The project PICTA-KILL - Novel strategies for biological psyllid pest control

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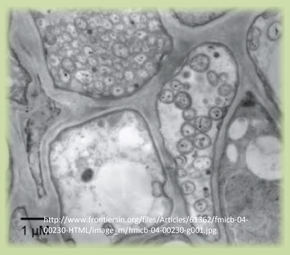
INTRODUCTION

Psyllid pests are distributed all over the world and cause damage in crop plants. Novel defense strategies against these insect pests are of international interest. Being the vector of *Candidatus* Phytoplasma mali, the infectious agent of apple proliferation, the psyllid *Cacopsylla picta* (Hemiptera; Psylloidea) is responsible for an annual economic loss of a three-digit-million range in Europe. Because there are no direct measures to combat apple proliferation, the vector itself has to be controlled in order to protect the plants.

DISEASE

Apple proliferation

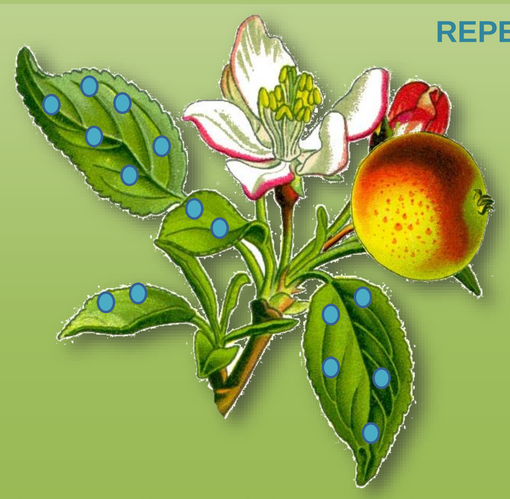
PATHOGEN

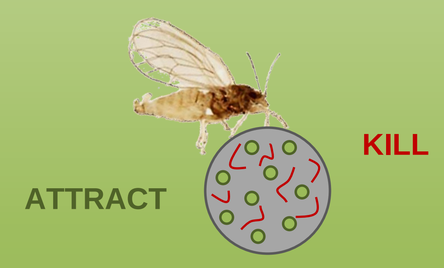


***Candidatus* Phytoplasma mali**

VECTOR

Cacopsylla picta





The overall aim of this recently granted project is to develop semiochemical-based co-formulations, which can be applied for "Attract-and-Kill"-strategies against *C. picta*. Furthermore, it will be examined if a combination with repellent agents supports the effect ("Push-Pull-Kill"- strategy).

PROJECT STRUCTURE

REPEL/PUSH

Potential **Repellents**
- benzylalcohol
- bornylacetate
- mixtures

ATTRACT/PULL

Potential **Attractants**
- β-caryophyllene
- ethylbenzoate
- mixtures

KILL

Entomopathogenic fungi
- *Pandora* sp. (Entomophthorales) (UC)
- *Metarhizium* sp.
- *Beauveria* sp.

Insecticides
- natural
- synthetic

FORMULATION

Polymers and adjuvants

Screening for formulation materials and methods (FHB)

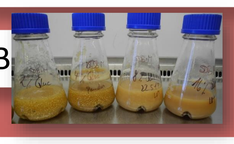
Methods for the production of (micro-)capsules applicable within a spray suspension or in combination with a trap

Collection and rearing of insects (JKI, IS)

Screening of attracting, repelling and arresting semiochemicals under laboratory conditions(JKI, IS)

Efficacy tests under laboratory conditions (JKI, FHB, UC)

Cultivation (FHB



Identified repellents

Identified attractants

Compounds efficiently killing *C. picta* under laboratory conditions

Mass production (FHB, BIO)

Formulation (FHB)

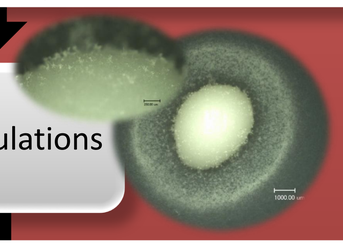
Collection and rearing of insects (IS, JKI)

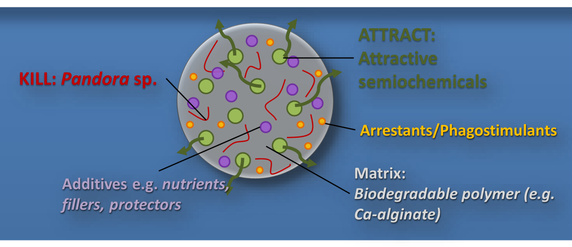
Repel/Push formulations

Attract/Pull formulations

Attract-and-kill formulations

Kill formulations





Analysis of emission rate of semiochemicals from formulations (FHB, JKI)

Collection and rearing of insects (IS, JKI)

Efficacy evaluation under laboratory conditions (IS, JKI)

Scale-up (BIO, FHB)

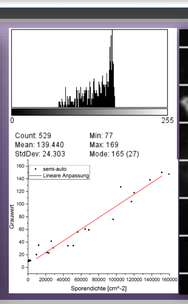
Efficacy evaluation under field conditions (JKI)

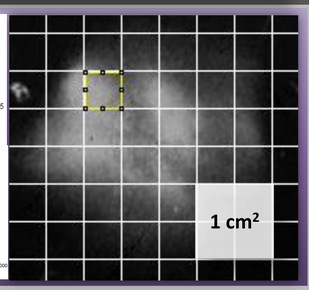
UC: University of Copenhagen
JKI: Julius Kühn-Institut
BIO: BIOCARE
IS: Insect Services
FHB: FH Bielefeld

Optimized formulations that with attract-and-kill or push-pull-kill strategies show high efficacy in the field

FIRST RESULTS

- An entomopathogenic fungus of the genus *Pandora* sp. (Entomophthorales) was isolated from the target insect *Cacopsylla* sp.
- The pathogenicity of the isolated fungus was demonstrated for different *Cacopsylla* species
- The fungus can be formulated within Ca-alginate beads and nutrients.
- An computer-assisted evaluation method was developed for the quantification of discharged conidia





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