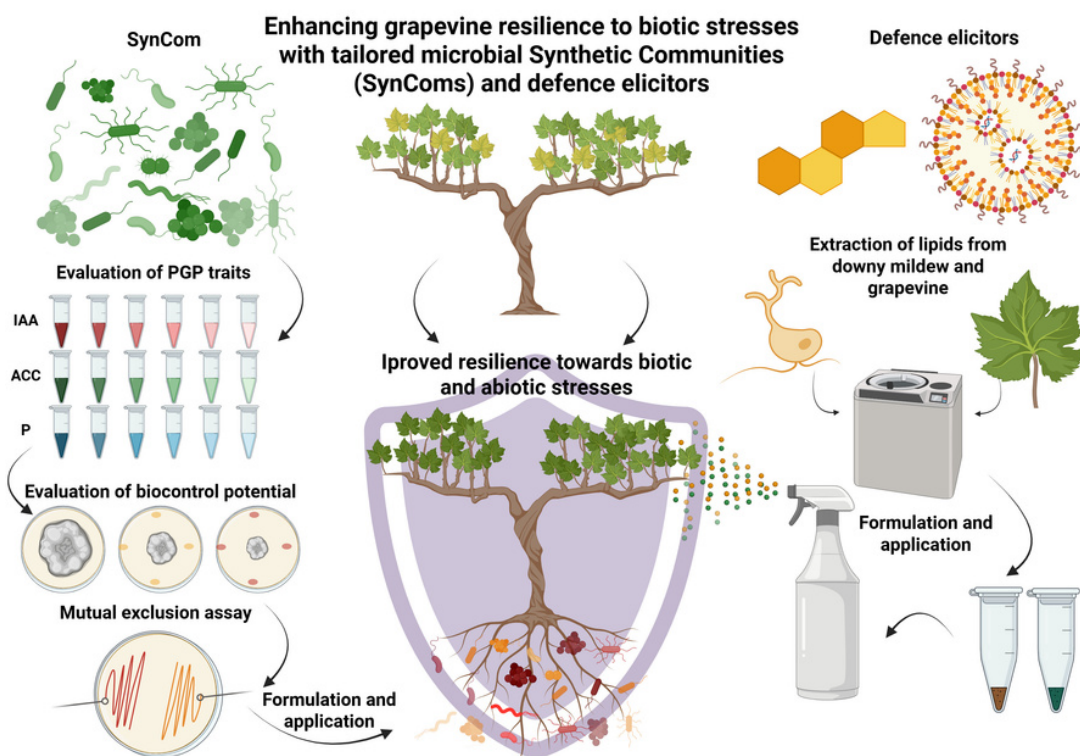


PRACTICE ABSTRACT - N°1

Enhancing grapevine resilience to biotic stresses with tailored microbial Synthetic Communities (SynComs) and defence elicitors

Grapevine plants face increasing pressure from biotic stressors, such as grapevine trunk diseases (GTDs), powdery and downy mildews. Traditional chemical-based control strategies are often unsustainable and can alter vineyard ecosystems impacting human health as well. Within the Shield4Grape project, we investigated the use of microbial synthetic communities (SynComs) and elicitor molecules as a nature-based solution to improve grapevine resilience. A grapevine-specific SynCom was formulated using endophytic bacterial strains isolated from woody tissues of healthy plants. These strains were selected based on their strong antagonistic activity against GTD pathogens and their ability to promote plant growth and tolerance to abiotic stress. SynCom-treated plants showed enhanced systemic defence responses, greater accumulation of defence-related metabolites, and a significant reduction in wood-decay fungal pathogens.



Although these benefits were accompanied by a moderate decrease in photosynthesis, they also reflected an effective energy shift toward protective mechanisms. SynCom application at early plant developmental stages, such as during nursery propagation, can enhance microbiome establishment and long-term effectiveness. For vineyards exposed to high disease pressure or abiotic constraints, tailored SynComs may offer synergistic benefits by balancing growth and stress responses. Furthermore, two lipids, one from grapevine and one only found in the downy mildew pathogen were tested as defence elicitors. When these lipids are applied to the leaves of susceptible plants, they confer a higher protection against infection, acting as a “vaccine”. When plants are infected, the production of antimicrobial metabolites and lipid-associated metabolites is increased leading to a higher tolerance to disease pressure. Both findings support the use of tailored SynComs and elicitors as promising tools for boosting plant’s defences and managing diseases in vineyards.

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PROJECT KEYWORDS

- # Pest/disease control in plants
- # Genetic resources
- #Outdoor horticulture and woody crops (incl. Viticulture, olives, ornamentals)
- # Biodiversity and nature
- # AKIS, incl. Advice, training, on-farm demo, interactive innovation projects

