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# Drechslera teres, the barley pathogenetic fungus

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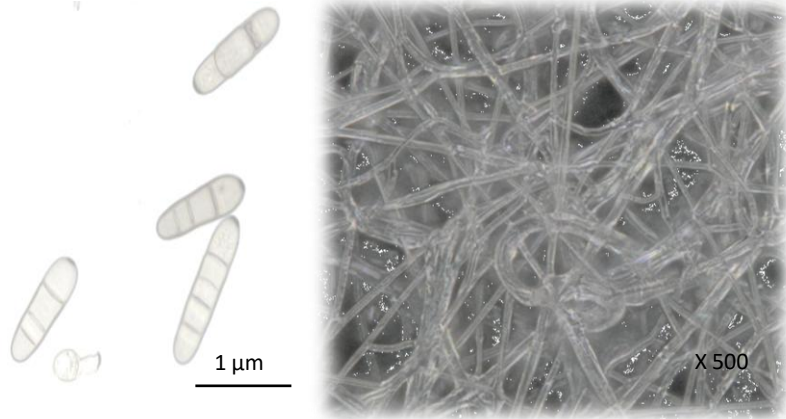
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## The strong comeback of *D. teres*

### Presentation of pathogen



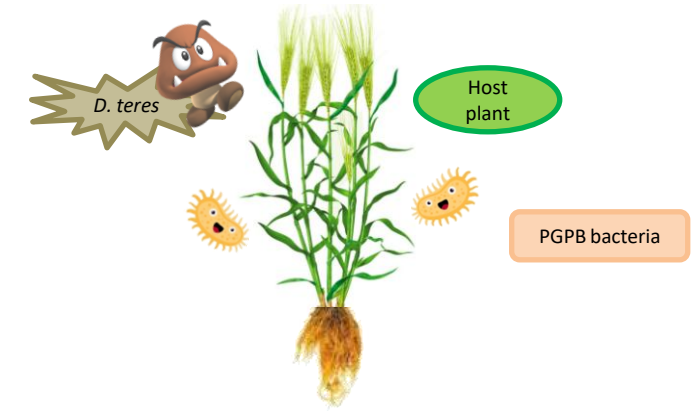
- ✓ *Drechslera teres*, asexual form [1]
  - ✓ Ascomycete
  - ✓ Hemibiotroph
  - ✓ Speed infection
  - ✓ Host: barley (*Hordeum vulgare*)

### Symptoms and damages



- ✓ Net blotch then necrosis, foliar disease
- ✓ Loss of production (10 to 40%) [2]
  - ✓ Serious economic problem
  - ✓ Spread throughout the world
  - ✓ Resistance developed by fungus

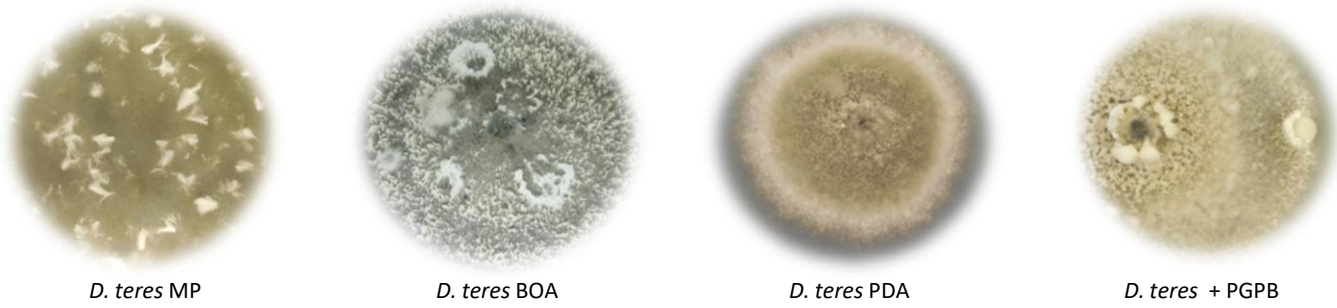
### Lutte BiHO project



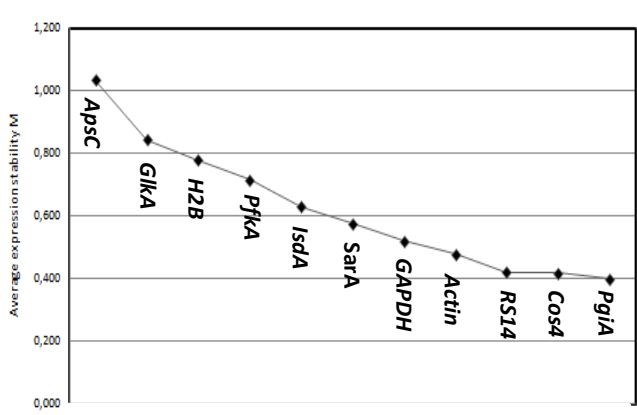
- ✓ **Objective:** To design and develop a biological control system based on the use of a beneficial bacteria to control barley leaf spot
- ✓ **Fundamental objective:** Study the cell wall of fungi with the aim of developing new antifungal products

## Materials and methods

- ✓ Analyze the differential expression genes in *D. teres* spores and mycelium after cultivation in different media in presence or absence in PGPB bacteria :



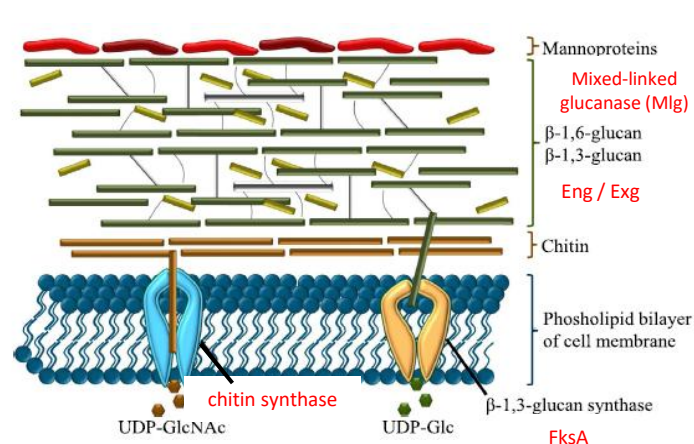
### Selection of reference genes



geNorm™ analysis of average expression stability values and ranking of eleven candidate reference genes based on pairwise comparison

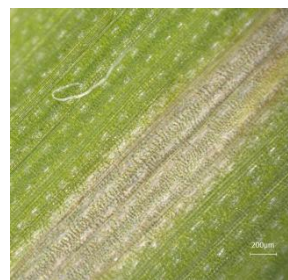
→ **Cos4 and PgiA are more suitable reference genes for qPCR normalization**

### Selection of target genes



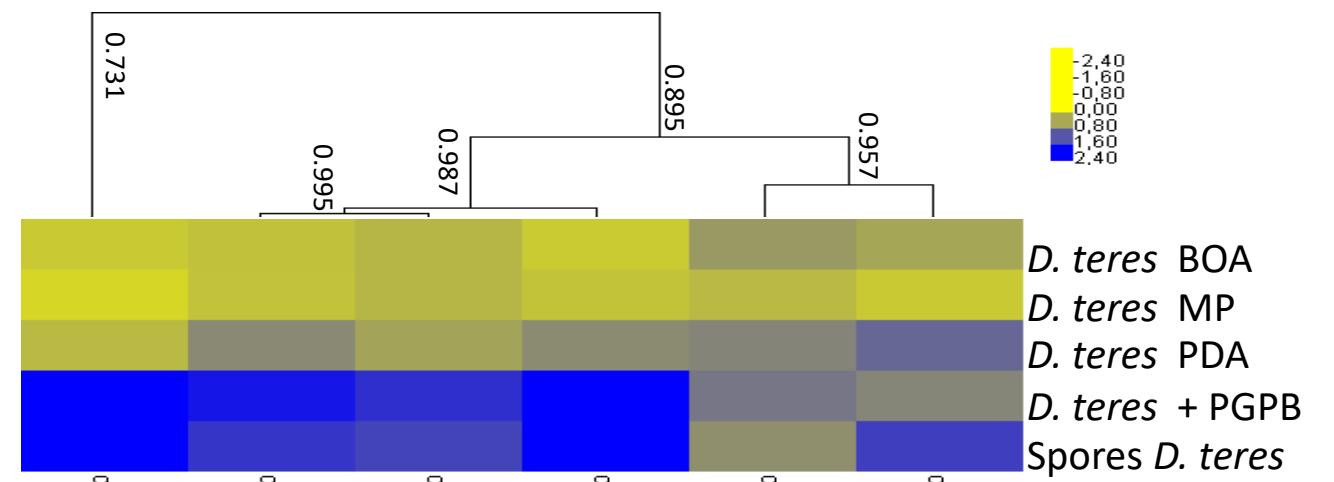
Schematic overview of fungal cell wall composition [3]

- ✓ Study of PTK1 (protein kinase) gene responsible for conidiation, appressoria formation and pathogenicity of barley



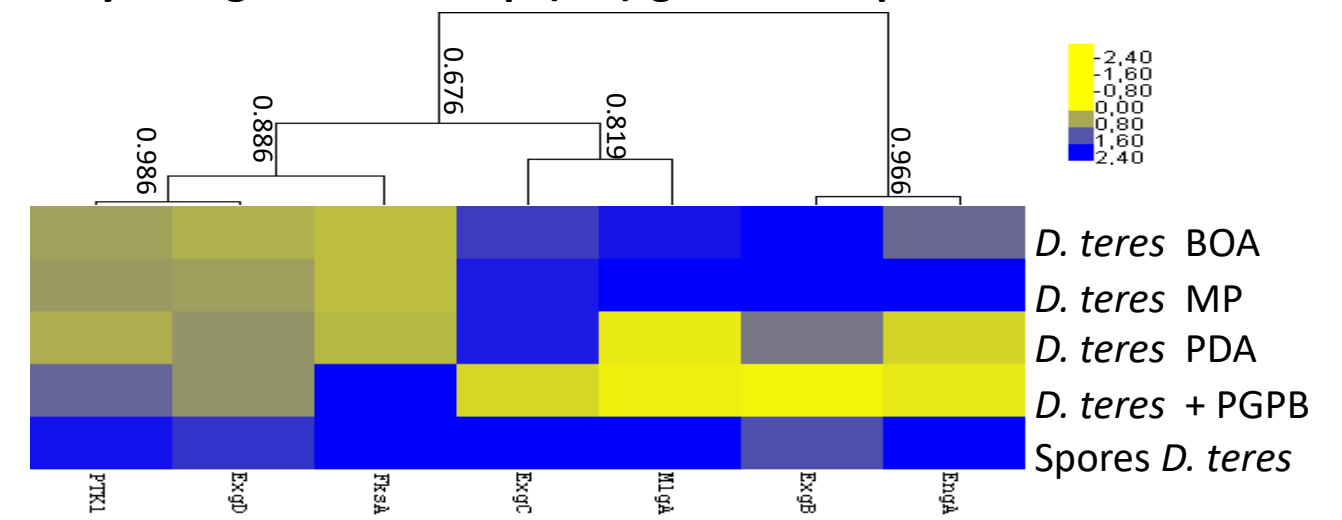
## Results

### Analyze of *CHS* expression in *D. teres*



- ✓ *CHS1* and *CHS2* have a similar expression profile
- ✓ *CHS3*, *CHS4*, *CHS5* and *CHS7* are more expressed in *D. teres* spores and mycelium in presence PGPB

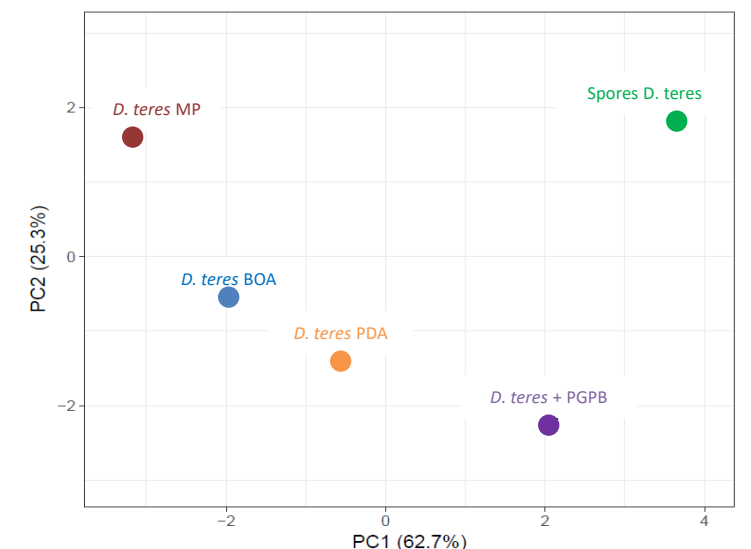
### Analyze of genes related β-(1,3)-glucan and protein kinase in *D. teres*



- ✓ Expression of genes related β-(1,3)-glucan and protein kinase increase in spores of *D. teres*

### Principal component analysis

- ✓ Dispersion of gene expression in the spores and the mycelium of *D. teres* grown on different media
- ✓ Genes expressed differently in spores



## Conclusions and perspectives

- ✓ The first study on the cell wall-related genes in *D. teres*
- ✓ Genes associated with the cell wall of *D. teres* are more expressed in spores

→ Is the composition of the barley cell wall modulated when attacked by the pathogen using microscopy?



### References:

- [1] Lightfoot, D.-J., and Able, A.-J., (2010). Growth *Pyrenophora teres* in planta during barley net blotch disease. *Australasian Plant Pathology* 39, 499-507
- [2] McLean, M.-S., et al., (2009). Epidemiology and control of spot form of net blotch (*Pyrenophora teres* f. *maculata*) of barley: a review. *Crop and Pasture Science* 60, 303-315
- [3] Fesel, P.-H and Zuccaro, A., (2016). B-glucan: Crucial component of the fungal cell wall and elusive MAMP in plants. *Fungal Genetics and Biology* 90, 53-60