



HAL
open science

Developing a culturomic approach to build a collection of grapevine foliar microorganisms with potential biocontrol activity against downy mildew

Aarti Jaswa, Paola Fournier, Valérie Martin, Isabelle Masneuf-Pomarède, Guilherme Martins, Simon Labarthe, Jessica Vallance, Corinne Vacher

► To cite this version:

Aarti Jaswa, Paola Fournier, Valérie Martin, Isabelle Masneuf-Pomarède, Guilherme Martins, et al.. Developing a culturomic approach to build a collection of grapevine foliar microorganisms with potential biocontrol activity against downy mildew. Journées Jean Chevaugeon - 14e Rencontres de Phytopathologie - Mycologie, Jan 2024, Aussois, France. . hal-04842411

HAL Id: hal-04842411

<https://hal.science/hal-04842411v1>

Submitted on 17 Dec 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.



Distributed under a Creative Commons Attribution - NonCommercial - NoDerivatives 4.0 International License

Developing a culturomic approach to build a collection of grapevine foliar microorganisms with potential biocontrol activity against downy mildew



Aarti Jaswa^{1,2}, Paola Fournier^{1,3,4}, Valerie Martin^{1,5}, Isabelle Masneuf-Pomarède², Guilherme Martins², Simon Labarthe³, Jessica Vallance^{1,†} & Corinne Vacher^{1,3,†}

¹ INRAE, Bordeaux Sciences Agro, ISVV, SAVE, 33140 Villenave-d'Ornon, France
² Univ Bordeaux, UMR Oenologie INRAE, Bx INP, Bordeaux Sciences Agro, ISVV, 33882 Villenave d'Ornon, France
³ INRAE, Univ Bordeaux, BIOGECO, 33610 Cestas, France
⁴ INRAE, CIRAD, Univ Montpellier, Institut AGRO, AGAP Institut, 34398 Montpellier, France
⁵ Department of Biology, Utah State University, Logan, UT, USA

Context

A culturomic approach involves the use of a range of culture conditions coupled with a high-throughput method of identification to isolate and identify microorganisms in a sample¹. A number of studies have shown that using plant-based culture media rather than conventional media that contain chemically synthesized or animal-based extracts can successfully increase the cultivability of plant-associated microbiota^{2,3}.

This study aimed to use a culturomic approach to build a collection of grapevine foliar microorganisms, which will subsequently be used to build Synthetic microbial Communities (SynComs) for biocontrol of downy mildew (caused by *Plasmopara viticola*).

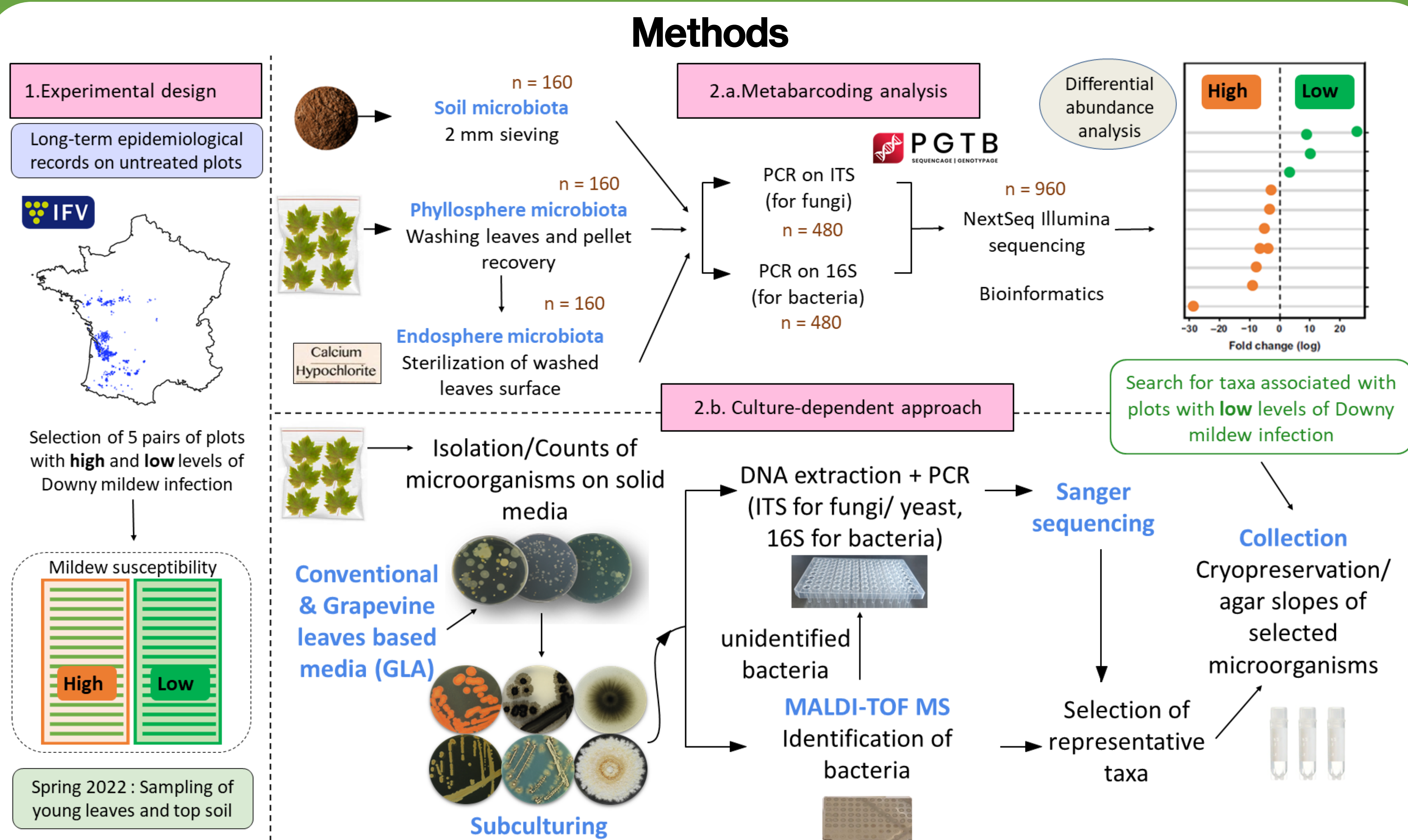


Fig.1: Workflow to isolate and identify epiphytic and endophytic bacteria, yeast and filamentous fungi from grapevine leaves in plots with contrasted levels of downy mildew infection. Media used for bacteria: Tryptic Soy Agar (TSA), Luria Bertani Broth Agar (LBA) and a Grapevine Leaf-based Agar medium (GLA). Media used for Yeast/Fungi: GLA and Malt Extract Agar (MEA)

Results

[1] We isolated 1091 microorganisms:
 • 544 bacteria
 • 243 yeasts
 • 304 filamentous fungi

[2] We were able to identify 86% of the isolates. A total of 90 genera were identified across the five culture media.

[3] Some genera were isolated exclusively on Grapevine Leaf-based Agar (GLA) (Fig 2 and 3):
 • 4 bacteria
 • 1 yeast
 • 13 filamentous fungi

Fewer colonies were isolated on GLA compared to conventional culture media, but the GLA allowed cultivation of specific microorganisms that didn't grow on the other media

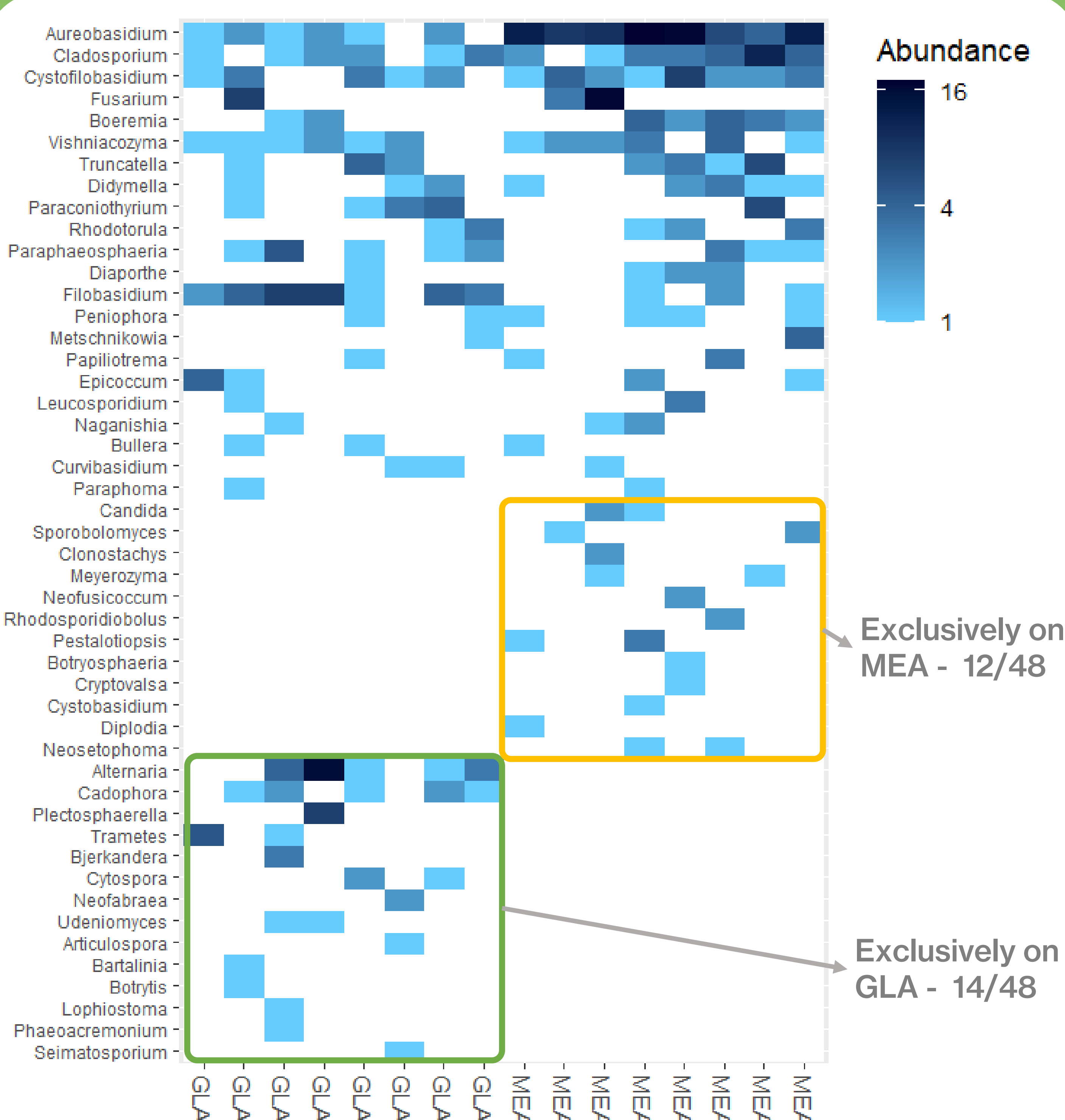


Fig.2: Filamentous fungi and yeast genera (n = 48) identified by Sanger sequencing on 2 media (GLA and MEA)

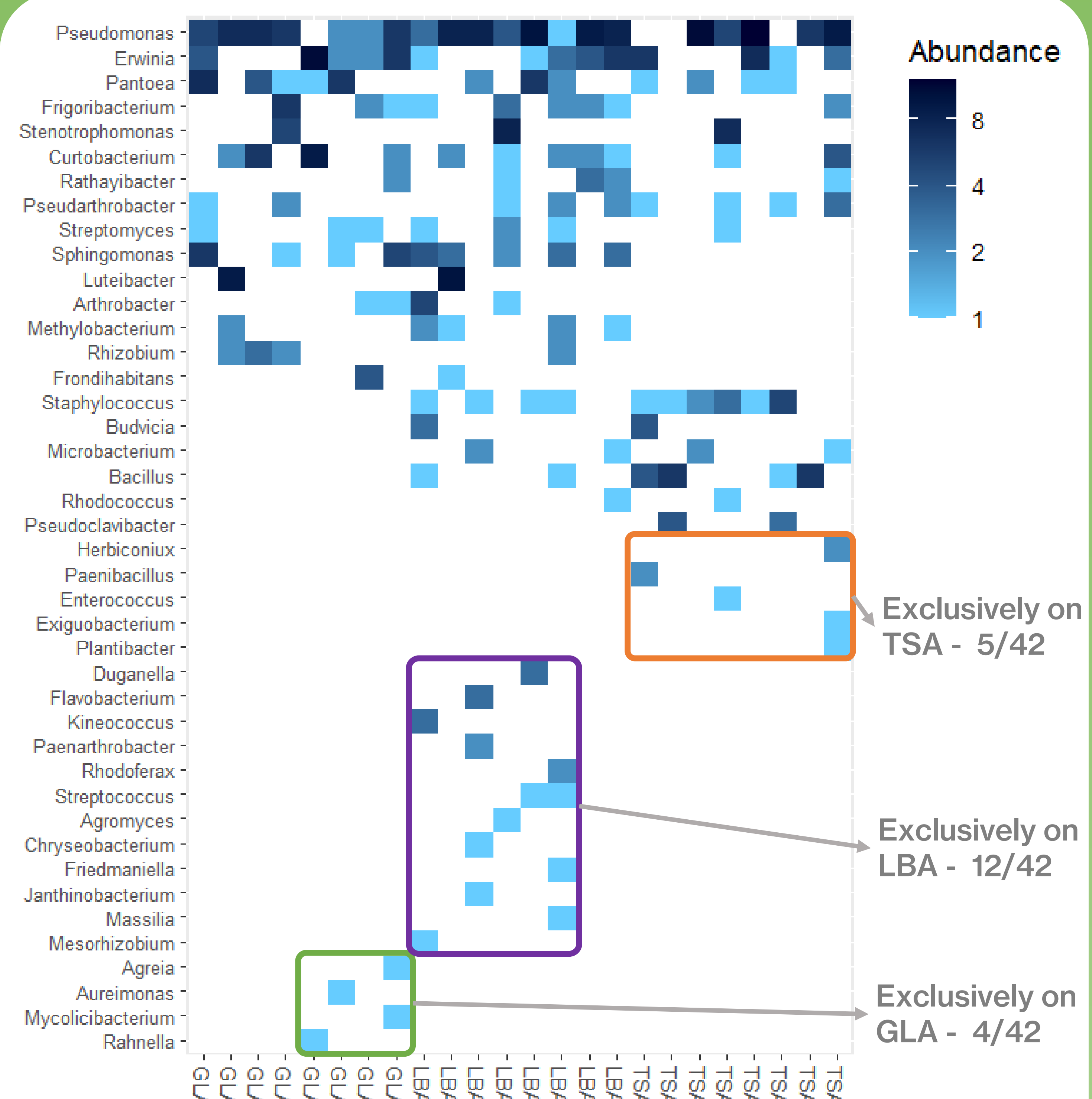


Fig.3: Bacterial genera (n = 42) identified by MALDI-TOF MS and Sanger Sequencing on 3 culture media (GLA, LBA and TSA)

References

- [1] Lagier et al., 2016. *Nat. Microbiol.*
 [2] Sarhan et al., 2019. *J. Adv. Res.*
 [3] Youssef et al., 2016. *J. Adv. Res.*

This work is part of the VITAE project ('Cultivating grapevine without pesticide') funded by the French National Research Agency (ANR, 20-PCPA-0010).