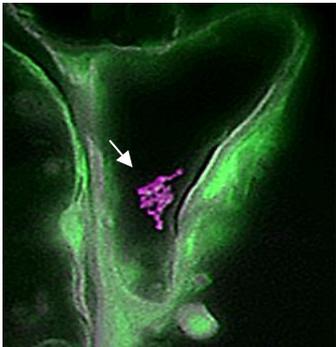


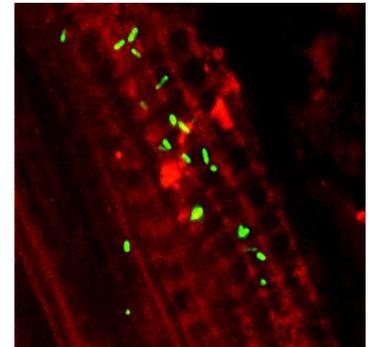
# Uncommon environments as sources of new biocontrol agents

**Dr. Stéphane Compant**



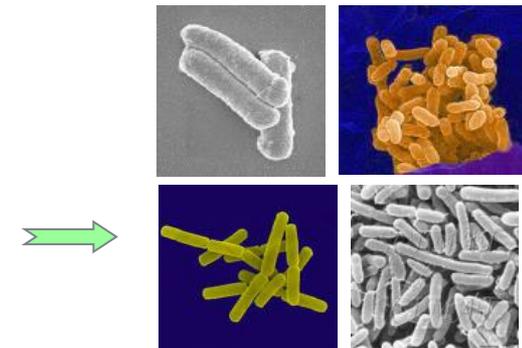
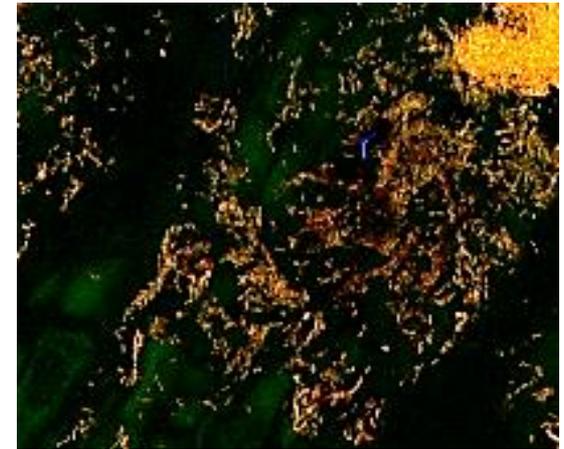
**Bioresources Unit, Health & Environment Department,  
AIT Austrian Institute of Technology GmbH,  
3430 Tulln, Austria**

**[Stephane.Compant@ait.ac.at](mailto:Stephane.Compant@ait.ac.at)**



# Widely used environments to find BCA

- Agricultural soils
- Soil rhizosphere
- Phytosphere of various plants, especially crops



Contain various bacterial taxa

## Other sources?

### Where to find other beneficial bacteria?

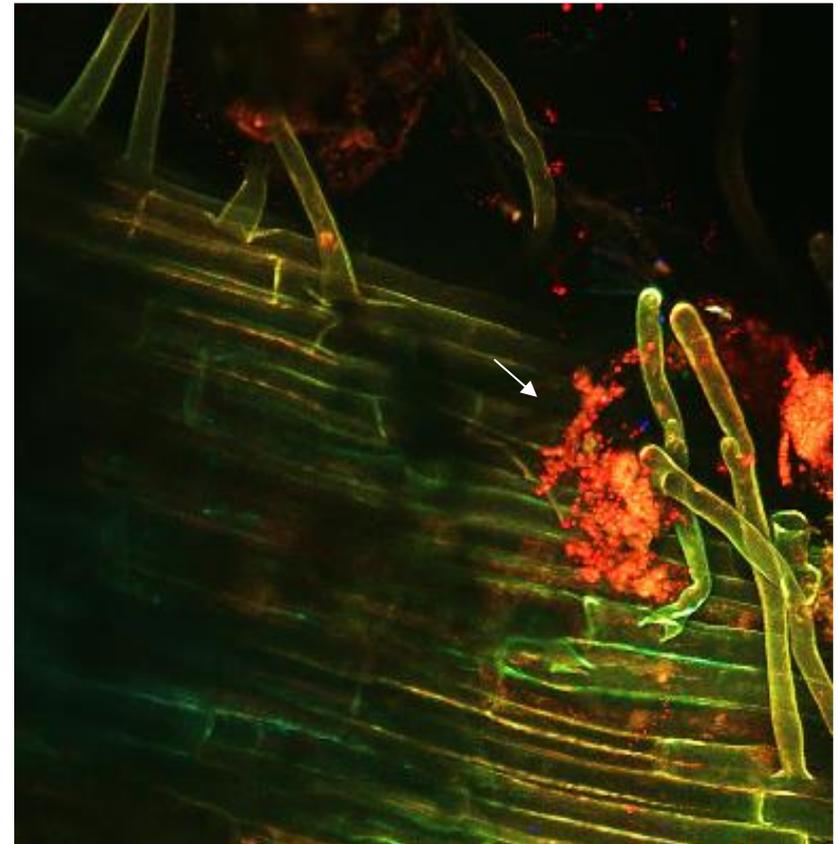
- From uncommon plants



Control  
+ *F. culmorum* E13b



*Streptomyces tauricus* 102  
+ *F. culmorum* E13b

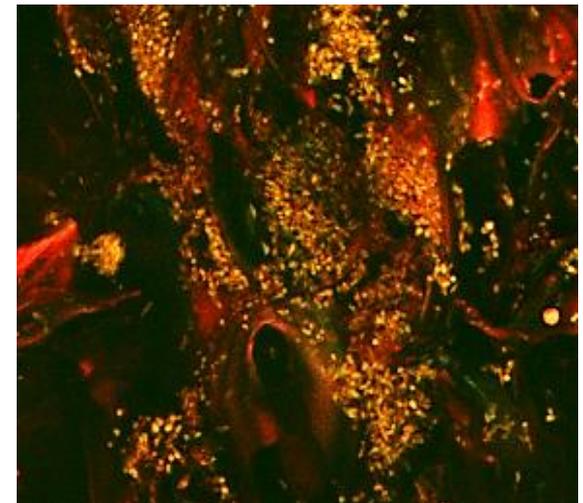
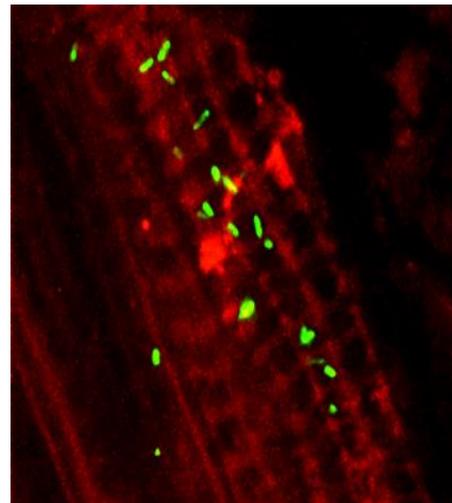
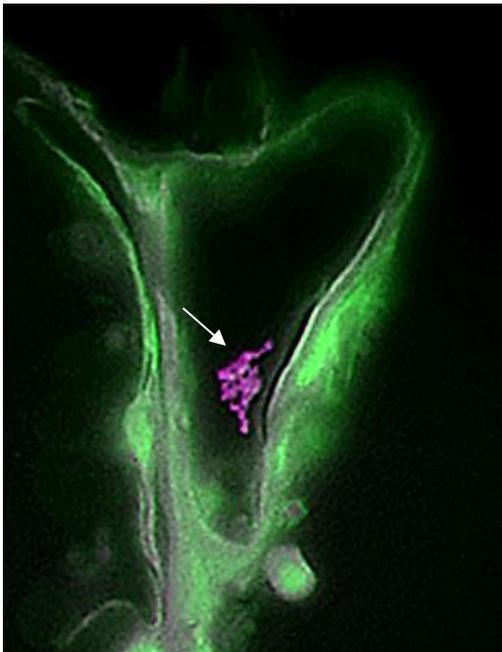


New taxa isolated from mosses but  
protecting wheat against *Fusarium* sp.

## Inside plants: Endophytic colonizers

- From various crop plants
- Different tissues

**Talk on Wednesday!**



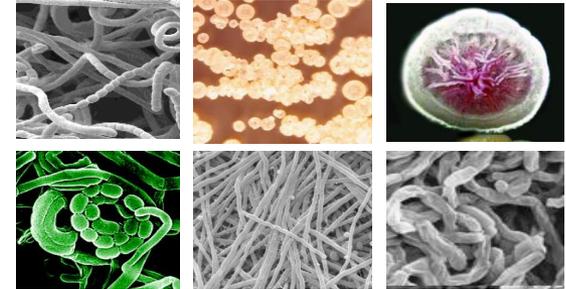
Since the 90's



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

### Where to find other beneficial bacteria?

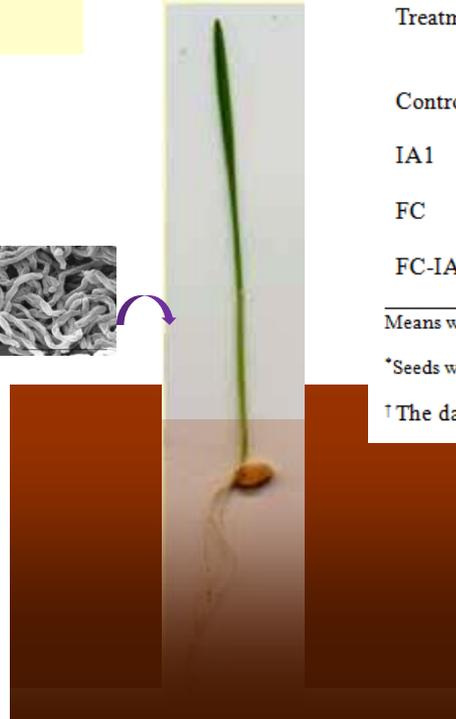
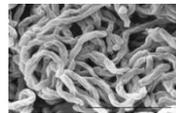
- From uncommon plants
- seaplants,
- rock,
- harsh environments



New taxa. new metabolites,  
New mechanisms  
of BCA

# Biocontrol of *F. culmorum* in wheat with a beneficial bacterium isolated from desert soil

Collaboration with A. Zitouni IBSM  
Algeria



**Table 2** Effects of the strain IA1 on seedling blight†

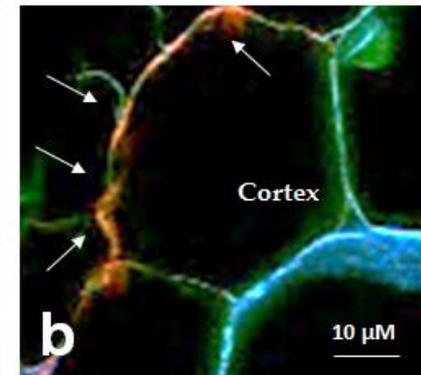
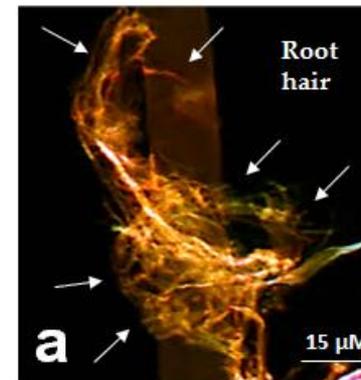
Treatment*	% Plants		Disease score	Length (mm)
	Emerged	Diseased		
Control	91.67 <sup>a</sup> ± 3.34	0 <sup>c</sup> ± 0	0 <sup>c</sup> ± 0	90.4 <sup>ab</sup> ± 6.95
IA1	81.67 <sup>ab</sup> ± 4.41	0 <sup>c</sup> ± 0	0 <sup>c</sup> ± 0	114.93 <sup>a</sup> ± 7.86
FC	16.67 <sup>c</sup> ± 1.67	100 <sup>a</sup> ± 0	3.88 <sup>a</sup> ± 0.3	19.93 <sup>c</sup> ± 3.03
FC-IA1	75 <sup>b</sup> ± 2.89	35.26 <sup>b</sup> ± 7.57	0.79 <sup>b</sup> ± 0.06	80.79 <sup>b</sup> ± 3.36

Means with the same letter in the same column are not significantly different at  $P = 0.05$ .

\*Seeds were co-inoculated with *F. culmorum* (FC) and actinomycete strain IA1.

†The data shown are mean values of three replicates ± SE.

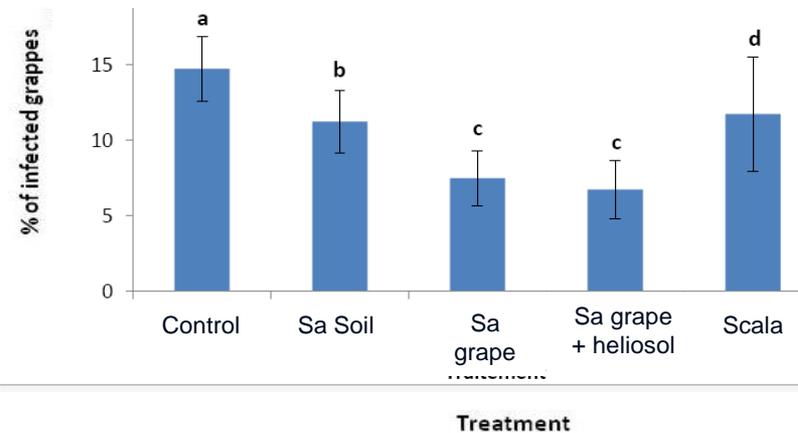
Phytospheric and endophytic colonization



# Biocontrol of *Botrytis cinerea* in vineyards using a microbe isolated from desert soil



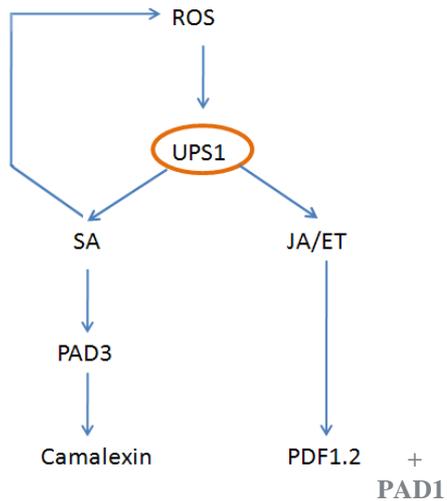
**Efficacy of *Saccharothrix algeriensis* NRRL B-24137 on *Botrytis cinerea* on Chardonnay cultivar 2011**



**Positive effect with low infection due to *B. cinerea* in the field (under high temperature conditions; 38-40° C in August 2011; Languedoc-Roussillon, France)**

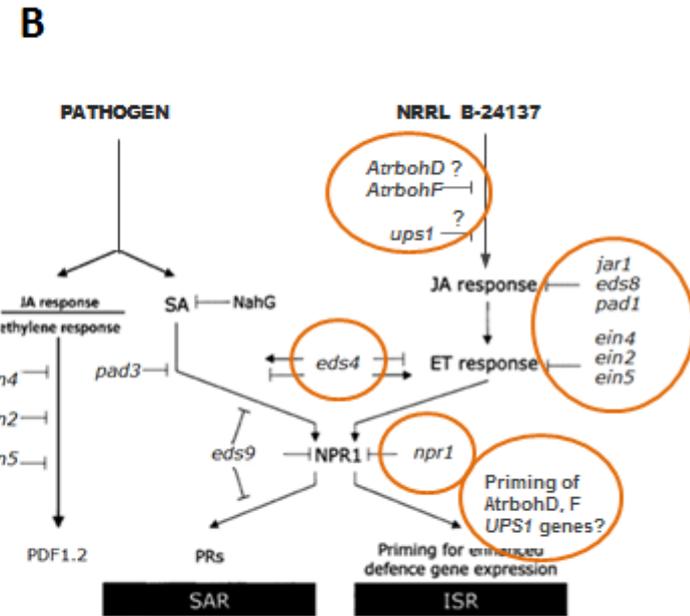
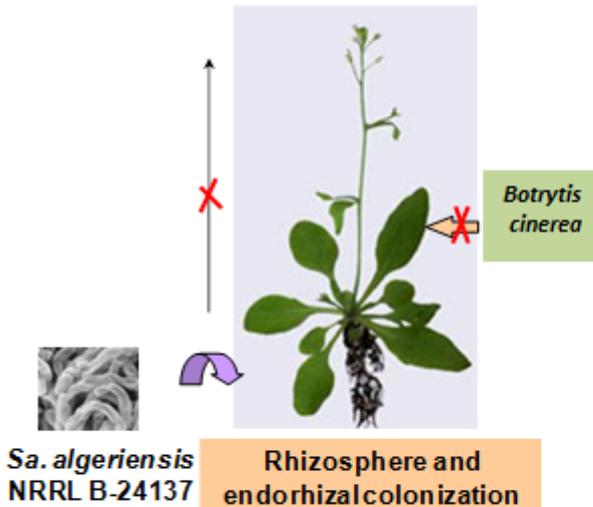
# New parts of mechanisms involved

## UPS1 and RBOHD involved in ROS signaling



Adapted from J. Denby, 2004

### A *Arabidopsis*



model proposed for ISR adapted from Okubara 2005, Pieterse 1998, Ton et al. 2001

Plant and Soil 2014

## ISR/SAR mechanisms

## Bioresources Unit, Tulln, Austria



**A. Sessitsch**  
Head; Senior scientist



**G. Brader**



**F. Trognitz**



**B. Mitter**



**E. Hackl**



**S. Compant**

Project leaders-Scientists working on plant-microbe interactions

- Deciphering the plant microbiome
- Genetic/omic analysis of beneficial strains
- Mechanisms of plant-microbe interactions
- Biocontrol of plant diseases
- Biofertilization of crops
- New sources of BCA
- Biomiming
- Bioherbicides
- Bioremediation
- formulation



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- energy,
- mobility
- safety & security
- foresight & policy development.

DANKE!

# AIT Austrian Institute of Technology

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