TOWARD A SUSTAINABLE VITICULTURE IMPROVED GRAPEVINE PRODUCTIVITY AND TOLERANCE TO ABIOTIC AND BIOTIC STRESSES BY COMBINING RESISTANT CULTIVARS AND BENEFICIAL MICROORGANISMS

E Ait Barka, Aziz Aziz, Lisa Sanchez, Patricia Trotel-Aziz, Cedric Jacquard, Clement Christophe, Nathalie Gaveau-Vaillant, N. Tzortzakis, R. Topfer, Anna Kicherer, et al.

FACCE SURPLUS
SUSTAINABLE AND RESILIENT AGRICULTURE FOR FOOD AND NON-FOOD SYSTEMS

RIBP Résistance Induite et Bio-protection des Plantes

Vitismart Toward a sustainable viticulture

Toward a sustainable viticulture: Improved grapevine productivity and tolerance to abiotic and biotic stresses by combining resistant cultivars and beneficial microorganisms

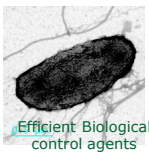
Aït Barka E., **Aziz A.**, Sanchez L., Trotel-Aziz P., Jacquard C., Clément C., Gaveau-Vaillant N., Tzortzakis N., Topfer R., Kicherer A., Escalona J-M., HÖFTE M. REY P., Gardiman M., De Nardi B., Grando M.S., Fusco L., Maciejczak M., Vermunt A., Falcão Salles J., Agstner B., Taglietti F., and other members of Vitismart consortium

GOALS: to improve resistance/tolerance strategies of grapevine cultivars to pathogens and to mitigate the undesirable effect of climatic change

Outcomes:

- Identification of susceptible and resistant genotypes for their tolerance/resistance to pathogens
- Identification of efficient Biocontrol agent (BCA) against mean grapevine diseases


Resilient new cultivars e.g. Calardis blanc


Efficient Biological control agents


Enhanced Resilience toward abiotic and biotic stress

- Investigate the physiological and molecular responses of grapevine inoculated with selected beneficial bacteria, under heat and water deficit conditions.
- Establishment of the best association between bacteria and resilient cultivars in order to deliver a new generation of grapevines adapted to climate change

WP0: Coordination & management

WP1: Vineyard management to face environmental effects

WP2: Grapevine genetic ressources exploitation to screen for more resilient cultivars

WP3: Prospection, identification and characterization of the most efficient strains against grapevine diseases

WP4: Molecular, biochemical and physiological investigation of the intricate networks underlying interactions between plant-pathogen and beneficial microbes under climate change

WP5: Socio-Economic Impacts

WP6: Technology transfer

WP7: Dissemination of results

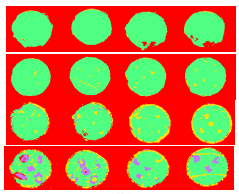
Water shortage
High temperatures

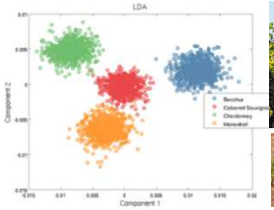
Plasmopara viticola
Botrytis cinerea

WP 2: Resilient cultivars

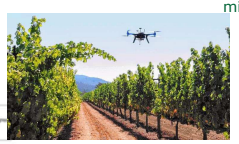
Hyperspectral imaging to early detect DM

Downy mildew: Leaf disc assays with 27 different genotypes (susceptible; resistant and breeding lines). The hyperspectral tool consists of five different models to achieve best prediction performance.



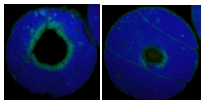


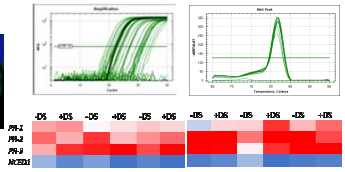
LDA using VNIR spectra for cultivar classification

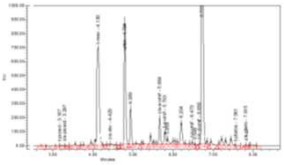


➢ **Identification of genotypes more adapted to abiotic stress conditions**

Grey mold: Mapping of physical barrieres against Botrytis/Drought


Photosynthetic parameters


Gene expression


Phytoalexin analysis

➢ **Identification of susceptible and resistant genotypes to biotic stress**

➢ **Establishment of the best association between bacteria and resilient cultivars**

Induced Tolerance

Induced Resistance

Physiology, primary metabolism, mineral status....

Priming of plant immune system

Hormones, minerals ..

N P

MAMPs

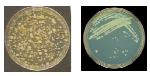
Beneficial microbes

WP 3: Efficient microbes

Characterization of microbiome from resilient cultivars by molecular tools

Microbial co-occurrence in the rhizosphere and endosphere using 16S rRNA based metagenomics, metatranscriptomics

➢ **Identification of efficient strains**
- *Pseudomonas fluorescens* sp.
- *Paraburkholderia phytofirmans*
- *Pythium oligandrum*



WP 4: Mechanisms underlying the tripartite interaction under climate change


Induced systemic resistance

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