



**HAL**  
open science

# Differential carbohydrate-active enzymes and secondary metabolite productions by the grapevine trunk pathogen *Neofusicoccum parvum* Bt-67 on a host and non-host biomass

Julián D Restrepo-Leal, Jochen Fischer, Nicolas Richet, Caroline Rémond, Olivier Fernandez, Ludovic Besaury, Florence Fontaine

## ► To cite this version:

Julián D Restrepo-Leal, Jochen Fischer, Nicolas Richet, Caroline Rémond, Olivier Fernandez, et al.. Differential carbohydrate-active enzymes and secondary metabolite productions by the grapevine trunk pathogen *Neofusicoccum parvum* Bt-67 on a host and non-host biomass. 12th International Congress of Plant Pathology, Aug 2023, Lyon, France. hal-04668144

**HAL Id: hal-04668144**

**<https://hal.science/hal-04668144v1>**

Submitted on 6 Aug 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.

# Differential carbohydrate-active enzymes and secondary metabolite productions by the grapevine trunk pathogen *Neofusicoccum parvum* Bt-67 grown on a host and non-host biomass

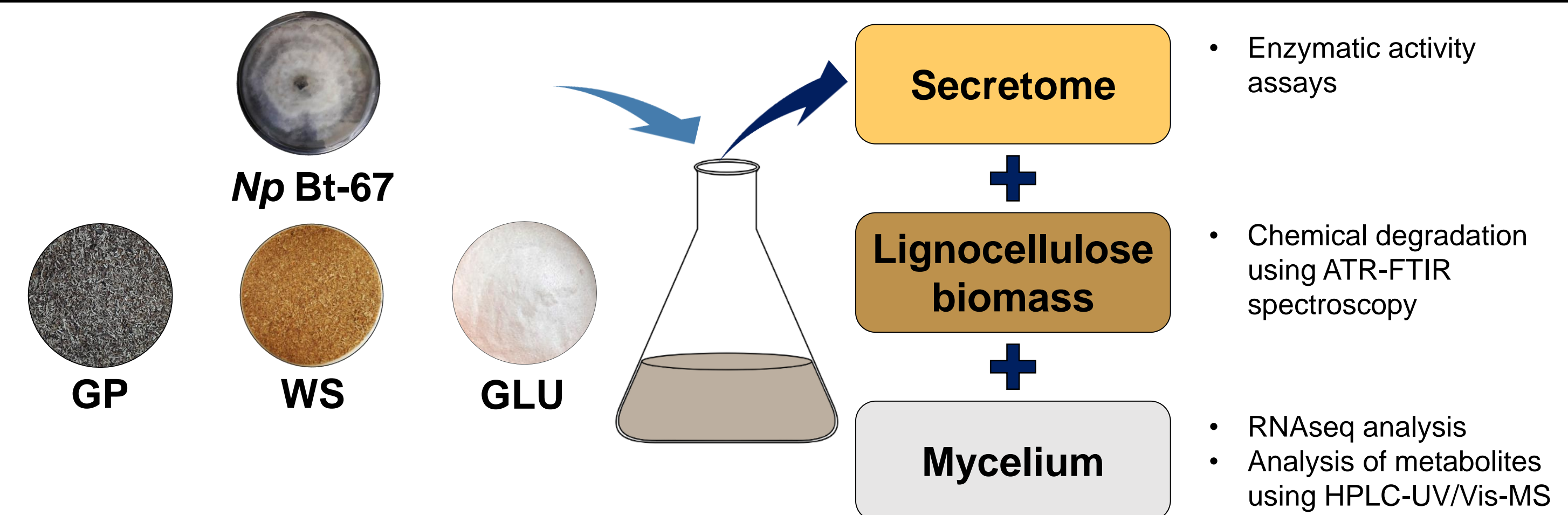
Julián D. Restrepo-Leal<sup>a,b</sup>, Jochen Fischer<sup>c</sup>, Nicolas Richet<sup>d</sup>, Caroline Rémond<sup>a</sup>, Olivier Fernandez<sup>b</sup>, Ludovic Besaury<sup>a</sup>, Florence Fontaine<sup>b</sup>

<sup>a</sup>Université de Reims Champagne-Ardenne, INRAE, FARE, UMR A 614, AFERE, 51100, Reims, France; <sup>b</sup>Université de Reims Champagne-Ardenne, RIBP USC INRAE 1488, MALDIVE, 51100 Reims, France; <sup>c</sup>Institut für Biotechnologie und Wirkstoff-Forschung gGmbH (IBWF), Hanns-Dieter-Hüsch-Weg 17, 55128, Mainz, Germany; <sup>d</sup>Université de Reims Champagne-Ardenne, Plateau Technique Mobile de Cytométrie Environnementale MOBICYTE, URCA/INERIS, UFR Sciences Exactes et Naturelles, Reims, France.

## Introduction

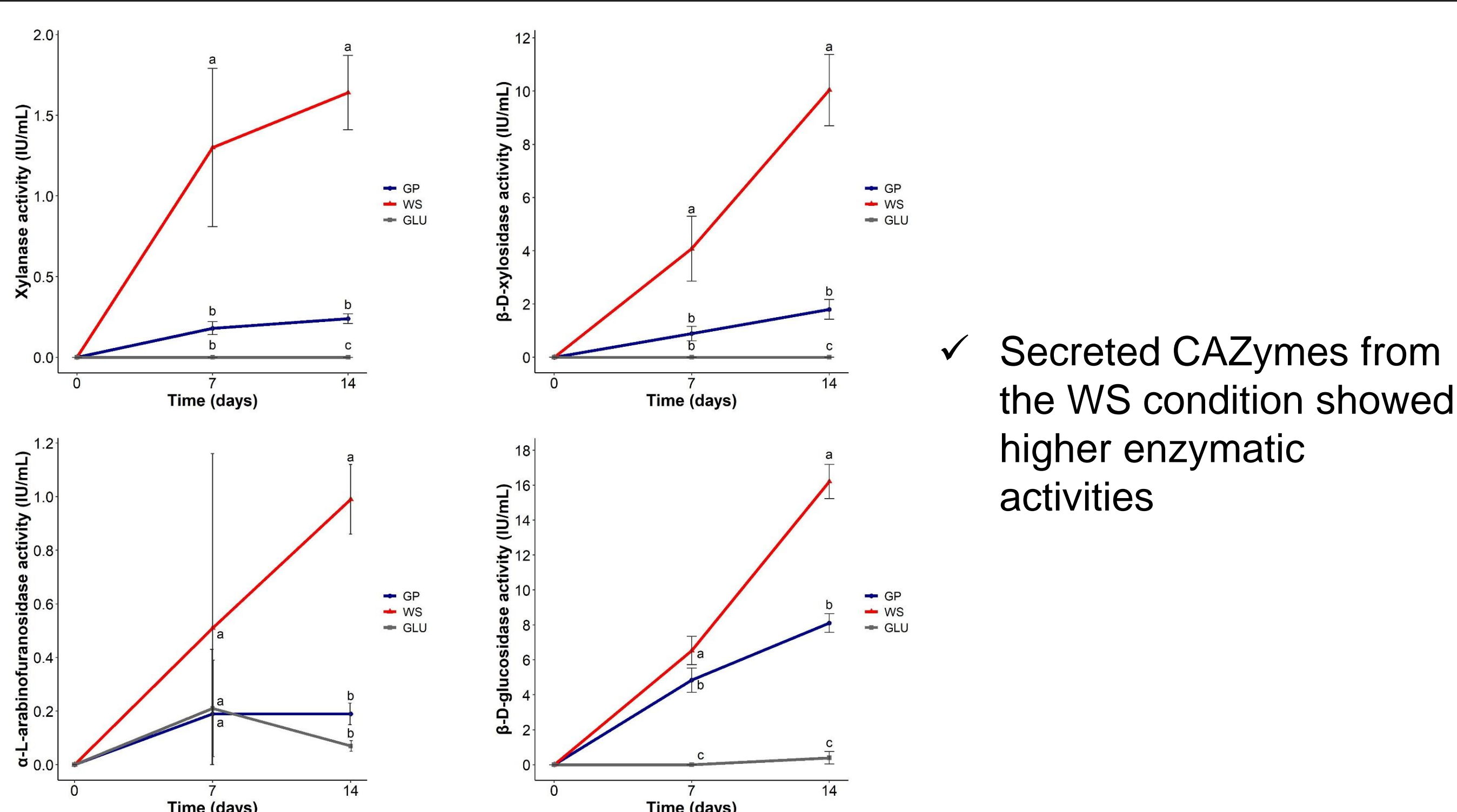
*Neofusicoccum parvum* is one of the most aggressive *Botryosphaeriaceae* species in grapevine, commonly reported as one of the causal agent of Botryosphaeria dieback. This species may secrete cell wall-degrading enzymes capable of overcoming the plant cell wall barriers [1]. Furthermore, *N. parvum* produces toxic secondary metabolites that may contribute to its virulence. To increase knowledge on the mechanisms underlying pathogenicity and virulence, we evaluated the capacity of *N. parvum* to produce Carbohydrate-Active eNzymes (CAZymes) and secondary metabolites when grown *in vitro* on two lignocellulosic biomasses: grapevine canes (GP) and wheat straw (WS), and with glucose (GLU) as control. For this purpose, we combined enzymology, transcriptomic, and metabolomic analyses [2].

## Experiments

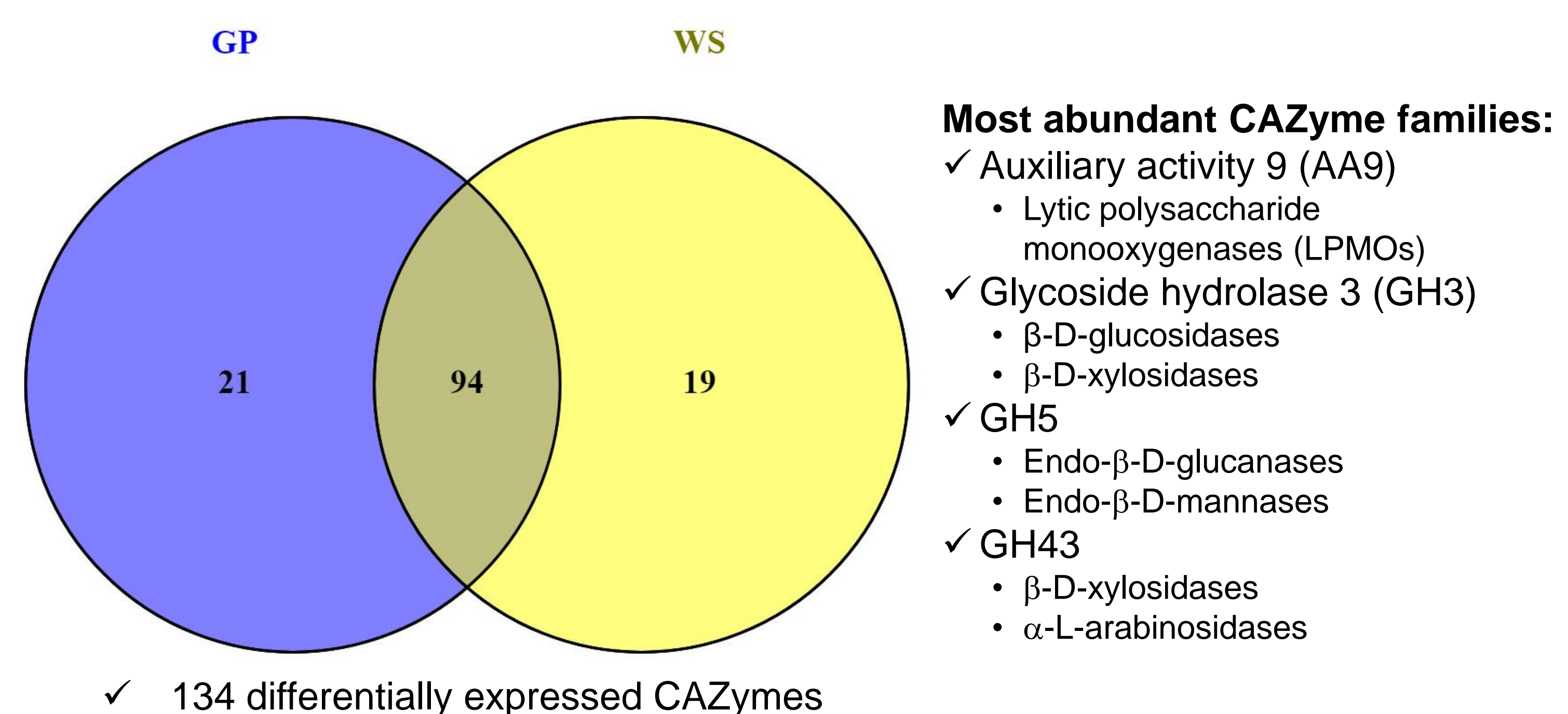


## Results

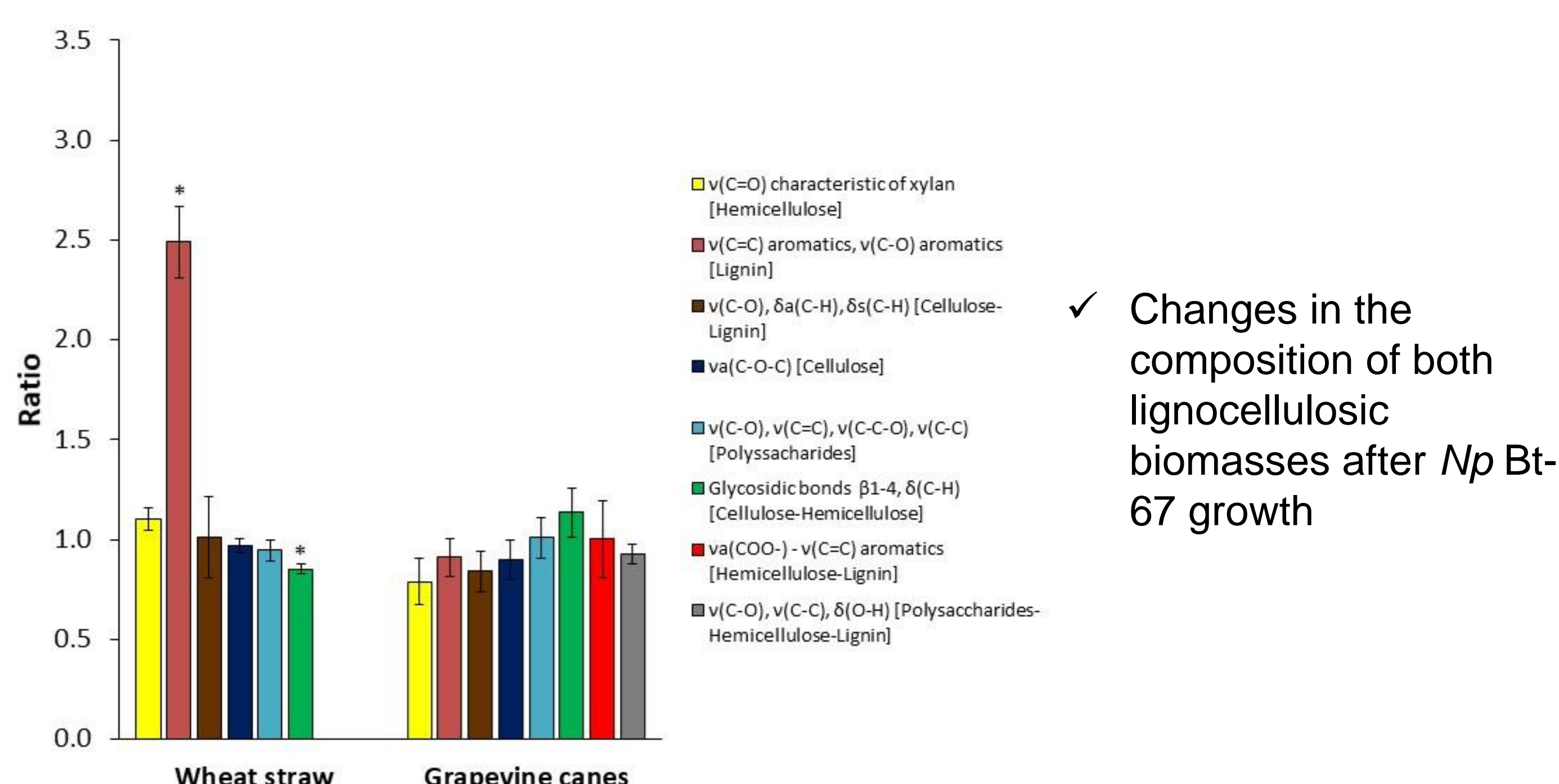
### 1 Enzymatic activities



### 3 CAZyme-genes expression

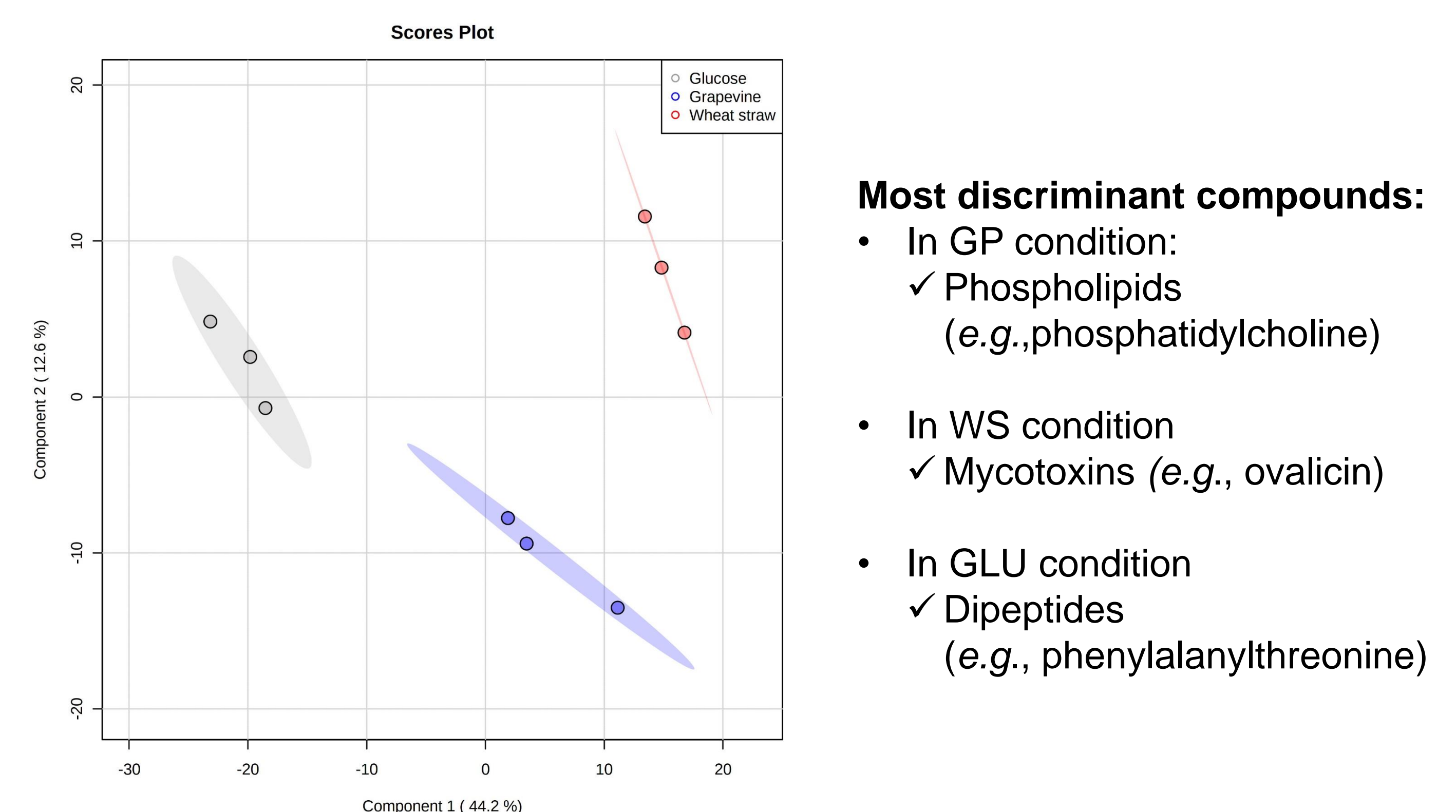


### 2 Lignocellulose degradation analysis using infrared spectroscopy



Relative degradation (<1) or enrichment (>1) of carbon bonds representative of the lignocellulose polymers (\* indicate statistical significance,  $P < 0.05$ )

### 4 Metabolites production



PCA analysis of metabolomic data showing segregation according to carbon source

## Conclusion and future work

- ✓ *Np* Bt-67 showed a differential production of pathogenicity- and virulence-related factors depending on the lignocellulosic biomass.
- ✓ Transcriptomic revealed that the cellulolytic enzymes, such as LPMOs, glucosidases, and endoglucanases were the most represented CAZymes.
- ✓ Enzymatic activities and lignocellulose biomass degradation were higher when the fungus grew with the non-host biomass (WS).
- ✓ Some differentially produced metabolites, such as phospholipids and ovalicin, appear to be relevant to the plant-microbe interaction.
- ✓ Our future works will focus on the purification and characterization of both CAZymes and toxic secondary metabolites.

## Acknowledgements

We are grateful to the Grand Reims for the financial support of the AFERE and MALDIVE Chairs

## References

- [1] Belair M, Restrepo-Leal JD, Praz C, Fontaine F, Rémond C, Fernandez O, Besaury L. 2023. *Botryosphaeriaceae* gene machinery: Correlation between diversity and virulence. *Fungal Biology* 127:1010–1031. DOI: 10.1016/j.funbio.2023.03.004
- [2] Restrepo-Leal JD, Belair M, Fischer J, Richet N, Fontaine F, Rémond C, Fernandez O. (in press). Differential carbohydrate-active enzymes and secondary metabolite productions by the grapevine trunk pathogen *Neofusicoccum parvum* Bt-67 grown on a host and non-host biomass. *Mycologia*.