

COST Action FA1103

Endophytes in biotechnology and agriculture

2011 | 2015

Objectives

- Identification of bottlenecks limiting the use of endophytes in biotechnology and agriculture and to provide solutions for economically and ecologically compatible exploitation of endophytes.
- Further knowledge of ecology of endophytes in plant-soil ecosystems and in plant-plant and plant-animal interactions.
- Identification of new competent endophytes from different plant hosts in Europe with importance for agriculture, environment and industry enabling a Central European web-based database of endophytes.
- Development of new microbial inocula for increase of biomass together with improved plant quality, plant-microbe interaction in soil, protection against biotic and abiotic stress, and phytoremediation as well as elucidation of endophyte recognition, mode-of-action.

Main Achievements

- 200 individual members (including 9 companies) from 41 countries in Europe and abroad: 46 % are female and 44 % Early Stage Researchers (PhD <8 years ago). 11 institutions from 9 non-COST countries have expressed their interest to join the Action.
- In the first one-and-a-half years three conferences were organized with together 360 participants, 9 Short-term Scientific Missions were approved and 110 publications were published by Action members in peer-reviewed journals.
- COST FA1103 elaborated a definition of the term 'endophytes': "Endophytes are microorganisms (bacteria, fungi, unicellular eukaryotes), which can live at least part of their life cycle inter- or intracellularly inside of plants usually without inducing pathogenic symptoms. This can include competent, facultative, obligate, opportunistic and passenger endophytes. Endophytes can have several functions and/or may change function during their lifecycle."

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Food and Agriculture (FA)

Participating countries

AT, BA, BE, CZ, DE, DK, ES, FI, FR, GR, IE, IL, IT, NL, PL, PT, SI, SK, TR, UK

Contact details

Chair of the Action

Carolin Schneider
Institut für Pflanzenkultur e.K.,
Germany
schneider@pflanzenkultur.de

Science Officer

Science Officer Food and Agriculture
COST Office
ioanna.stavridou@cost.eu

Website

www.endophytes.eu

ENDOPHYTES



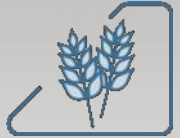
New endophytic species
(*Kabatiella bupleuri*) emerging from a
surface-sterilized leaf of the plant
Bupleurum gibraltarium
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Working Group activities

Working Group 1 'Ecology of endophytes'

- Survey of endophyte populations in key plants for European agriculture and ecosystems
- Ecosystem effects of multiple symbiotic interactions: endophyte-grass-mycorrhiza-rhizobium-legume
- A new initiative was taken to explore the colonization of Verotoxin-producing *Escherichia coli* subtypes (STECs) in seeds and the possibility for acquisition of novel virulence or resistance traits from plant-associated communities. This research was initiated because of the reported outbreaks of *E. coli* in sprouts in Germany and France.

Working Group 2 'Identification of new competent endophytes'

- Different methods for efficient isolation of EMOs from plant tissues will be compared among the participants of the COST Action.
- Standard systems using selected model plants and pathogenic MO will be set up to test the bacterial and fungal isolates of this initial collection for their establishment inside plant tissues and their capacities to combat certain plant pathogens.
- Set-up of a questionnaire for establishment of the European Endophyte Database

Working Group 3 'Development of new microbial inocula'

- Screening process will span from *in vitro* tissue culture assays through lab-scale, greenhouse and field trials, the impacts of the endophyte inoculants on population dynamics of pathogens, autochthonous microorganisms and communication in plants will be investigated.
- Different inoculation methods will be investigated as the development of a suitable procedure for the production of bio-preparations by cultivation and stable formulation is a necessary precondition for the practical application and shelf life of endophytes.

Working Group 4 'New industrial products in life sciences'

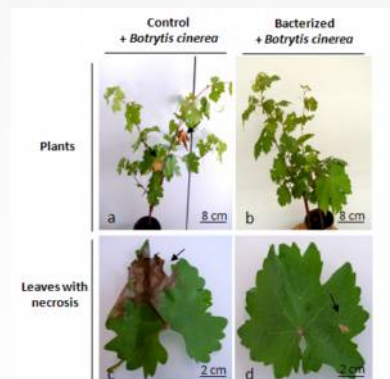
- Secondary metabolites can mediate interorganism communication and ecological interactions and can determine biocontrol efficacy, efforts on model organisms employed by other WGs will be prioritized
- Selection of fungal endophytes from *Olea europaea* for the biological control of *Colletotrichum acutatum* and *Verticillium dahliae*.
- Expression of SM pathways during establishment of fungus-plant or fungus-insect vector interactions will be followed and the ecological advantage of these compounds during the endophyte life cycle will be understood. The model organisms described above should also be included here.

Industry participation

Inoq GmbH
Matthias Döring
Researcher
Germany
doering@inoq.de
www.inoq.de



Koppert B.V.
Willem Ravensberg
Manager R&D Microbials
Netherlands
wravensberg@koppert.nl
www.koppert.nl



Endophytic *Saccharothrix algeriensis* NRRL B-24137 induces systemic resistance towards *Botrytis cinerea*
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