Natural compounds from viticulture waste as promising antifungal and antimycotoxin drugs

Charles Tardif, Laetitia Pinson-Gadais, Pierre Waffo-Téguo, Caroline Rouger, Florence Richard-Forget, Trang Minh Trah

RÉPUBLIQUE FRANÇAISE

Liberté
Égalité
Fraternité

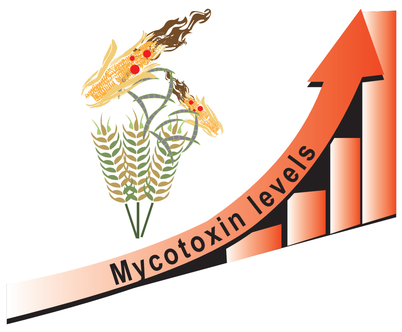
Natural compounds from vine by-products as promising antifungal and antimycotoxin drugs

Trang Minh Tran[1], Charles Tardif[2], Laetitia Pinson-Gadais[1], Pierre Waffo-Téguo[2], Caroline Rouger[2], Florence Richard-Forget[1],Vessela Atanasova[1]

PROBLEM STATEMENT

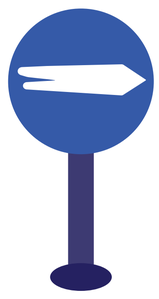
Driven by **global warming**, contamination of agricultural commodities with **mycotoxins** (e.g., deoxynivalenol (DON), fumonisins (FB), T-2 toxin, zearalenone, aflatoxins (AF), ochratoxins and patulin) becomes an intractable problem worldwide, **threatening global food security and human health**. Searching for **eco-friendly antimycotoxin drugs** is an urgent need to **lower the dependence on agrochemicals**.

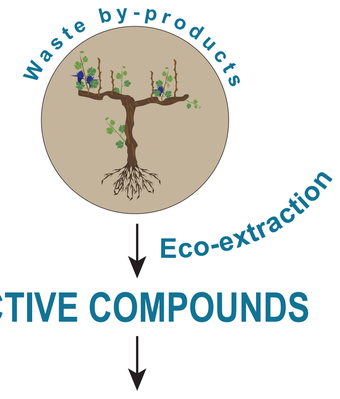
CLIMATE CHANGE



INCREASED TOXIGENIC FUNGI

REDUCED AGRO-CHEMICAL USES



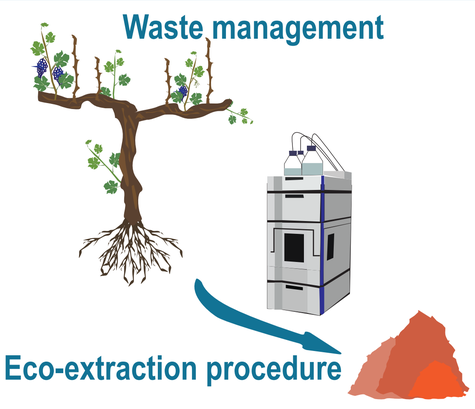


BIO-FUNGICIDES

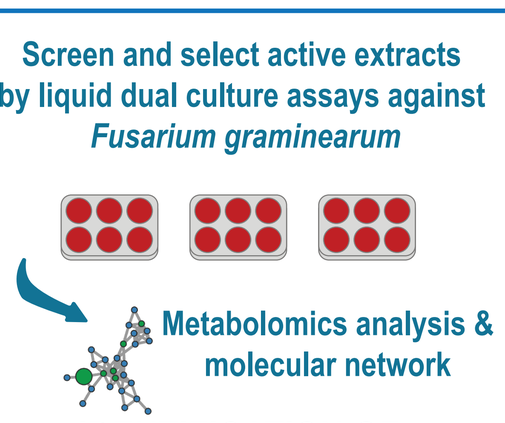
STUDY OBJECTIVES

Exploit and evaluate the **antifungal and antimycotoxin activities of main active biomolecules** derived from **vine by-product extracts** via treatments with ***Fusarium graminearum*** fungus - leading to develop eco-friendly solutions against phytopathogens.

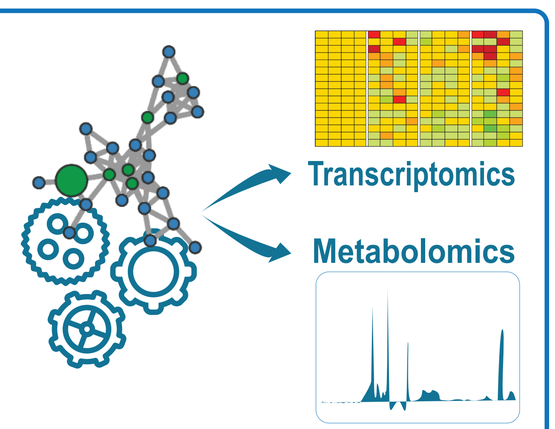
EXPERIMENTAL PROCEDURE



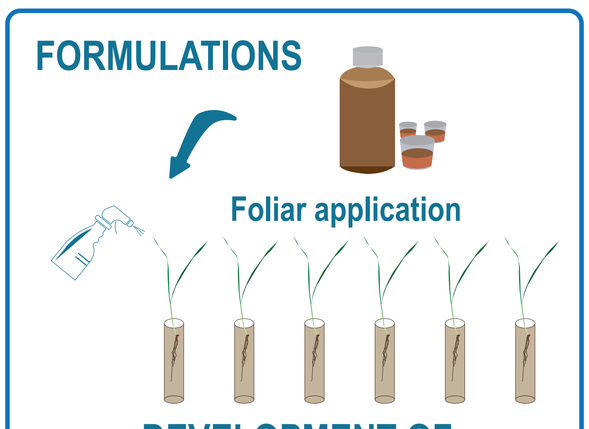
PRODUCTION OF EXTRACTS



IDENTIFICATION OF ACTIVE COMPOUNDS



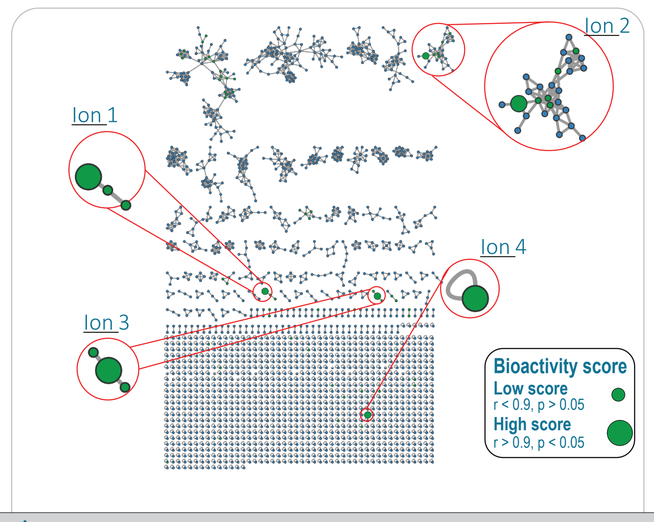
MODES OF ACTION



DEVELOPMENT OF BIO-FUNGICIDES

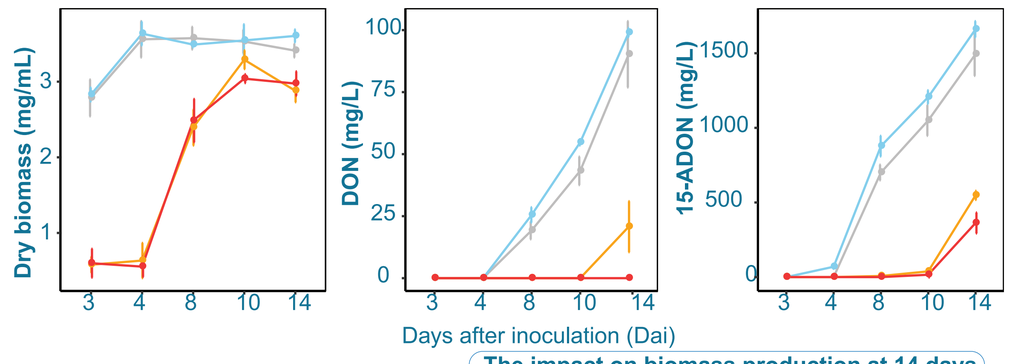
RESULTS

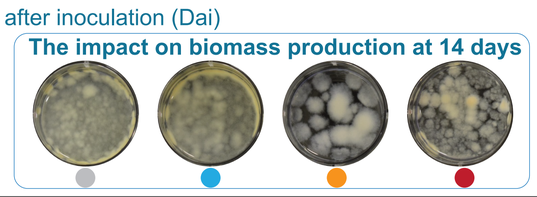
Identification of active compounds using bioactivity-based molecular network



- **Four ions** were potentially related to the antifungal activity of the extract against *F. graminearum*.
- These ions were attributed to the **phenolic oligomeric compounds**.

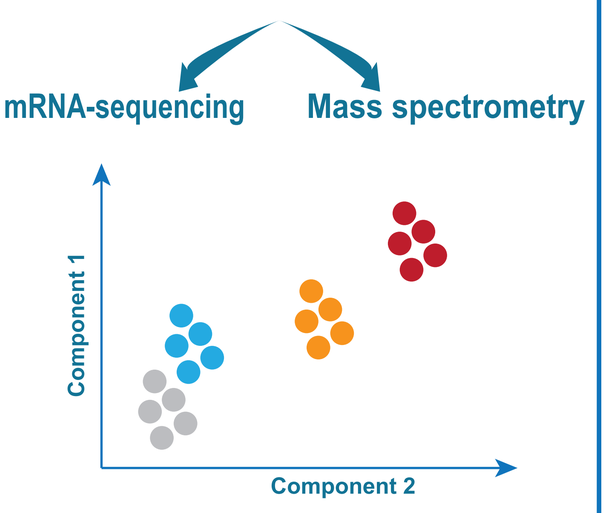
Antifungal and antimycotoxin activities of active compounds





- The **oligomeric compound** showed **higher antifungal and antimycotoxin activities** against *F. graminearum* compared to the monomeric compounds.
- **Methylation** contributed to **the enhanced antifungal and antimycotoxin capacity** of phenolic compounds against *F. graminearum*.

Modes of action of active compounds



- Using **omics** including mRNA-seq-based transcriptomics and mass spectrometry-based metabolomics will allow us to have a **deeper understanding of their modes of action**.

MycSA UR1264 Mycologie et Sécurité des aliments INRAE

anr agence nationale de la recherche

Centre
Nouvelle-Aquitaine Bordeaux

[1]INRAE, RU1 264 Mycology and Food Safety (MycSA), 71 , Avenue Edouard Bourlaux, 33883 Villenave d'Ornon, France
[2]Faculty of Pharmaceutical Sciences, RU Enology, EA 4577, USC 1 366 INRAE, Molecules of Biological Interest, ISVV, Univ. Bordeaux, 21 0, Chemin de Leysotte, 33882, Villenave d'Ornon, France

Corresponding author: minh-trang.tran@ inrae.fr and vessela.atanasova@ inrae.fr