

## Background

### Olive Anthracnose (OA) and Chestnut Ink Disease (CID)

- Eukaryotic phytopathogens, *Colletotrichum* fungi and *Phytophthora* oomycetes.

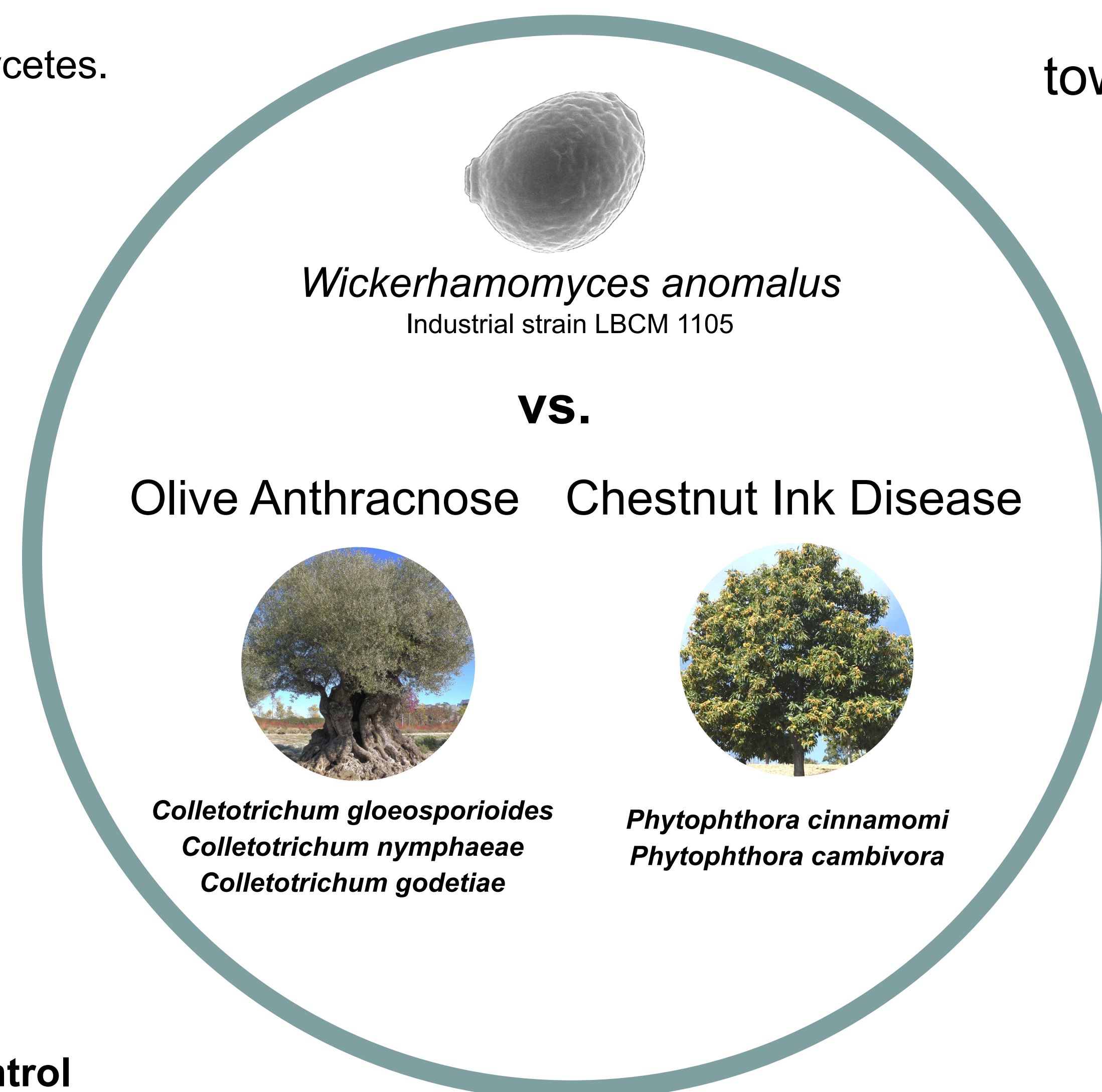
### Current disease management

- Mostly through **chemical fungicides**.
- Ineffective** and **harmful** for the environment.
- Increasingly under strict legislation impeding utilization.

**URGENT EFFECTIVE AND ECO-FRIENDLY ALTERNATIVES NEEDED**

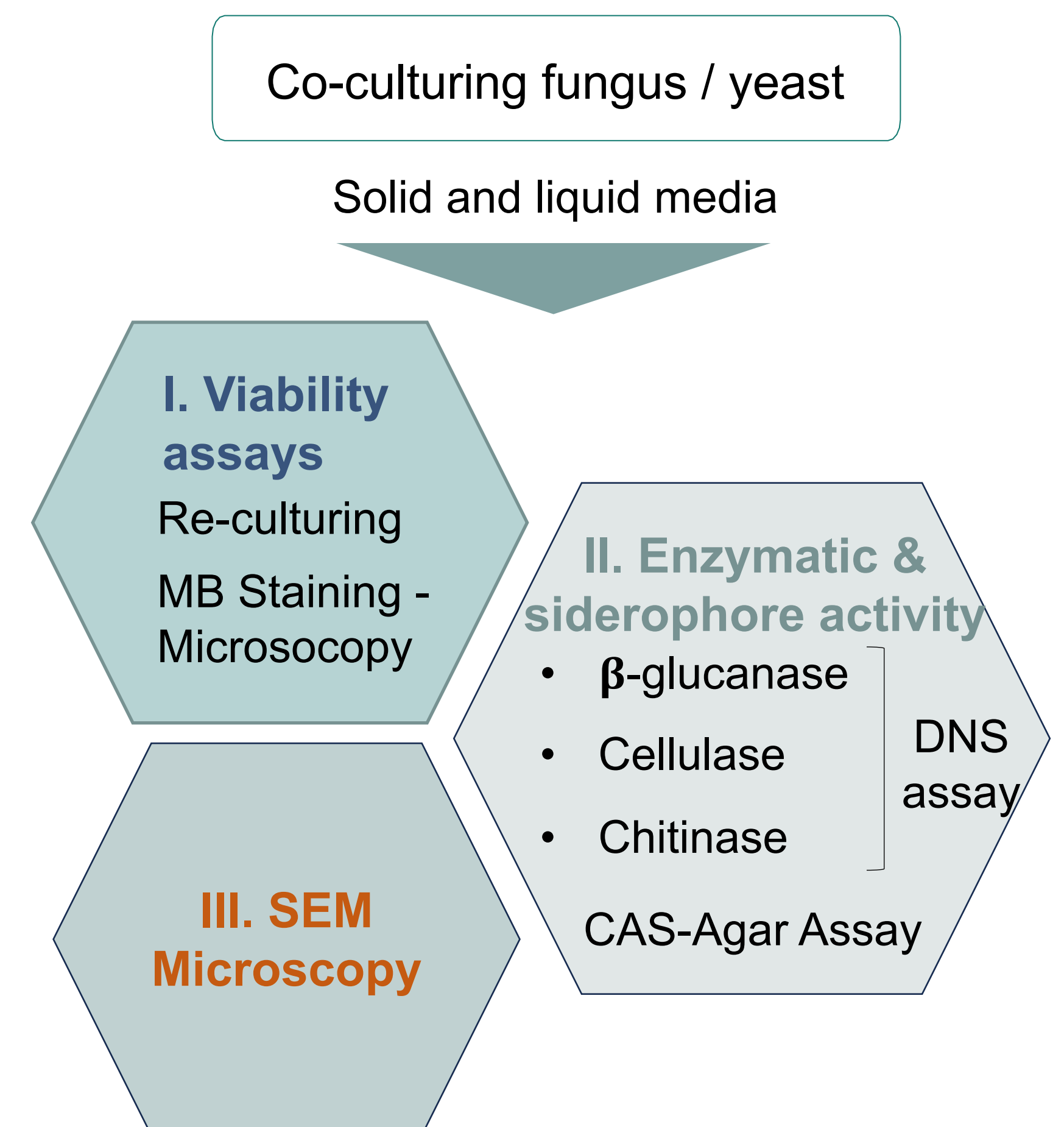
### Yeasts as Fungal Antagonists

- Well known antagonistic activity against other yeasts, fungi and bacteria
- Often applied in **food spoilage control** and excellent candidates for **in field biological control**



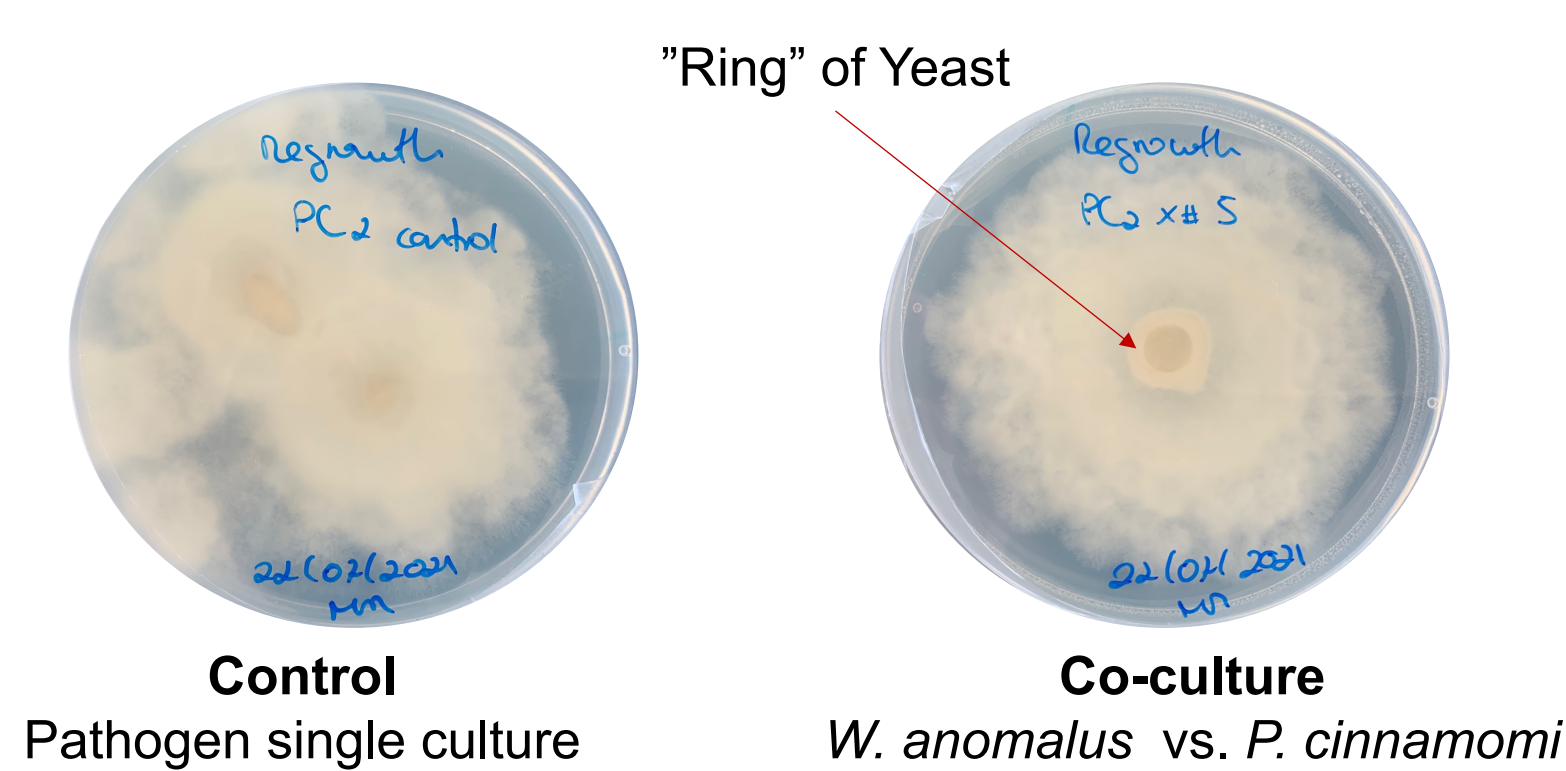
## Aims and Strategy

Explore the strong and recognized antagonistic potential of *Wickerhamomyces anomalus* towards more sustainable management of OA and CID



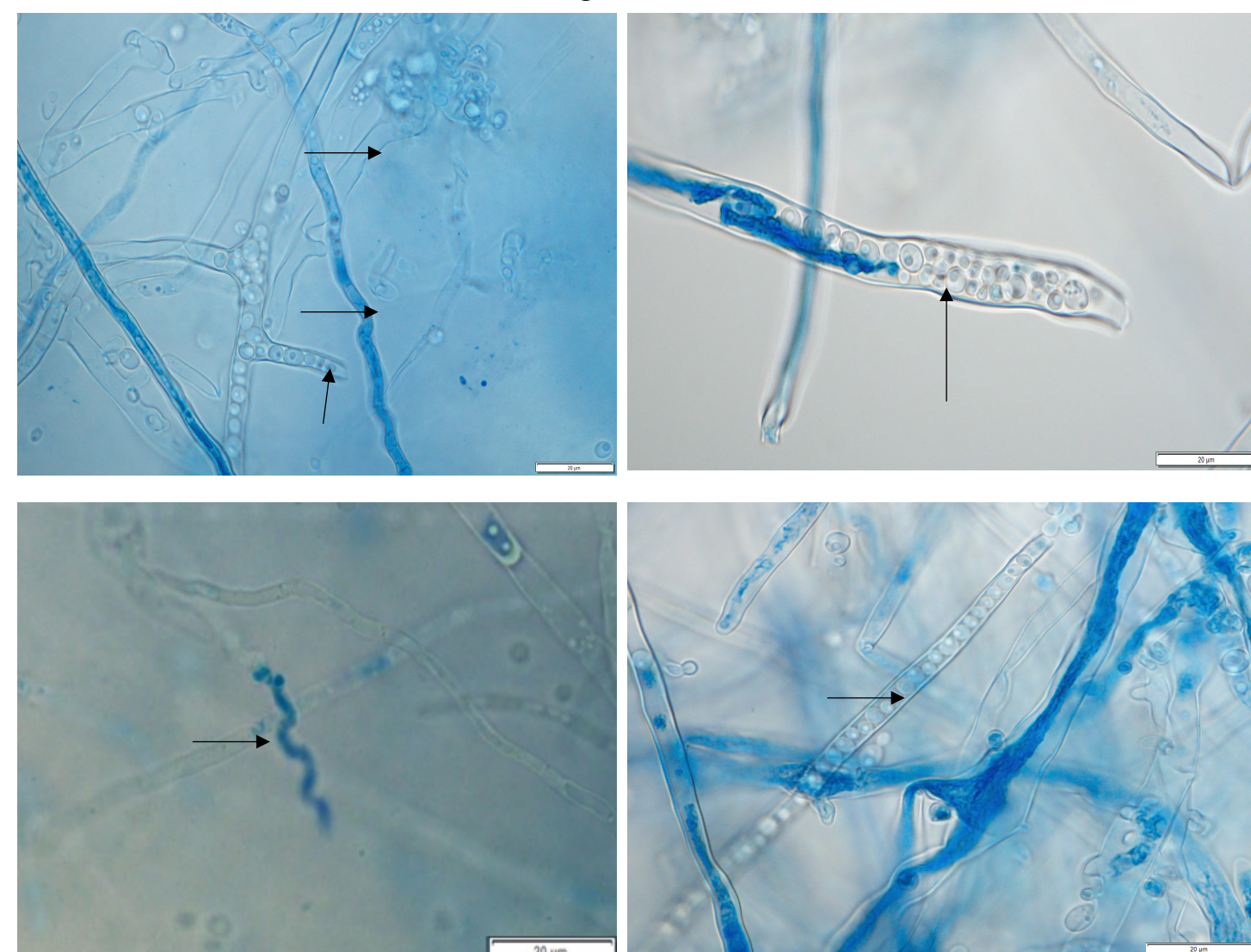
## Results

### I. Viability assays



Growth on all combinations → Viability is retained

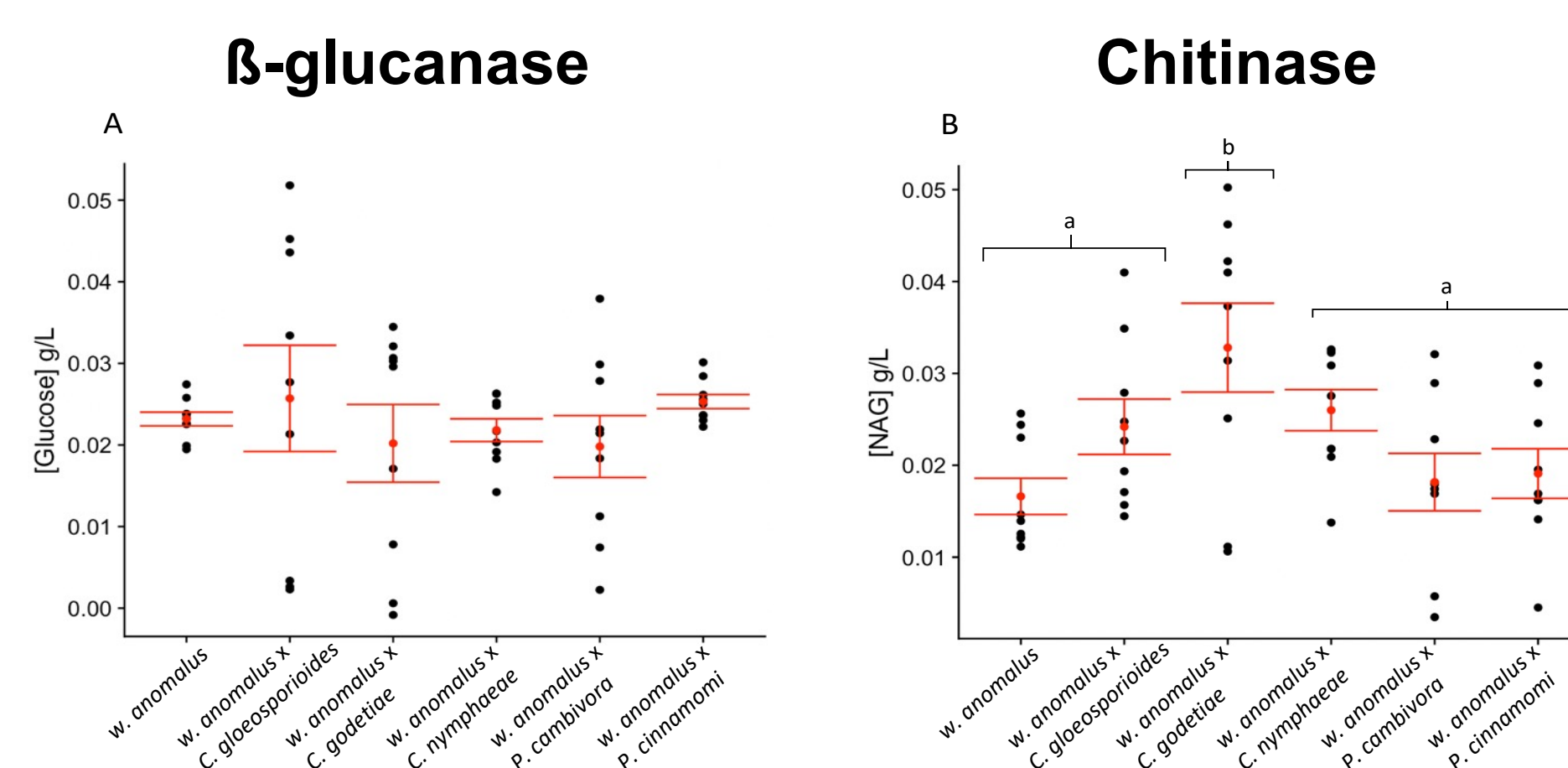
### MB Staining - MICROSCOPY



MB staining on all combinations

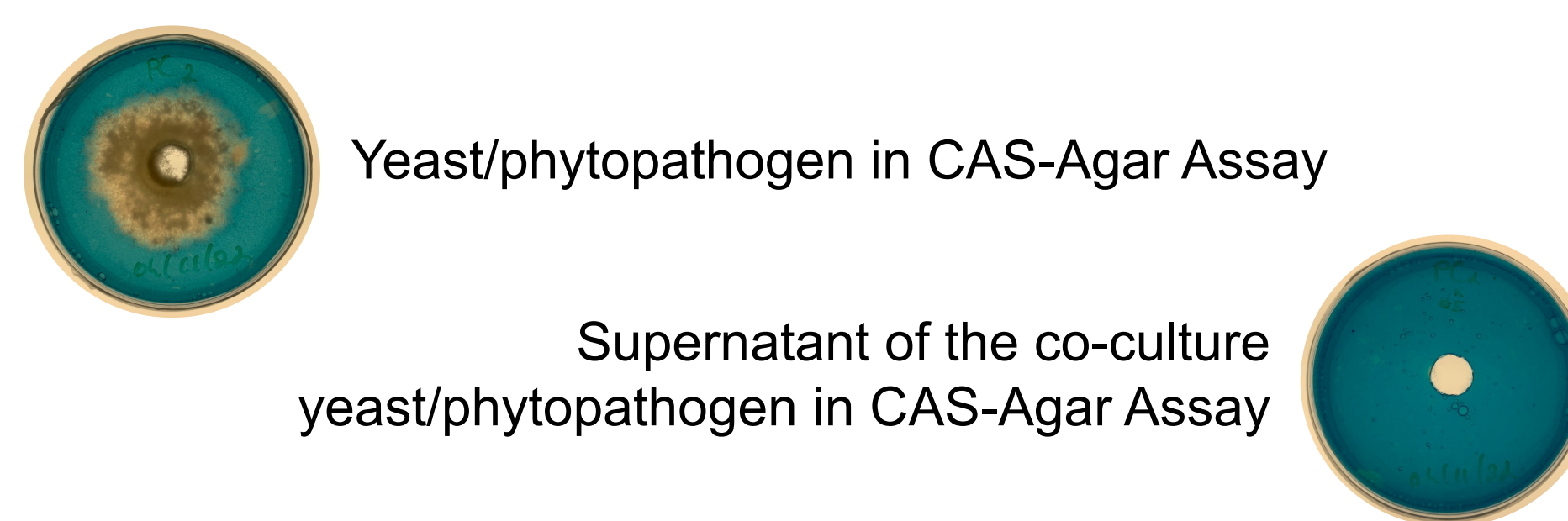
- Part of all fungal cultures are dead
- No dose-dependence → **cell contact is needed**
- Emptied hyphae** and **coiled hyphae**
- Ruptured hyphae filled w/ yeast cells**

### II. Enzymatic and siderophore activity



**β-glucanase and Chitinase** activity observed in all co-cultures **but** also on yeast single culture

No **cellulase** activity

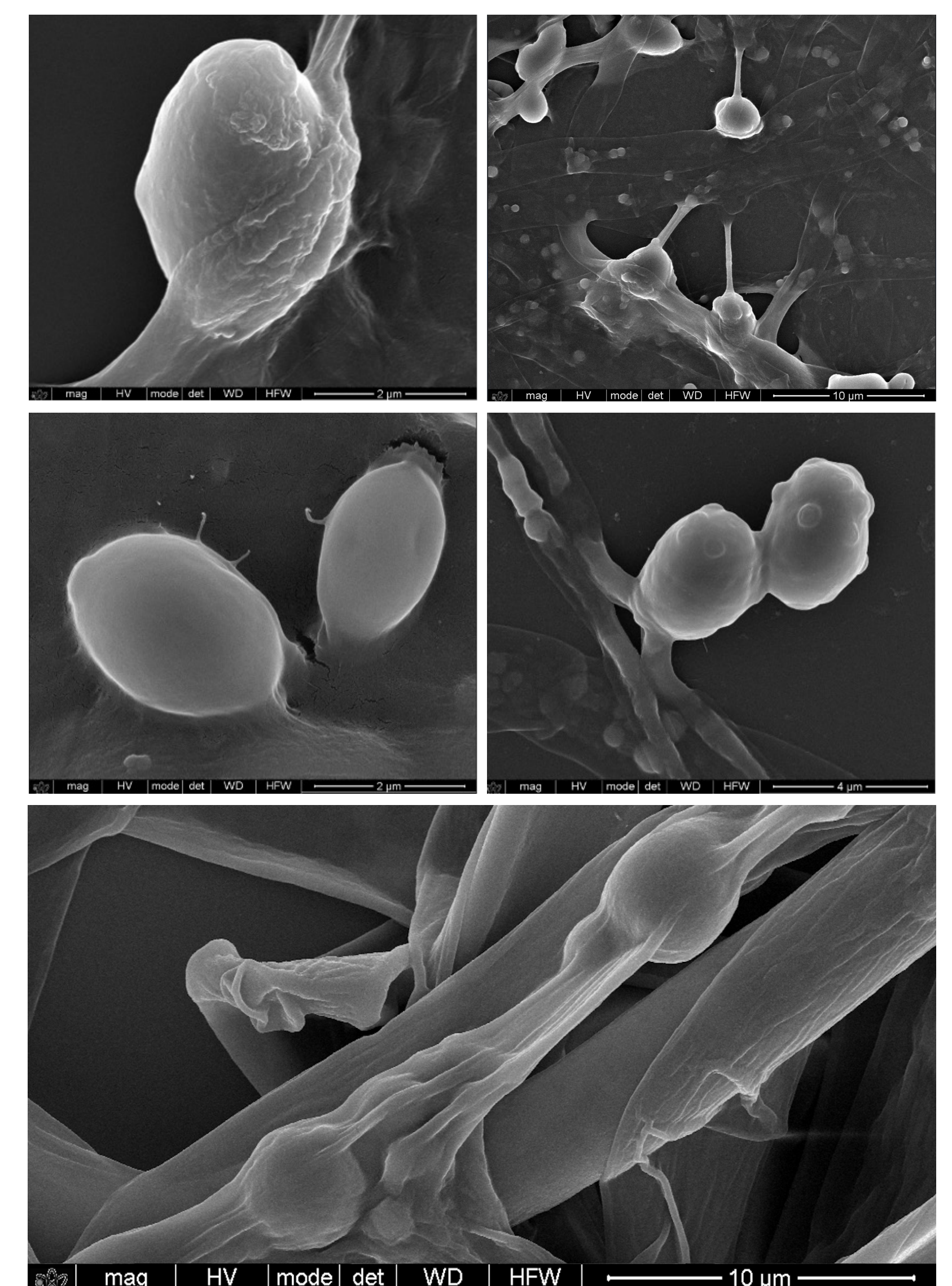


No **siderophore** activity

**NO INFLUENCE ON ANTAGONISM**

**YEAST PREDATORY BEHAVIOR**

### III. SEM Microscopy



- Veil-like structure** covering yeasts in attachment points to hyphae **ALL FUNGI**
- Tube-like structures** connecting yeasts to hyphae **C. godetiae**, **C. nymphaeae**
- Fimbriae-like filaments** around yeasts **C. nymphaeae**, **C. gloeosporioides**
- Cell wall fusion** between yeasts and hyphae **C. gloeosporioides**
- Spherical structures** inside hyphae **P. cinnamomi**

## Take-home message

The results from the enzymatic assays clearly show that the production and release of enzymes to the extracellular space is not *per se* a condition for them being involved in antagonism. *W. anomalus* behaves as a **contact predator** of **filamentous fungi** and **oomycetes**, and interacts differently with different opponents, which suggest species specific recognition mechanisms, and decreases the danger of indiscriminate impact in wild microbial populations. Results confirm this yeast as a serious candidate for *in field* assays on the biological control of OA and CID.