

### Biocontrol of the parasitic plant species Phelipanche ramosa, using rapeseed rhizosphere fungi or phytotoxic metabolites

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# Biocontrol of the parasitic plant species *Phelipanche ramosa*, using rapeseed rhizosphere fungi or phytotoxic metabolites

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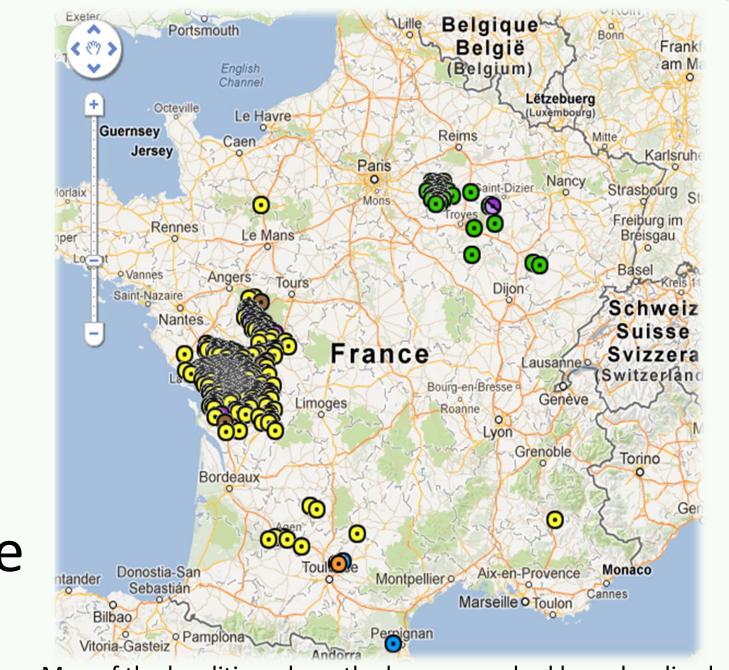
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Branched broomrape, Phelipanche ramosa (L.) Pomel

-> holoparasite whose germination is necessarily triggered by the host roots exudates
 -> wide range of host species (Brassicaceae, Solanaceae, Fabaceae...)
 -> 100 000 to 200 000 seeds per individual surviving 20 years in the soil

-> no effective conventional management strategy

Main objective: to develop a biological method, using different approaches, to control the broomrape during its underground stages in cultivated fields



Map of the localities where the broomrape had been localized

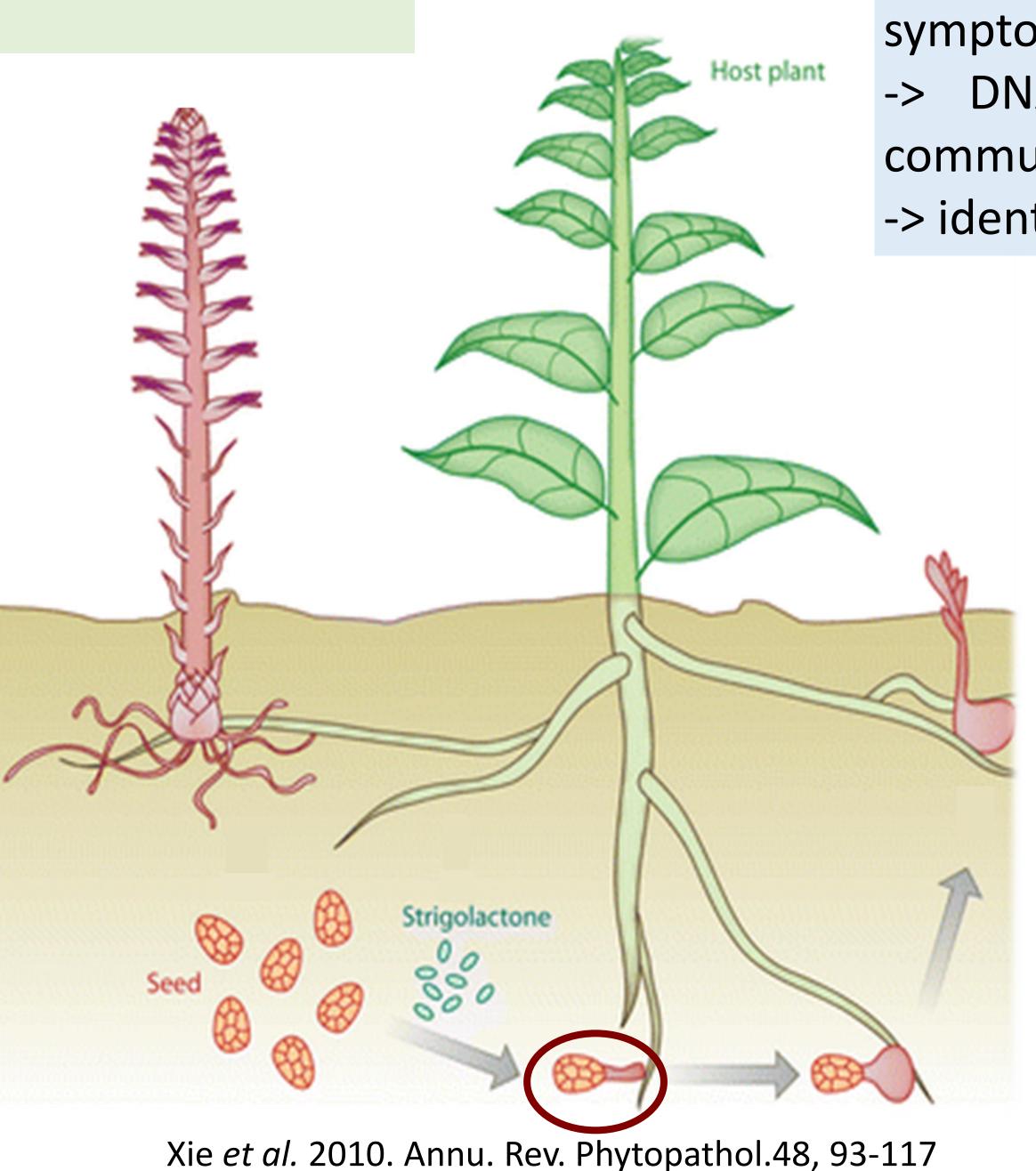
# Microbiology

**Objective:** to identify biocontrol candidates of broomrape **Method** 

-> harvest of symptomatic tissues (stems and seeds)
 -> isolation and identification of fungal isolates on culture media

-> testing these strains on healthy tissues (stems and seed)





# Metabarcoding

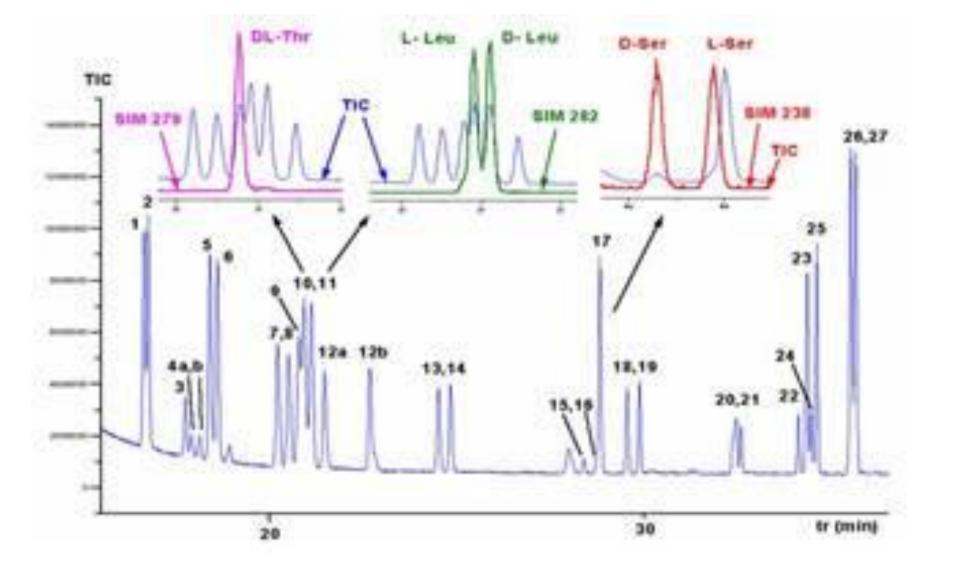
**Objective:** to characterize the diversity of fungal endophytes. To identify pathogenic fungi, and to decipher the origin of the endophytic communities (soil, plant...). To identify fungi which stimulate the plant defense reactions

## Method

-> DNA extraction and amplification of fungi from symptomatic and asymptomatic stems and seeds
-> DNA sequencing of the different fungal communities

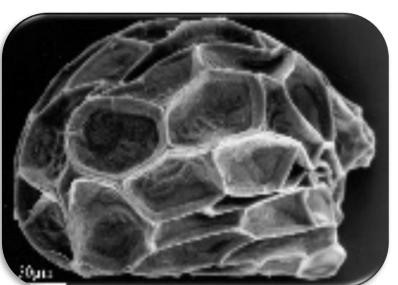
-> identification of fungal pathogens

Gibot-Leclerc *et al.* 2012 Flora 207, 512–521





**Objective:** to describe pathogen penetration



**Objective:** to identify metabolites that can be

mechanisms in the seeds and stems of broomrape Method

Gibot-Leclerc *et al.* 2012

used as phytotoxic products in cultivated crops

## Method

**Metabolomics** 

-> metabolites extraction of pathogenic candidates
 -> phytotoxicity test of identified metabolites

-> analysis of the penetration process (pathogenic fungi-seeds, pathogenic fungi-stems)

 -> observation of the tri-partite interaction (pathogenic fungi, parasitic plant and host plant)

This project will emphasize interactions between three organisms (a host, a parasite and a pathogen) at both molecular, microscopic and macroscopic levels

The global approach is required to understand and target the broomrape weakness in a biocontrol strategy

\* Finally the outcome will be a potential biocontrol product for broomrape either as a fungal strain or a phytotoxic metabolites