

ZIM Success Story

Central Innovation Programme for SMEs

ZIM-Network R&D Project 051



Biofungicides for Sustainable Agriculture

Fungal infestation of crop plants is a twofold problem in agriculture: (1) economically, because harvest losses and high costs of pesticides for fungus control occur, and (2) ecologically, because the chemicals used pollute the environment. During the international cooperation project, a biofungicide was developed from phytochemicals extracted from the African lily. It's the first fungicide suitable for organic farming.

There is a wide range of chemical fungicides on the market, but not a single approved plant-based fungicide suitable for organic farming. The project partner AgraForUm has already developed the first economically usable fungicidal active complex from the African lily (*Agapanthus africanus*). However, in order to avoid loss of biological activity, it has so far only been possible to store it in a petroleum derivative. The bioactive substances (secondary plant substances) are essential for the effectiveness of the biofungicide, as they serve as a defense against pests for the plant. All attempts to implement the previous process with ecologically neutral substances have so far not been successful. Within the R&D project, the partners AgraForUm, TERRACON, ZeSys and Chemical Process Technologies have, for

the first time, succeeded in developing an oil-free carrier substance for the active complex.

The product and its innovation

The biofungicide Agabio is the first fungicide suitable for organic farming. Methanol continues to be used as an extraction solvent, since this is the only solvent that achieves full bioactivity. The new feature is that after the raw extract has been extracted, it is transferred into a non-toxic low molecular weight alcohol as an additional processing step. The new formula consists of polypropylene glycol and copper sulphate which can be approved for organic farming. The project also included a spectroscopic rapid test for the activity measurement of the ingredient complex and a quantitative method to

measure active substance concentrations. Although Agabio is obtained from a single plant, it consists of at least five active substances, the combination of which makes the development of resistance extremely unlikely. The effectiveness of the substance complex is comparable to that of conventional, chemically produced fungicides without having the detrimental side-effects associated with the conventional pesticides.

Market and Customers

Due to stricter regulatory requirements and pressure from consumers and importers, fewer and fewer fungicides are available to farmers. The environmentally friendly alternative, Agabio, has the potential to open up large market shares,

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Cooperation partners

- AgraForUm GmbH, Bomlitz
- TERRACON Laboratorium für Umwelt- und Pestizidanalytik GmbH, Jüterborg
- Zentrum zur Förderung eingebetteter Systeme e.V. (ZeSys e.V.), Berlin
- Chemical Process Technologies Ltd., Pretoria (South Africa)



Extraction reactors for the ingredient complex



Accelerated Solvent Extraction (ASE)

especially in sensitive export markets like the European Union. More field trials are currently being carried out in South Africa and marketing in South Africa is scheduled to begin at the end of 2019. The necessary registration processes for a market launch can be completed more quickly in South Africa, since all field trials are carried out under ideal conditions. The primary areas of application for Agabio will be the agricultural production of grapes, citrus fruits and potatoes. South Africa is exceptionally well suited for a market launch, as it is one of the world's most important wine-growing regions and is the third largest exporter of citrus fruits. The cooperation partner AgraForUm focuses on the development and production of innovative organic products suitable for use in agriculture. Chemical Process Technology Ltd. is an expert on the development of chemical synthesis technologies. TERRACON is a laboratory for environmental and pesticide analysis, carrying out analyses of active substances and pollutants in the environment, agriculture and medical products. The ZeSys research facility

expertise lies in the monitoring, control, regulation and processing of information using embedded systems.

The ZIM collaboration network

MALDI App brings together 14 partners from the fields of environmental, industrial and medical analytics. The cooperation began with the development of applications for MALDI-TOF Mass Spectrometry, an analysis method for chemical compounds that can identify complex biological samples using "fingerprint analysis". The network also focuses on the analysis of human allergens and the detection of explosives in soil and groundwater samples.



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The Central Innovation Programme for SMEs provides funding to all technologies and sectors:

- Individual ZIM projects
- ZIM cooperation projects
- ZIM collaboration networks

Information and advice on collaboration networks and their R&D projects

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