Isaria fumosorosea for pest insect control in vegetables

Introduction
The goal of this BIOCOMES research is to develop a microbial biocontrol product based on the entomopathogenic fungus *Isaria fumosorosea* for the control of different pest insects on vegetables as well as test and validate its efficacy. One of the main objectives is to compare the potential of a newly selected *Isaria fumosorosea* isolates with the already available strain against whitefly and other important pest insects, their dose response and the potential non target-effects (beneficial insects). The efficacy of the two strains needs to be assessed under commercial application conditions in vegetable crops grown in greenhouses and open fields in the Mediterranean, as well as in Brassica crops grown in the Northern European zone.

Approach
In the 1990s *I. fumosorosea* was identified as one of the most common entomopathogenic fungi infecting *Bemisia* spp. and *Trialeurodes vaporariorum* in Asia, Russia, USA, South America and India. Depending on the strain *I. fumosorosea* has a broad host range and can therefore be efficient against several pest insects. The framework in BIOCOMES for the new product development includes not only the efficacy against the relevant pest under different climatic conditions but also the evaluation of the cost-effectiveness in the production and the product design (product quality, shelf life and storage conditions, applicability). One part of the scientific work was to find and define the molecular markers for the two promising *Isaria* strains to be able to differentiate them from other isolates. In the BIOCOMES project we also investigated the environmental fitness (temperature range and humidity) of *Isaria* strains under controlled laboratory conditions to be able to define their ecological restrictions and therefore potential restrictions of the resulting formulation. The two Mediterranean project partners tested the formulated prototype products under GEP regulated trial protocols over three years. The greenhouse trials in Mediterranean region focused on two whiteflies. For the Brassica crops in the Northern EU zone BIOCOMES tested the effects on *Plutella* sp. under open field conditions.
Results

According to the project objectives the potential of 9 different *Isaria fumosorosea* isolates from one partner were compared under controlled laboratory conditions (temperature, humidity) with the already available strain (functioning as a standard). At the same time the spore production of this isolate collection was assessed by another project partner. Based on these data sets one isolate from the collection has been selected. The final two strains were separately formulated and tested against whitefly and other relevant pests in efficacy studies under greenhouse and field conditions. Important steps for development of strain-specific markers have been made. In the first project year the modification of the formulation according to the applicability from the preliminary greenhouse trials was made. Shelf life tests under different storage conditions were already started in the second project year in order to have sufficient time to evaluate them over a longer time period.

Project partners evaluated the efficacy of the prototype products under commercial growing conditions in vegetables in three different European regions over two years in several trials. The efficacy data of the first application year showed moderate impact. Therefore, results of the second year have to be analysed until now to decide upon the next steps.

Next steps

The prototype formulation for two pre-screened Isaria strains shows promising results in storage (shelf-life) and applicability under commercial conditions. The efficacy of these products has to be further tested under field conditions and on additional crops for a broader market potential. For the integration of these products in the integrated pest management (IPM) system the application scenario has to be adapted to each crop.