

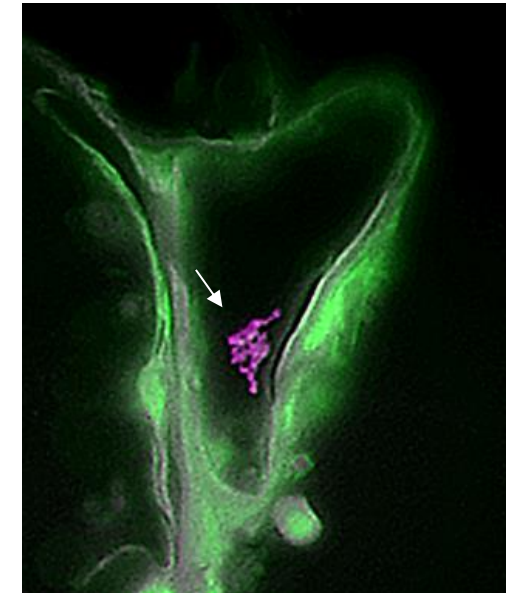
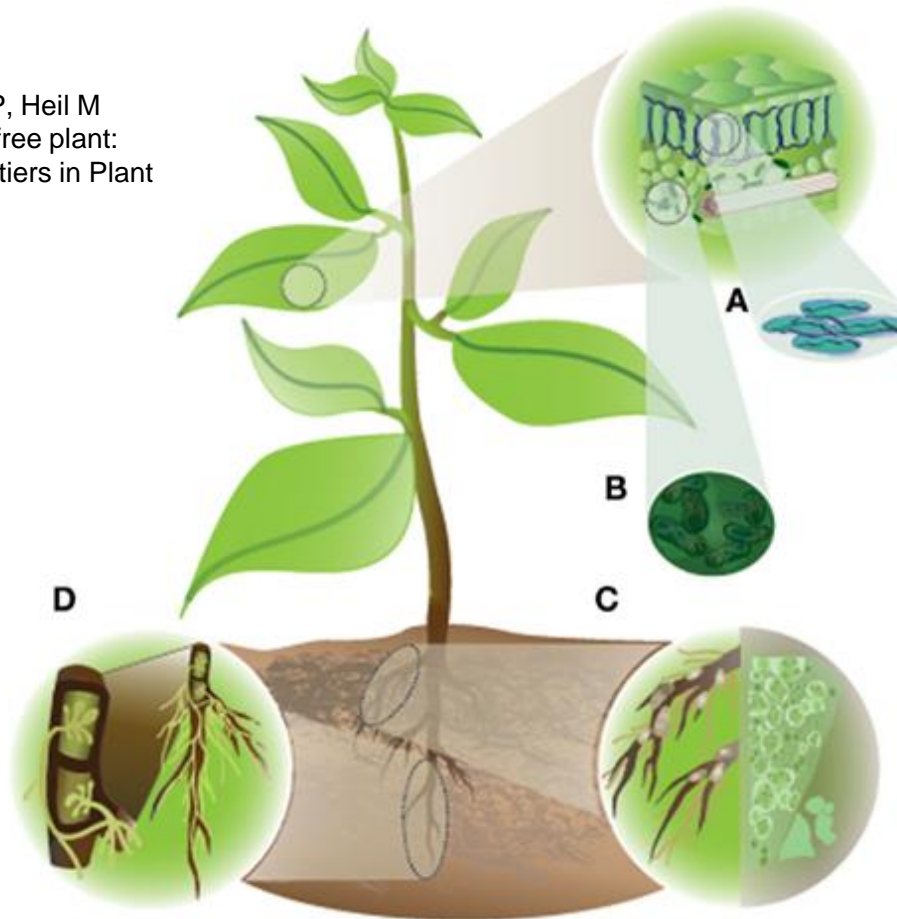
# Endophytes in Biotechnology and Agriculture

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COST ACTION FA1103



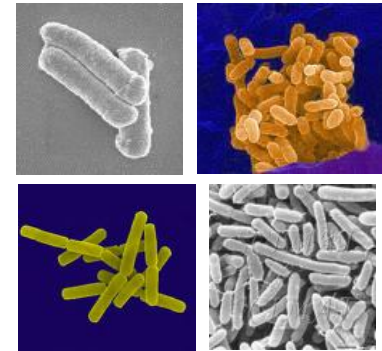
Partida-Martinez LPP, Heil M  
(2011) The microbe-free plant:  
fact or artefact? Frontiers in Plant  
Science 2



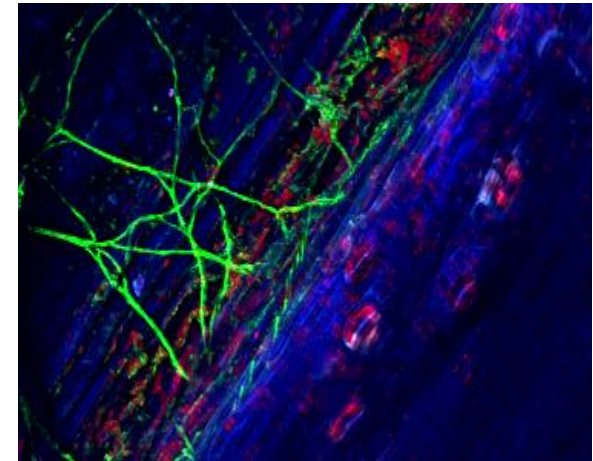
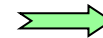
**Endophytes: microbes  
colonizing internally plants  
without being harmful to  
their hosts**

**Endophytes in different plant parts. They can be virus, bacteria, archae, oomycetes and fungi**

# Endophytes



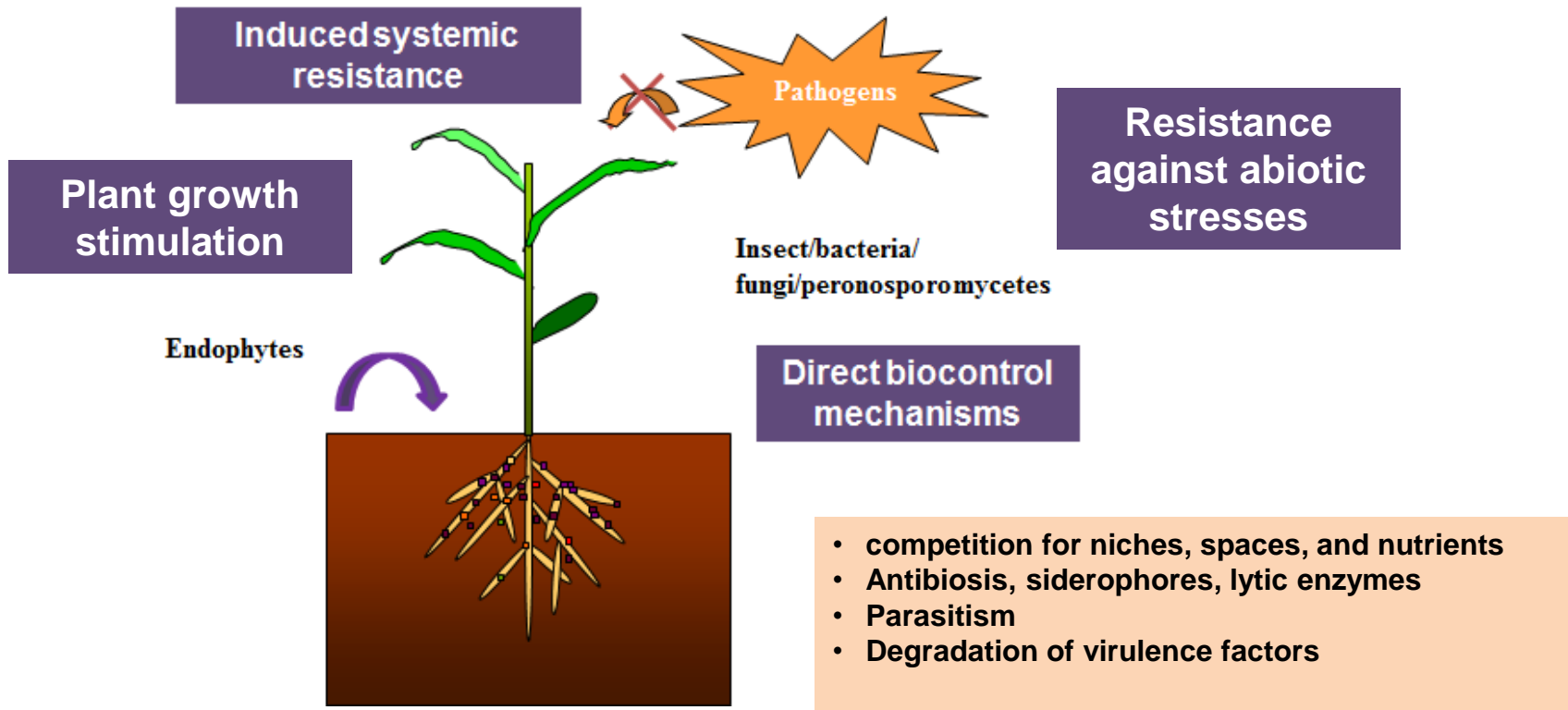
*Bryophytae,*  
*Pteridophytae,*  
*Gymnospermae*  
*Angiospermae*



Contain various  
microbial taxa

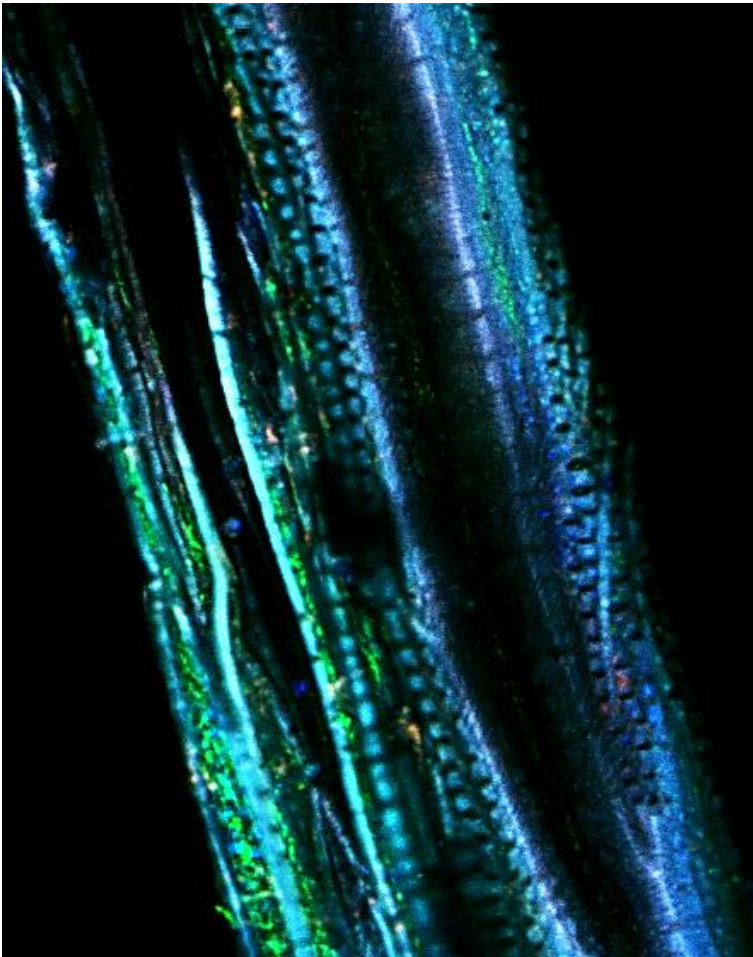
**Endophytic microbes in various plants**

# Use as biofertilizers and biocontrol agents?



Rev oeno 2011, 2013, Adv  
Agronomy 2013, Current  
Opinion Biotechnology 2014

**And plant strengthening**



● Bacteria in xylem vessels of grapevine

- Start 12/2011
- End 12/2015
- 22 Countries participate
- COST Near Neighbour Countries: 1 (Tunisia)
- International Partner Countries: 7 (2x USA, 1 India, 1 Argentina, 1 Australia, 1SA, 1 NZ)
- 135 COST entities participating
- 40 non-COST entities participating
- 69 MC members(+subs)
- 250 working groups members

## Scientific context and objectives



Identify of bottlenecks limiting their use

Provide solutions for economical and ecological exploitation

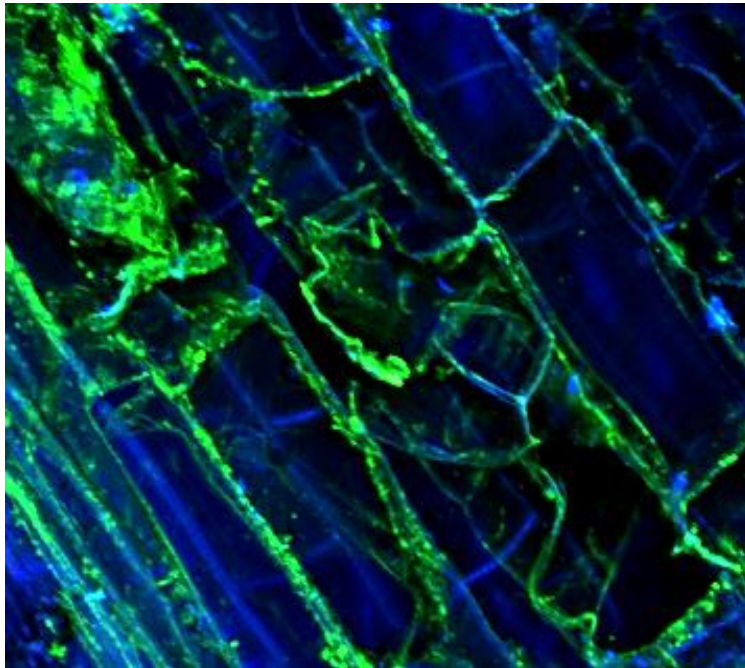
Better knowledge of ecology of endophytes

New competent endophytes

Development of new microbial inocula, elucidation of endophyte, recognition, mode-of-action

Increased cooperation and exchange of knowledge about endophytes

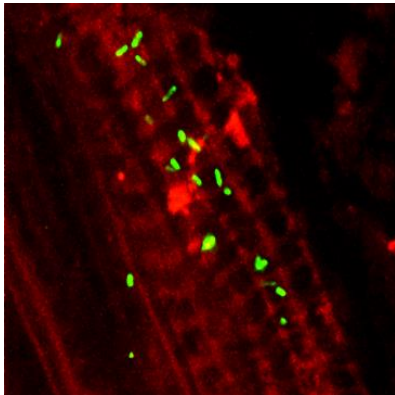
# Working groups



● Fungi in stolon of *Trifolium* sp.

1. WG 'Ecology of endophytes'
2. WG 'Identification of new competent endophytes'
3. WG 'Development of new microbial inocula'
4. WG 'New industrial products in life sciences'

# Use of COST Instruments



Activity (No.)	Year 1	Year 2	Year 3	Year 4
MC/WG Meetings	4	4	2	
STSMs	6	6	already 6	
Training Schools	0	1	0	
Workshops or Conferences	2	2	2	
Joint Publications	36	17	ND	



## Short term scientific missions



**Young scientist travelled with grant from cost action to learn how to do and make collaborations**

**Example: S. Nigri from Italy to the Netherlands to know more about ecology of endophytes**

## Training schools



**Scientists are trained in specific topic related to endophytes**

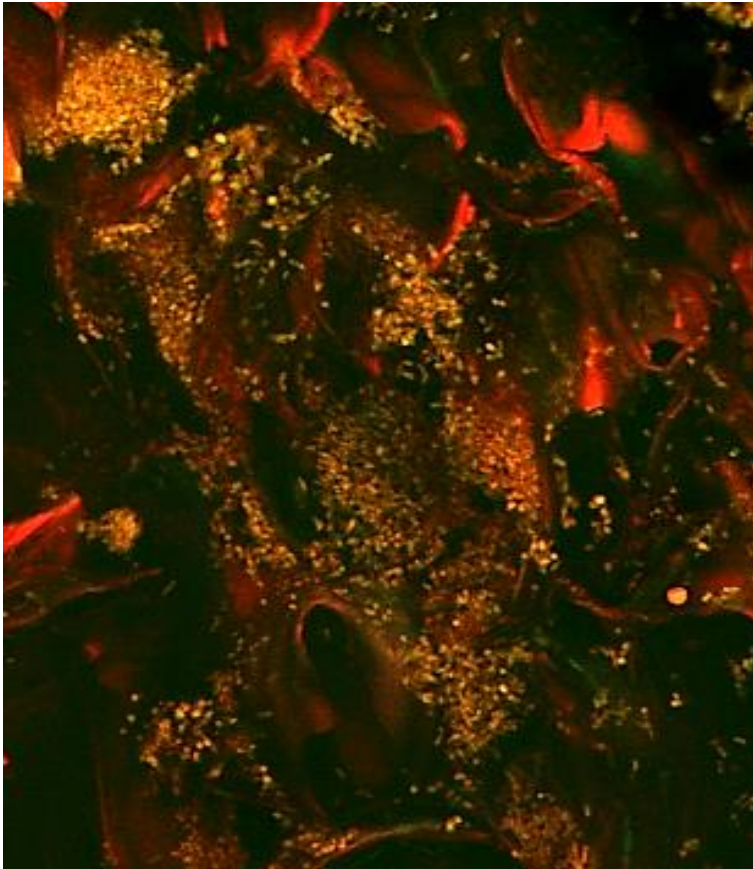
Example:

**„Characterisation of biologically active secondary metabolites from endophytic fungi“**

**Hosted by Marc Stadler Germany**

## Publications

- **More than 250 since the beginning in high rank journals (with up to 14 as impact factor)**
- **More than 50 due to collaborations between cost scientists**
- **Patents also made**
- **Books of dissemination done**
- **Special issues in high rank scientific journals ex: soil, plants and endophytes in Plant and Soil (editors Compant, Mitter, Campisano, Mercado-Blanco)**
- **Definition paper also done**



## Challenges

**To continue to build research on endophytes**

**To decipher better black boxes of endophytes**

**To increase the use of endophytes and their byproducts**

**Thank you**

[www.endophytes.eu](http://www.endophytes.eu)