Multispecies microbial consortia from vineyards for controlling grapevine pathogens

Presenter: Mahlatse Moremi

Introduction

- Grapevine (*V. vinifera*) production is threatened by several diseases
  - Significant losses in grape yield and fruit quality – economic impacts on grape production
- These diseases are controlled using chemical fungicides
  - Fungicide resistance and restrictions on chemical fungicides have intensified the search for sustainable strategies, mainly biological control agents (BCAs).
- Microbial consortia gained attention – strengths of various microbes
  - Compared with single strains, compatible microbial consortia can provide broader and more reliable disease suppression through complementary mechanisms of action- antibiosis, niche competition, and induction of plant defense responses.
- The aim of this study was to develop vineyard-derived multispecies microbial consortia and evaluate their biocontrol potential against grapevine pathogens



B. cinerea (grey rot)



E. necator (powdery mildew)



Pl. viticola (downy mildew)

In vitro compatibility of yeast and bacterial strains

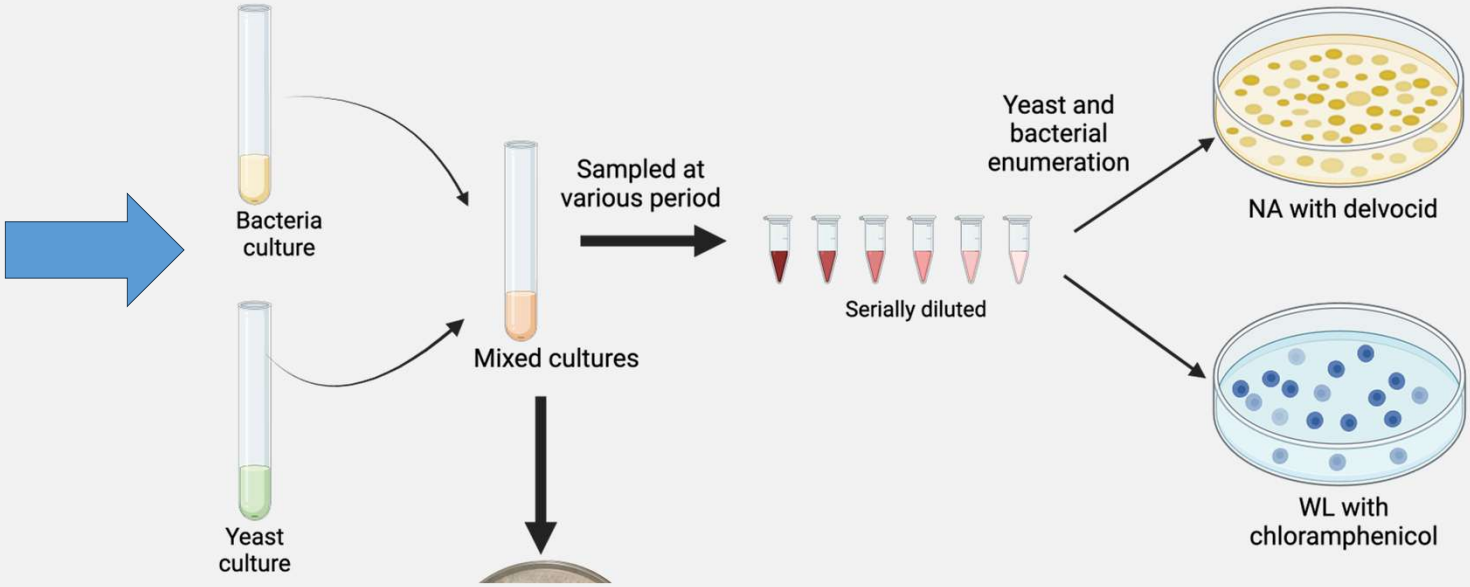
Selected bacterial strains

- *B. wiedmannii* B4016
- *B. nakamurai* B4001 & B4022
- *P. agglomerans* B4020

Selected yeast strains

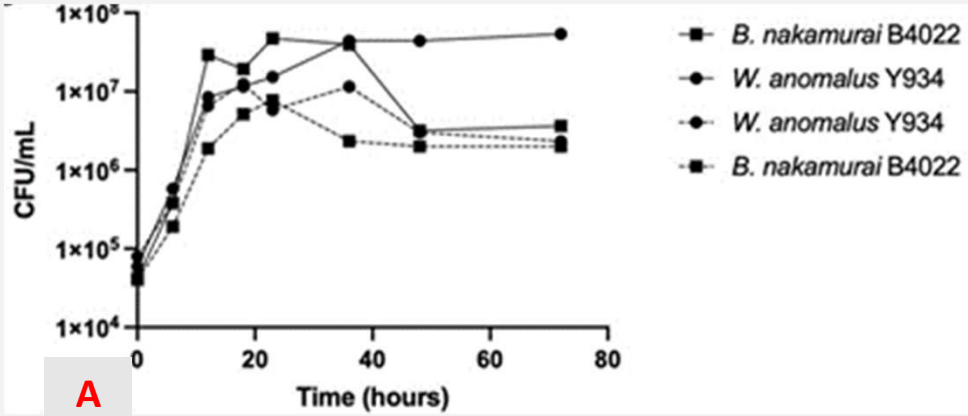
- *H. pseudoburtonii* Y963
- *W. anomalus* Y541, Y934, and Y951

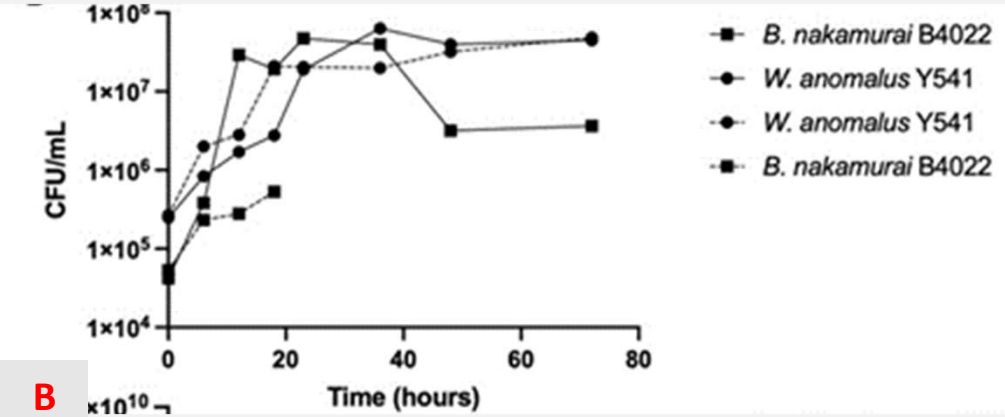
Standardized cells (~10^6 cells/mL)



Moremi et al. 2025; Maluleke et al. 2022

In vitro compatibilities of yeast-bacterial strains



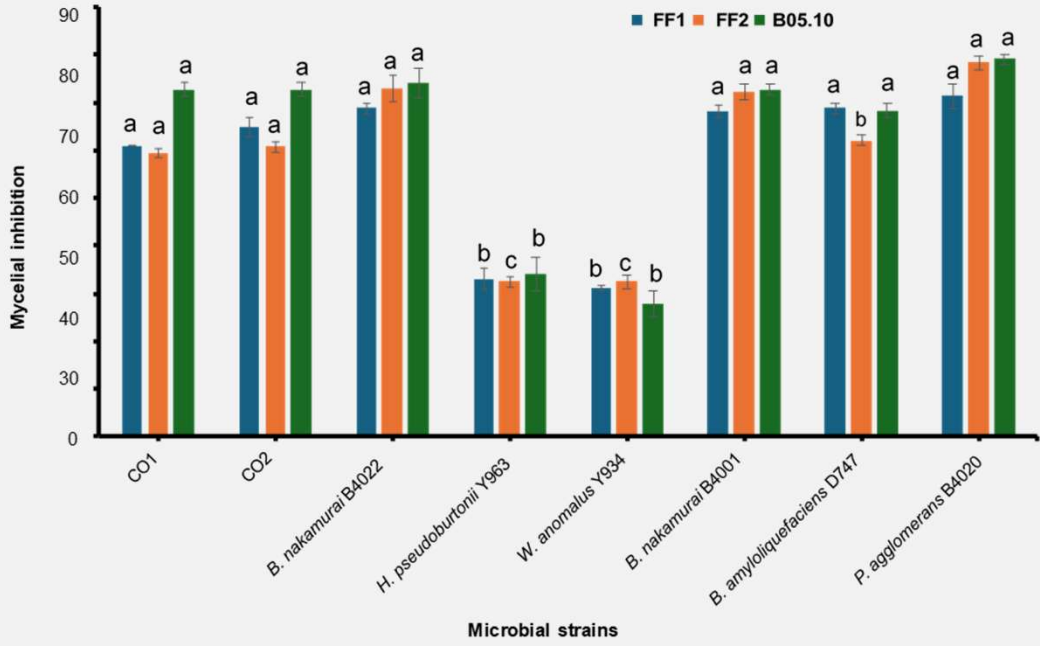


- The growth of co-cultures -incompatible (<24 hrs),partial compatible (36&48 hrs) and compatible (72 hrs)
  - B4020, B4001 and B4022 were compatible with *W.a* Y934 and *H.p* Y963
  - B4016 was incompatible with yeast strains (Y541, Y934, and Y951)
- Consortium 1 (CO1):*P. agglomerans* B4020, *B. nakamurai* B4022, *W. anomalus* Y934
- Consortium 2 (CO2):*H. pseudoburtonii* Y963, *P. agglomerans* B4020, *B. nakamurai* B4001

In vitro screening of consortia against *B. cinerea* strains

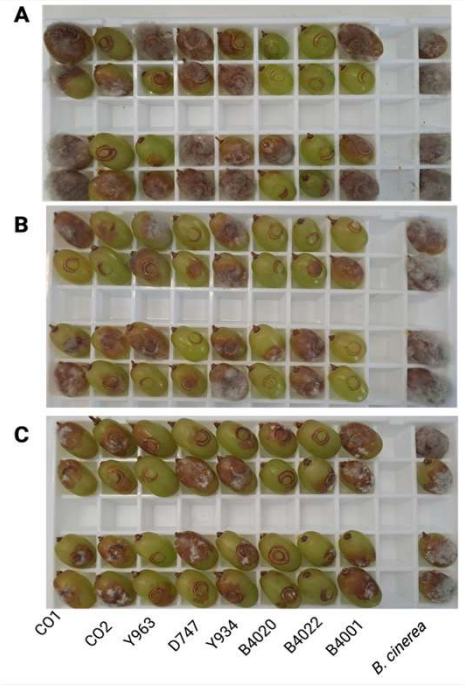


Dual-culture assay



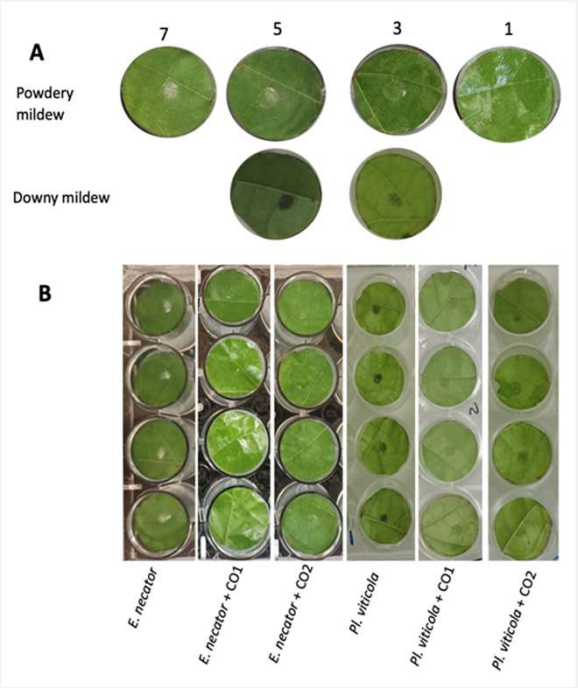
- Both consortia inhibited mycelial growth (>70%)
- Overall single bacterial strains outperformed yeast strains

Grape bioassay



1-No visible grey mould spot; 2-development of brown colour and soft mycelia; 3-distribution of mycelium on the wounds; 4- sporulation of mycelium from wounds

Leaf disc assay



- Brown colour and soft mycelia were observed on grapes with B05.10 and consortia or single strains.
- *P. agglomerans* B4020 strongly reduced grey mould than consortia, and other single strains (including D747).

- Both microbial consortia significantly reduced the severity of mildew diseases compared to the untreated control.

Conclusion

- Compatible microbial consortia could provide a sustainable approach to chemical fungicides - **integrated disease management in table grape production.**
- Laboratory bioassays - **greenhouse and vineyard field trials required**
- Research provides a foundation for developing locally adapted, vineyard-derived microbial biocontrol products - **sustainable and profitable table grape production.**

THANK YOU

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