



**HAL**  
open science

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

Dinia Cartry, Stéphanie Gibot-Leclerc, Eric Nguema-Ona, Eric Bernaud, Véronique Edel-Hermann, Nadine Gautheron, Carole Reibel, Christian Steinberg

### ► To cite this version:

Dinia Cartry, Stéphanie Gibot-Leclerc, Eric Nguema-Ona, Eric Bernaud, Véronique Edel-Hermann, et al.. Biocontrol of the parasitic plant species *Phelipanche ramosa*, using rapeseed rhizosphere fungi or phytotoxic metabolites. Journée des doctorants UMR Agroécologie, Apr 2019, Dijon, France. 2019. hal-02737982

**HAL Id: hal-02737982**

**<https://hal.inrae.fr/hal-02737982v1>**

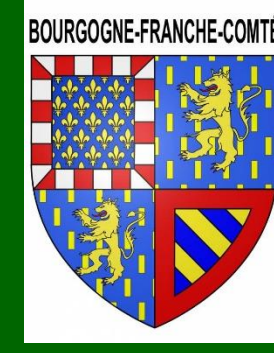
Submitted on 30 May 2024

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

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

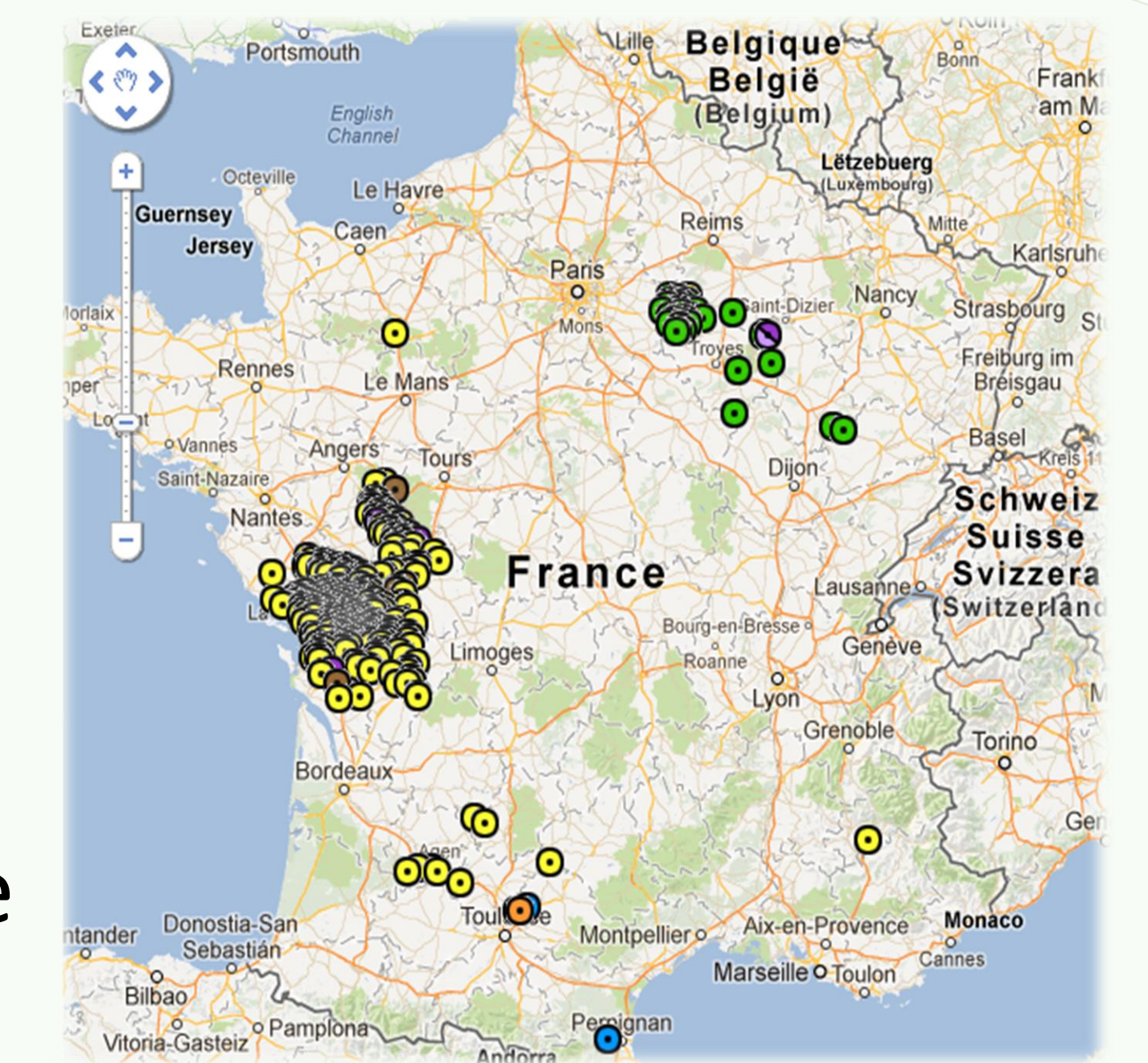
Dinia Cartry<sup>1</sup>, Stéphanie Gibot-Leclerc<sup>2</sup>, Eric Nguema-Ona<sup>3</sup>, Eric Bernaud<sup>1</sup>, Véronique Edel-Hermann<sup>1</sup>, Nadine Gautheron<sup>1</sup>, Carole Reibel<sup>2</sup>, Christian Steinberg<sup>1</sup>



<sup>1</sup> INRA, UMR 1347 Agroécologie, 21000 Dijon, France  
<sup>2</sup> AgroSup Dijon, UMR 1347 Agroécologie, 21000 Dijon, France  
<sup>3</sup> CMI Groupe Roullier, 35400 Saint Malo, France

## 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



Map of the localities where the broomrape had been localized

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

### 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

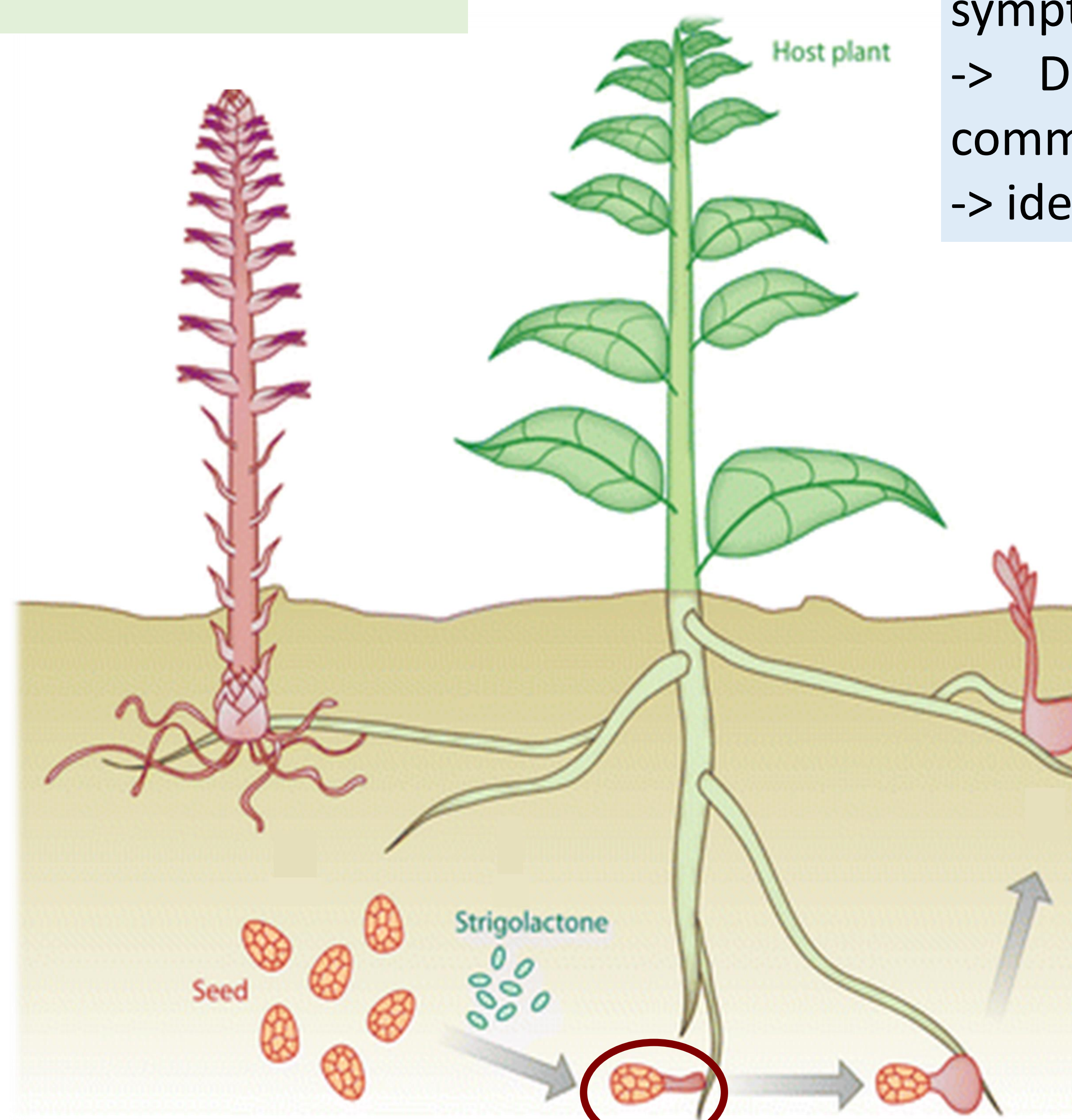
**Objective:** to characterize the diversity of fungal endophytes. To identify pathogenic fungi, and to decipher the origin of the endophytic communities (soil, plant...). To identify fungi which stimulate the plant defense reactions

#### Method

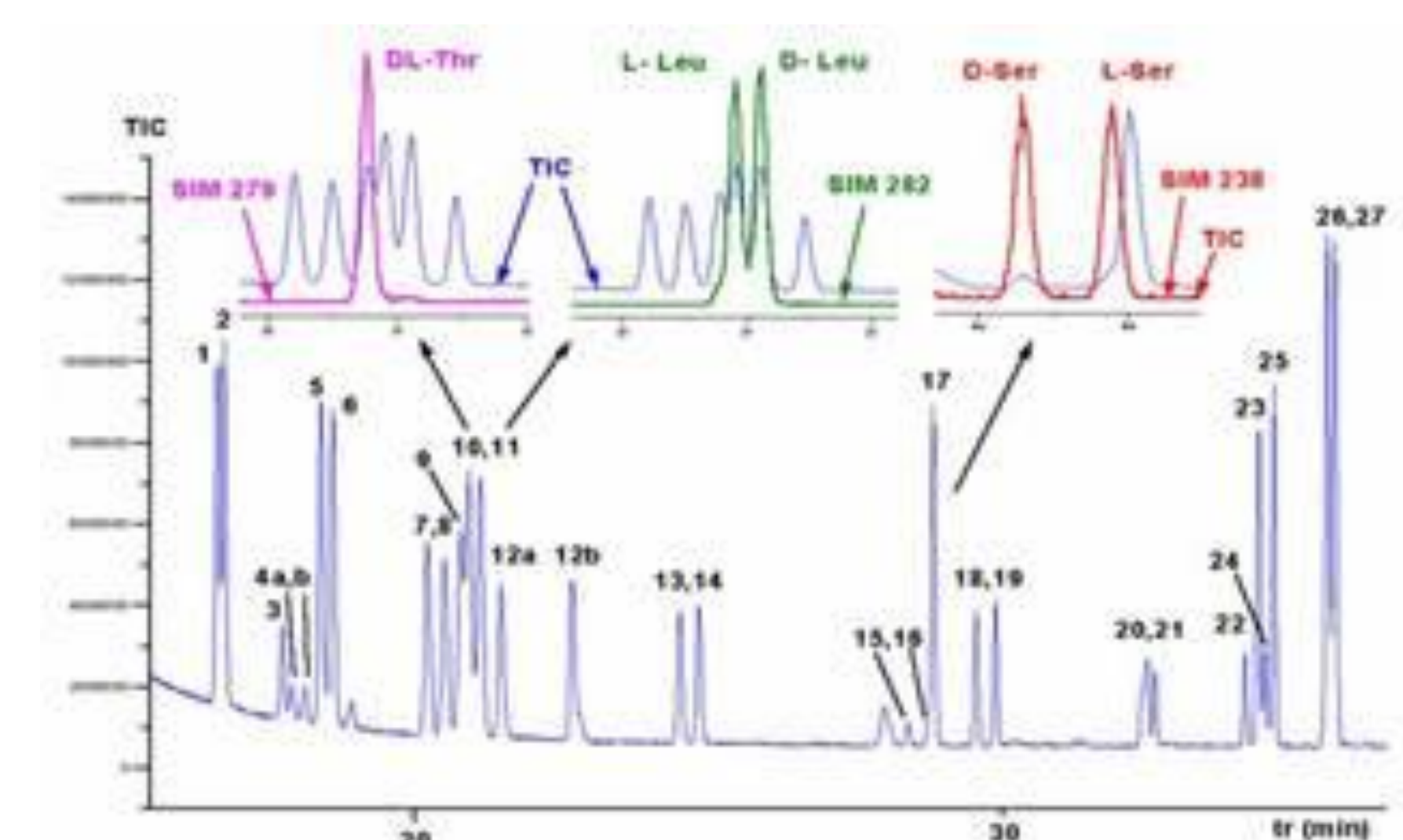
- > DNA extraction and amplification of fungi from symptomatic and asymptomatic stems and seeds
- > DNA sequencing of the different fungal communities
- > identification of fungal pathogens



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



Xie *et al.* 2010. Annu. Rev. Phytopathol.48, 93-117



### Cytology

**Objective:** to describe pathogen penetration mechanisms in the seeds and stems of broomrape

#### Method

- > analysis of the penetration process (pathogenic fungi-seeds, pathogenic fungi-stems)
- > observation of the tri-partite interaction (pathogenic fungi, parasitic plant and host plant)



Gibot-Leclerc *et al.* 2012

### Metabolomics

**Objective:** to identify metabolites that can be used as phytotoxic products in cultivated crops

#### Method

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

❖ 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