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## Introduction

Microalgae are photoautotrophic microorganisms that produce a wide range of bioactive compounds with several activities such as antifungal. Since few reports (studies) are available on the activity of *Euglena cantabrica* against fungal plant pathogens, the aim of this research was to study the activity of the green microalgae water extract against the pathogenic fungus *Botrytis cinerea* *in vitro* and *in vivo* on strawberry fruits.

## Materials and Methods

### Water extraction (Roberti et al., 2016)



### Pathogen material

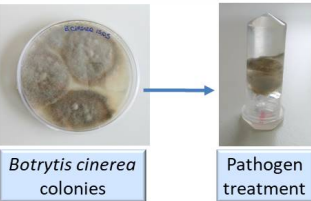


### Plant material



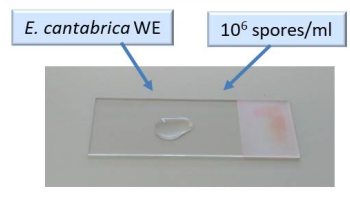
### In vitro experiment

#### Activity on fungal colony growth



- Treatment of pathogen for 6 hours with three different concentrations of WE:  $5 \cdot 10^{-3}$ ,  $2.5 \cdot 10^{-3}$  and  $1.25 \cdot 10^{-3}$  g/ml
- Inoculation of treated pathogen on PDA medium
- Daily measurement of colony growth

#### Activity on fungal spore germination



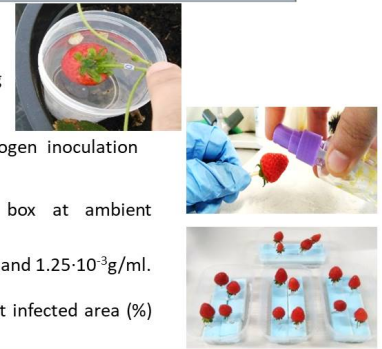
- Spores were left in contact with WE in a test tube
- WE concentrations:  $2.5 \cdot 10^{-3}$  and  $1.25 \cdot 10^{-3}$  g/ml
- After 4 and 24 hours germinated spores were counted at the optical microscope

### In vivo experiment

#### Strawberry fruit treatment and pathogen inoculation

##### PRE-HARVEST TREATMENT

- 1st Day: Fruit treatment by dipping in PS suspension
- 2nd Day: Fruit harvesting + pathogen inoculation  $10^5$  spores/ml
- Fruit incubation in a plastic box at ambient temperature.
- WE concentration tested:  $2.5 \cdot 10^{-3}$  and  $1.25 \cdot 10^{-3}$  g/ml.
- Disease symptoms recorded: fruit infected area (%) after 6 day of incubation.

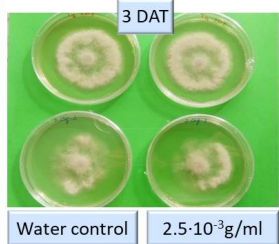
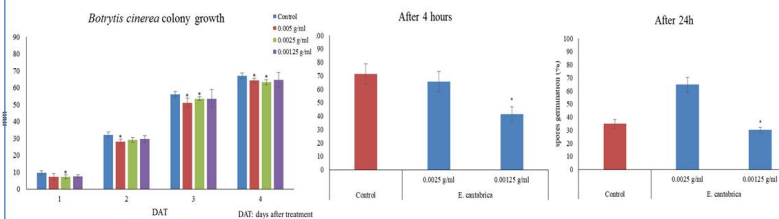


## Results

### In vitro experiment

#### Activity on fungal colony growth

#### Activity on fungal spore germination

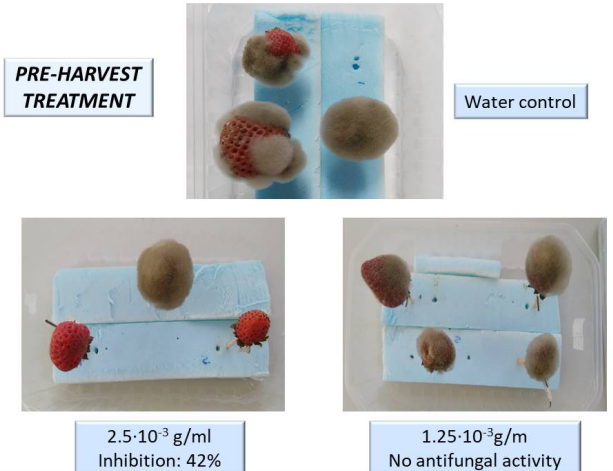


	Concentration WE (g/l)		
	$5 \cdot 10^{-3}$	$2.5 \cdot 10^{-3}$	$1.25 \cdot 10^{-3}$
2 DAT	13.0%	9.5%	7.9%
3 DAT	9.2%	5.5%	4.7%
4 DAT	4.0%	4.7%	3.7%

- Water extracts from *Euglena cantabrica* inhibited *Botrytis cinerea* colony growth

### In vivo experiment

#### INHIBITION of *Botrytis cinerea* symptoms by *E. cantabrica* WE



## Conclusions

The activity in reducing both colony growth *in vitro* and *B. cinerea* symptoms in pre-harvest treatment by *Euglena cantabrica* water extract suggests to continue the research for exploitation our results in order to consider the microalgae as a potential useful tool for the disease management in sustainable agriculture.

Further research is needed to better understand the activity of the *E. cantabrica* water extract and which compound/s has/have the major antifungal activity.

References:  
 Roberti R., H. Righini, C. Pérez Reyes (2016). Activity of seaweed and cyanobacteria water extracts against *Podosphaera xanthii* on zucchini. Italian Journal of Mycology vol. 45, 66-77.

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