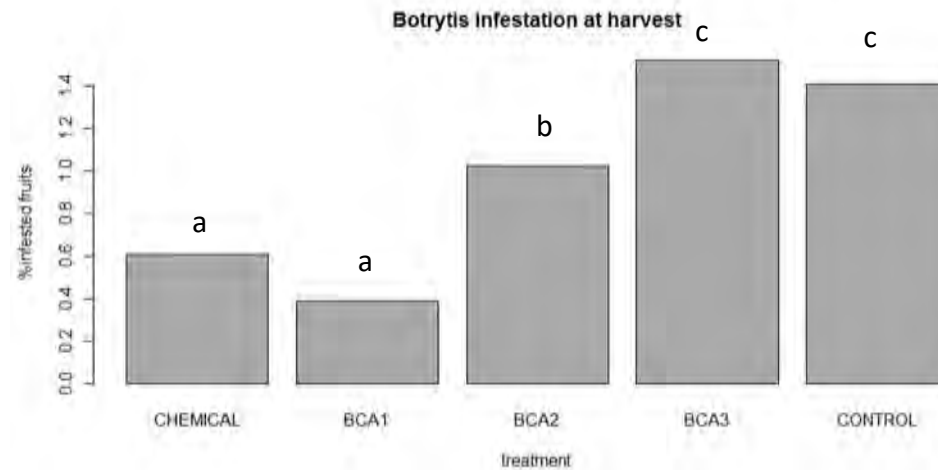
- Targeted product delivery
- Strong reduction in product use
- Continuous application
- Considerable savings in labour



Biobest “Flying Doctors”® System



Botrytis infection at harvest

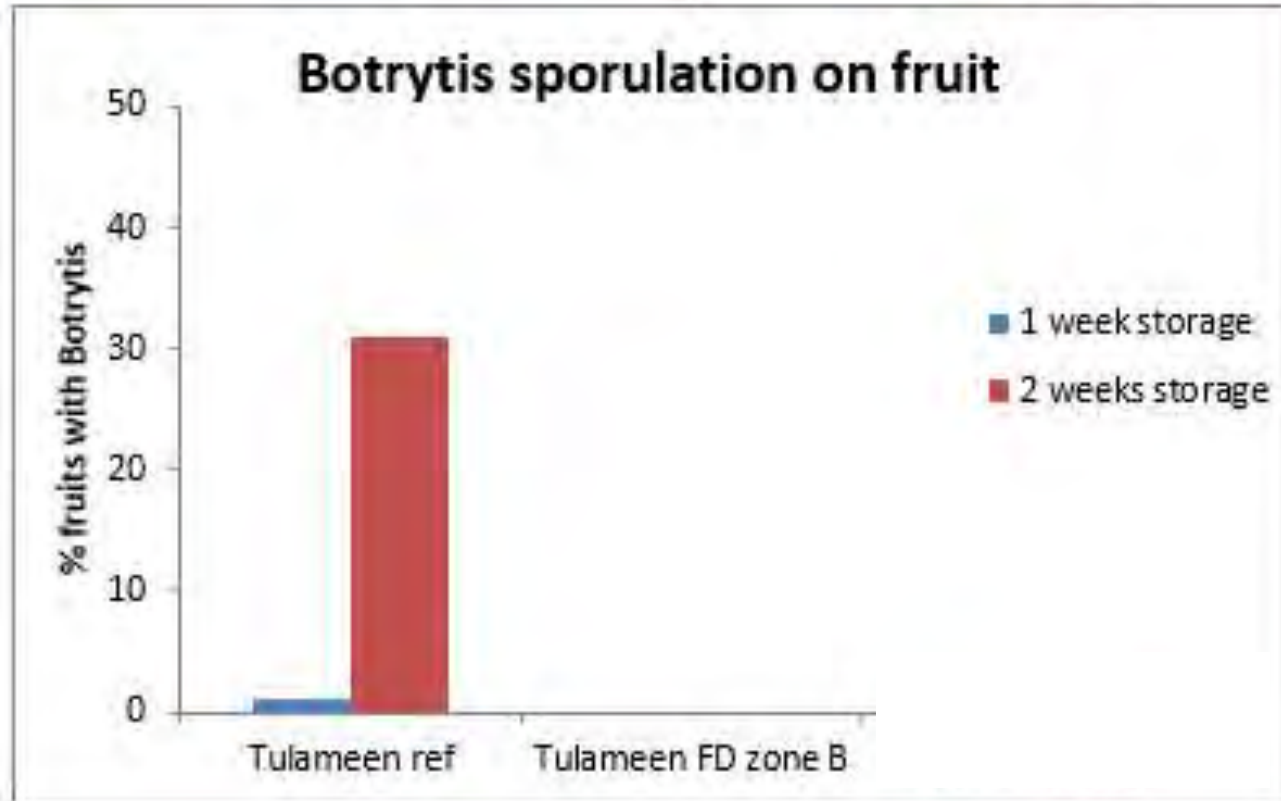


↑
Verdera 4B (*Clonostachys catenulatum*)

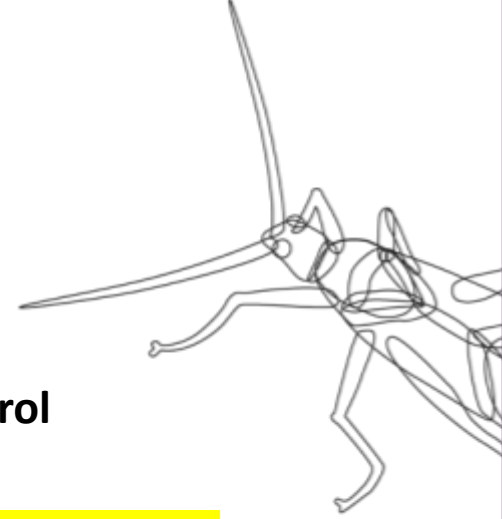
Raspberries, Botrytis



Raspberries, Botrytis (Post harvest assessment)



Example 2: A new solution for the control of Powdery Mildew



Biologicals used in disease control

Bacteria

Bacillus (Serenade, Sonata)
Pseudomonas
Streptomyces

Fungi

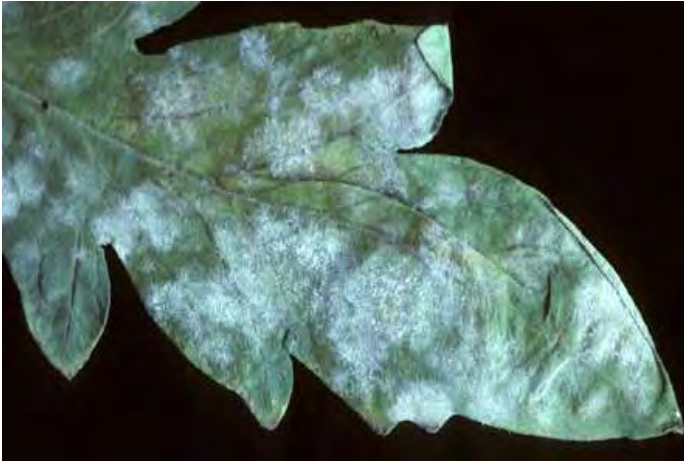
Ampelomyces (AQ 10)
Aureobasidium
Trichoderma
Clonostachys

Viruses

Bacteriophagen

Example 2:

A new solution for the control of Powdery Mildew



Pronematus ubiquitus (Pu)



Pronematus ubiquitus: a unique cosmopolitan mite



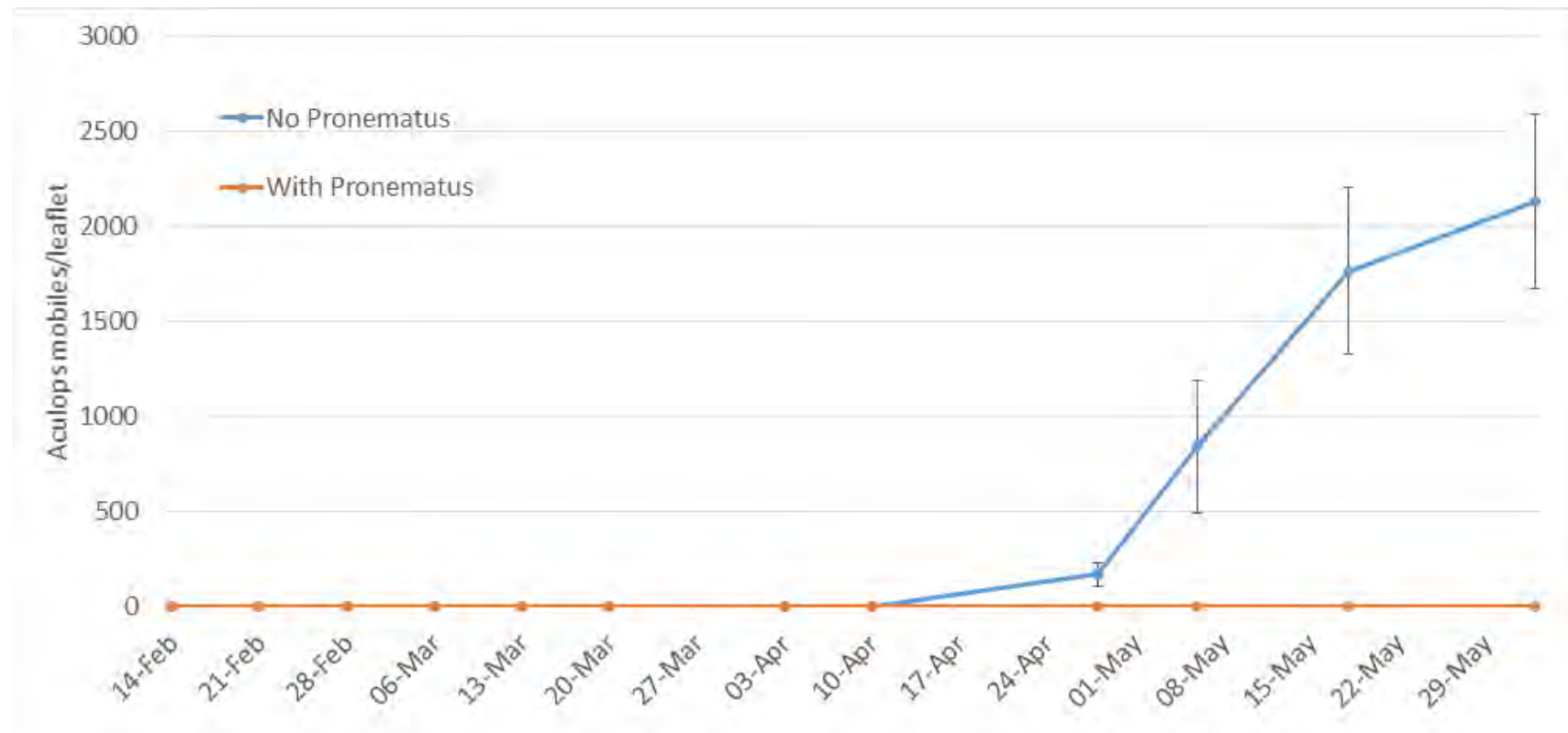
Unique characteristics:

- Size
- Omnivore. Can feed on
 - Small arthropods (stages)
 - pollen
 - fungi
 - Plant sap
- Can be used preventatively
- Large populations



First Biocontrol agent to control Tomato Russet Mite (TRM)





UNTREATED



P. ubiquitus





Cucumber

Strawberry



Example 3: Turning ants from foes to friends



By eliminating ants...

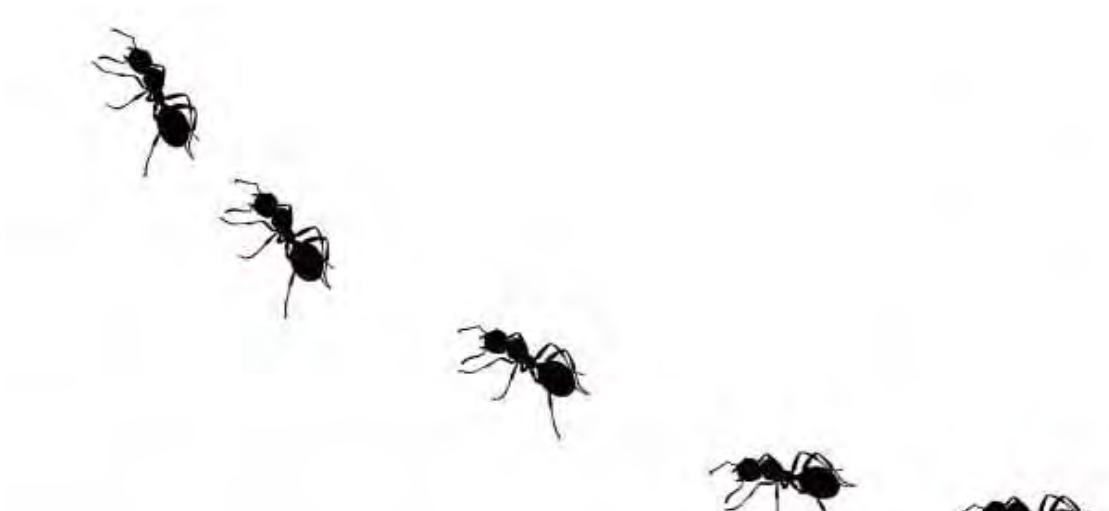
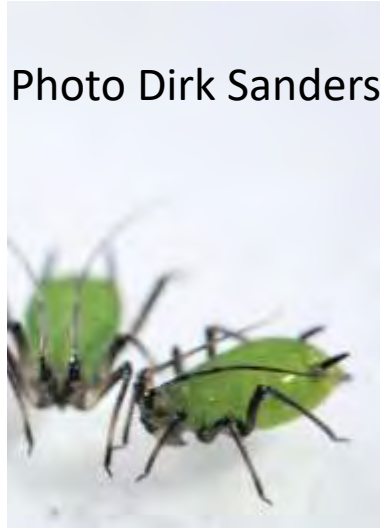


We also lose a powerful ally in pest control



Ant Distraction

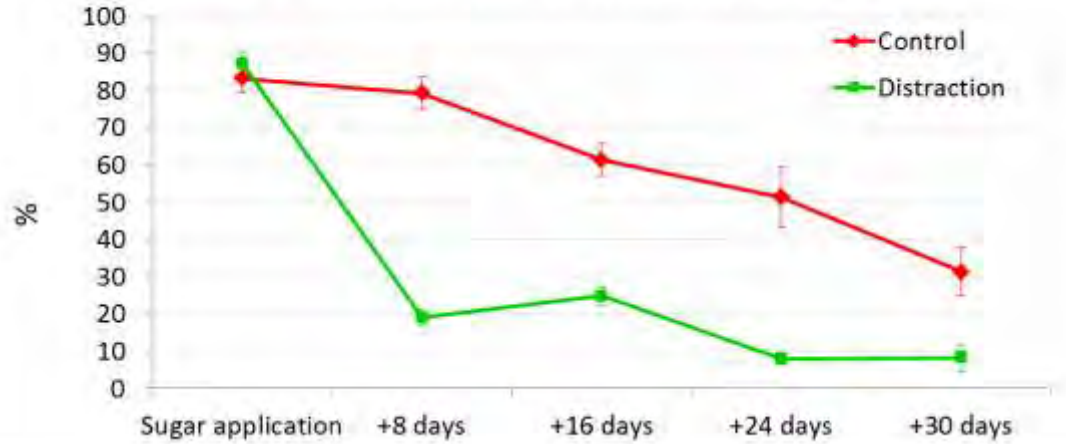
Photo Dirk Sanders



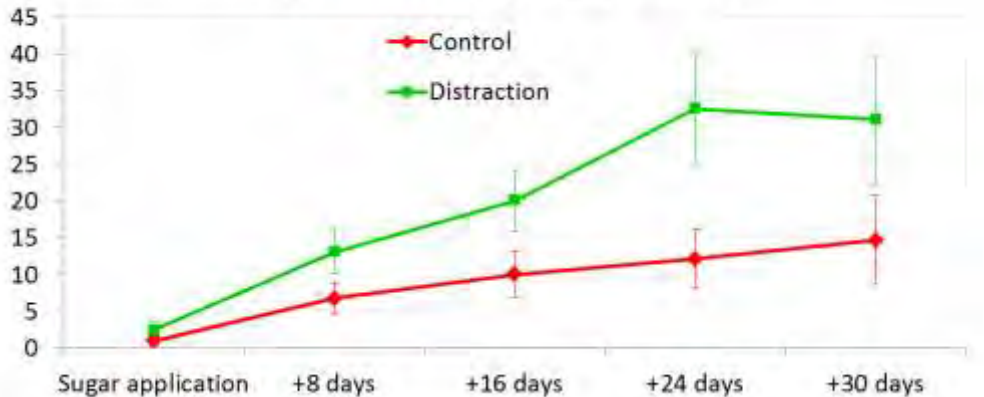


Citrus Trials 2015

% mealybug colonies occupied by ants

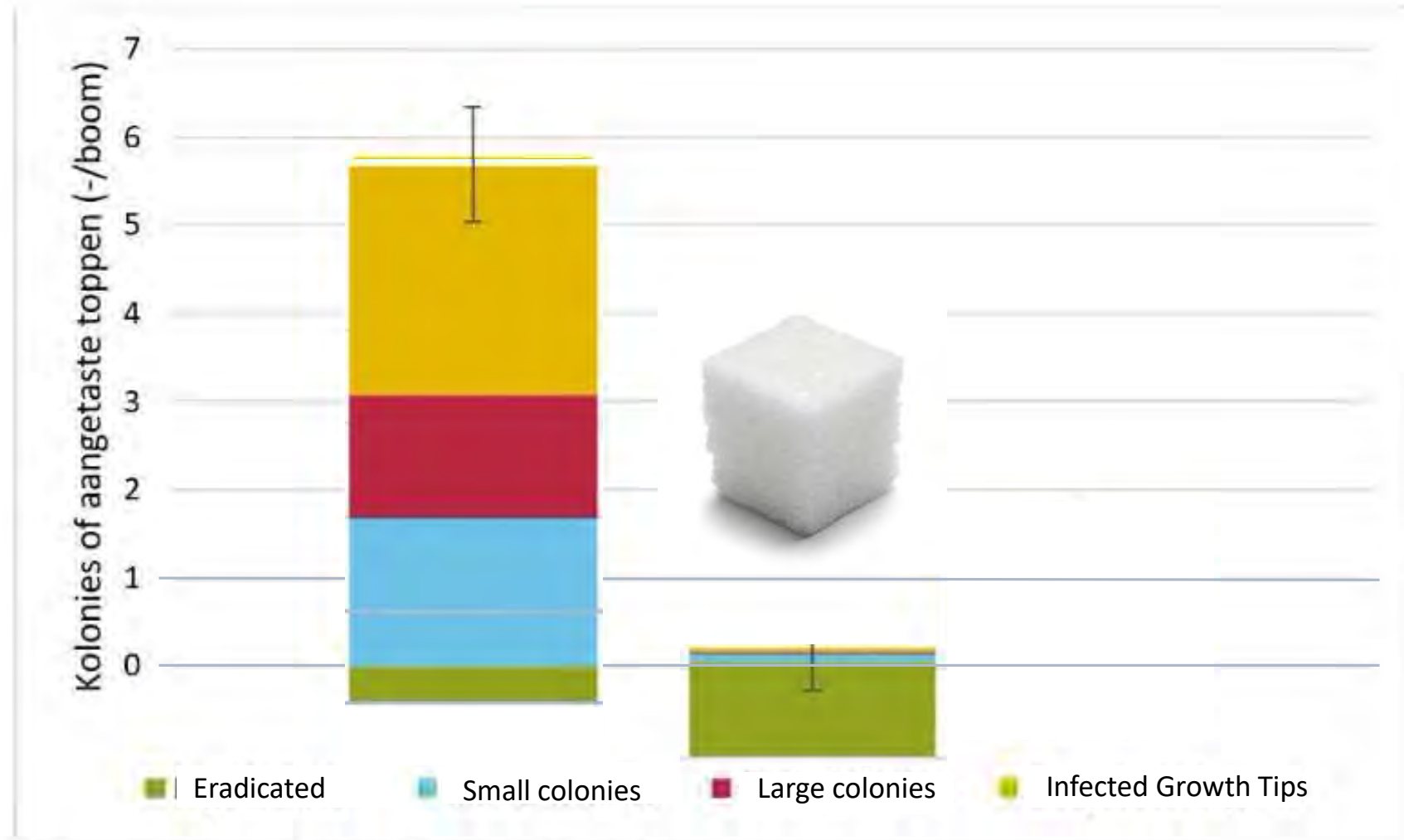


% parasitized mealybugs per colony



Rosy Apple Aphid (2021, the Netherlands)







Example 4: Making Flower Power work for farmers
Not only pollinators, also pest natural enemies need flowers,
but...



...not all flowers feed natural enemies

Select plants that optimize biological pest control

(Wäckers and van Rijn, 2012)



family	Floral Nectar depth	Longevity (AFLI)			References parasitoids (species)
		Hoverfly <i>E. balteatus</i>	Lacewing <i>C. carnea</i>	Parasitoids	
Apiaceae	0	+	+	-	Geneau et al., unpubl. (<i>Microplitis mediator</i>)
Apiaceae	0	+		+/-	Vattala et al., 2006 (<i>Microtonus hyperodae</i>)
Apiaceae	0	+	++	+	Winkler et al., 2009 (<i>Cotesia glomerata</i>)
Apiaceae	0	+		+	Winkler et al., 2009 (<i>Cotesia glomerata</i>)
Apiaceae	0	+		+/-	Winkler et al., 2009 (<i>Cotesia glomerata</i>)
Apiaceae	0	+	++	+/-	Foster & Ruessink, 1984 (<i>Meteorus rubens</i>)
Polygonaceae	0	+	+	+	Winkler et al., 2009 (<i>Cotesia glomerata</i>)
Boraginaceae	0	+	++	-	Nilsson et al., unpubl. (<i>Trybliographa rapae</i>)
Ranunculaceae	0	+		-	Kehri & Bacher, 2008 (<i>Minotetrastichus frontalis</i>)
Caryophyllaceae	1	+	++		
Asteraceae	1	+	+	-	Nilsson et al., unpubl. (<i>Trybliographa rapae</i>)
Asteraceae	1	+	+/-	-	Wäckers 2004 (<i>Cotesia glomerata</i>)
Asteraceae L	1	-	+		
Asteraceae	2	+	+		
Asteraceae	2	+/-	+/-		
Asteraceae	2	+/-	+	-	Wäckers 2004 (<i>Cotesia glomerata</i>)
Asteraceae	2	-	+/-		
Asteraceae	3	-		-	Rahat et al., 2005 (<i>Trissolcus basal</i>)
Asteraceae	3	+	++	+/-	Winkler et al., 2009 (<i>Cotesia glomerata</i>)
Asteraceae	3	+	+		
Asteraceae	4	-	+/-	+	Rahat et al., 2005 (<i>Trissolcus basal</i>)
Malvaceae	4	-		-	
Boraginaceae	4	+/-	+/-	-	Irvin et al., 2007 (<i>Gonatocerus</i> spp.)
Fabaceae	4	-		-	Kehri & Bacher, 2008 (<i>Minotetrastichus frontalis</i>)
Fabaceae	4	+		++	Geneau et al., unpubl. (<i>Microplitis mediator</i>)
Fabaceae	4	-	-		




Targeted Flower strips

Our largescale projects in the Netherlands, Belgium, UK, Switzerland and Germany in support of horticulture and arable crops




**Getting More Power from Your Flowers:
Multi-Functional Flower Strips Enhance Pollinators
and Pest Control Agents in Apple Orchards**

Alistair John Campbell ^{1,*} , Andrew Wilby ², Peter Sutton ³ and Felix Wäckers ^{2,4}

Biodiversity works for farming


REDUCTION IN INSECTICIDE USE



 In conventional wheat and potato production **pesticides reduced by >90%** (van Rijn, 2018)

Sustainable systems and productivity go hand in hand

YIELD IMPACT (NATURAL PEST CONTROL & POLLINATION)

 In conventional wheat and vegetable production **yield increased:** **Wheat 11%, Peas 26%** (Wäckers et al., Ecostac)

 **Beans 30%**



Targeted Insect Conservation for Productive Agriculture: a Win-Win for Farmers and Nature

- Perennial flowering strips for biocontrol
- Targeted to supporting antagonists of agricultural pest
- On 15 - 30 farms in Lower Saxony, Saxony and Thuringia
- Assessment of short- and long-term impacts in several field crops
- Workshops for farmers, NGO
- Development of a new agri-environmental measure



Duration:

August 2020 – July 2026

Total financial volume:

1.4 Mio. €

Contact:

Dr. Anna Kosubek

kosubek@agrarnuetzlinge.de

W przypadku zainteresowania współpracą lub wymianą prosimy o kontakt ----->

Funded:

Thank You



Urgently Needed: Alternatives

**RESEARCH & INNOVATION
TO DRIVE THE
GREEN DEAL**

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#EUGreenDeal | #InvestEURResearch



**European
Commission**