VitiSmart

During the past 100 years, average global temperatures have risen approximately by 0.8 °C, with an increase in the variance of temperature and precipitation. Furthermore, average global temperatures are projected to rise by 3-5 °C by 2100. A changing climate leads to changes in the frequency, intensity, spatial extent, duration, and can result in unprecedented extreme weather and climate events.

Global weather- and climate-related disaster losses reported over the last few decades reflect mainly monetized direct damages to assets. Climate change (CC) will affect the ecosystem processes such as primary production, and the distribution and abundance of plant species. Climate change will also alter the plant diseases since the rate at which pathogens evolve and overcome host resistance may increase. Because abiotic factors such as temperature affect host susceptibility to pathogens and pathogen aggressiveness, interactions between plant resistance traits and abiotic stress tolerance may represent the most substantial impact of climate change on plant productivity.

VitiSmart is a 3 years project with interdisciplinary research activities, structured with a well-balanced division between research and innovation, basic and applied research, field data collection and demonstration, socio-economic, technology transfer and dissemination actions, as well as management. It will contribute to the achievement of sustainable development goals by integrating economic, social and environmental dimensions and addressing mutually food security and climate challenges. The project is composed of 3 main themes: 1) Sustainably increasing agricultural quality, productivity and incomes; 2) Adapting and building resilience to climate change; and 3) Reducing chemical inputs while maintaining quality using biocontrol methods. **The project aims to produce**, at the end of the project, **a resilient viticultural system** able to speedily **recover from biotic and abiotic stresses**. This will be achieved by **combining resilient cultivars with beneficial microorganisms to acquire a natural-cross-tolerance while maintaining yield**.

OBJECTIVES

The main objectives of the project are:

- Strengthen climate change models on grapevine crop systems by understanding how climate change will affect cropping systems (as opposed to crop productivity).
- Improve both preventive and curative strategies for more grapevine cultivars tolerant to pathogen under a CC context.
- Understanding of the molecular and physiological pathways underlying the interaction between grape cultivars/beneficial microbial agents/pathogens/climate change.
- Facilitate interdisciplinary research integrating innovative adaptive strategies with socio-economical aspects of grapevine production.
- Support the European grapevine growers by matching consumer demands for top quality grapes and food safety.

The research gaps and the specific objectives of the project are to:

- Integrate innovative adapting strategies by developing new effective methods of vineyard management and optimized production systems to increase resilience to abiotic and/or biotic stresses.
- Exploit efficient plant genetic resources to "resilient-oriented" breeding.
- Improve grapevine productivity and quality, in parallel to reduce agrochemical inputs.
- Improve the understanding of the intricate networks underlying the tripartite interaction between plants, microbes and environment, by molecular, biochemical and physiological approaches.
- Promote interdisciplinary research with socio-economical aspects of grape and wine supply chains. Cost-benefit analysis and financial studies of different agronomical practices used.
- Provide the innovation transfer and its dissemination to grape and wine producers.
- Support the European grapevine growers.
- Bridging the existing gap between research and farming practices and facilitating communication and cooperation among stakeholders.

Fig. 1: Resilient new cultivars e.g. Calardis blanc

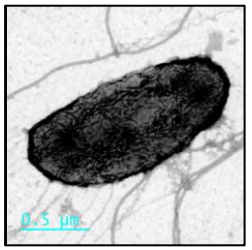

Fig. 2: Efficient Biological control agents

Fig. 3: Enhanced resilience toward abiotic and biotic stress

(Fig. 1, 2 and 3: © JKI & URCA)

RESULTS

The expected results are:

- Development of methods and tools for viticultural system to characterize grapevine resilience (from agronomical to molecular markers).
- Identification of resilient genotypes (varieties, clones and rootstocks that are more tolerant to abiotic and biotic stresses) according to geographical zones.
- Increase productivity in an environmentally sustainable manner by reducing agrochemical inputs.
- Minimizing the economic and environmental costs of protecting against plant diseases.
- Release of resilient microbial-inoculated-grapevine plants that are more adapted to abiotic and biotic stresses, from nurseries to field.

•Evaluation of the socio-economic impact of these strategies.
•Establishment of a network among different actors (researchers, enterprises, policy-makers) targeted to present and future needs, problems and opportunities of end-users.
•Overcoming regional and national barriers by endorsing an European dimension of networks for optimal efficacy of multisite experimental trials.

VitiSmart project will provide advanced knowledge by creating the potential for reducing environmental impacts whilst increasing environmental quality in CC scenarios. It will cover a carefully selected range of most experienced Universities, RTD-institutions and SMEs in 9 European countries to compare "the state of the art best practices" in different EU wine regions and implement novel strategies "beyond-state-of-the-art" for improving grapevine resilience to CC in a sustainable way and taking into account Regional specificities. By combining agronomic practices, precision viticulture tools, physio-molecular analysis, modeling, breeding and genomics approaches, VitiSmart expects to generate the following impacts:

i) Scientific Impacts:

• **Understanding the links** between improved sustainable agronomic practices, resistant grapevine cultivars and grape quality under different environments.
• **Provide advanced knowledge** on markers for resilience.

ii) Applied Impacts:

• **Vineyard management benefits**, adaptation of varieties and rootstocks and management practices to both biotic and abiotic stresses.
• **Environment impact benefits**, sustainable production systems, reduction of external inputs and pesticides while minimizing further environmental degradation, improving water and land use and mitigation strategies, and preserving biodiversity.
• **Regional and European political benefits**, adaptation strategies to local environment vulnerability and different terroir, improving management of typical products, rural development, and European cohesion to cope with local and global challenges.

iii) Socio-Economic Impacts (Cost-impacts and financial analysis):

• **Consumers' life impacts**, improving product quality, food security and knowledge to support for decision making process.
• **Employees' impacts**, the research, management and public engagement activities around the project will generate job opportunities, creating a workforce with high technical expertise and leadership that can be used in European scientific industries and related businesses.
• **Producers' impacts**, reduction of grape production costs.
• **Supply chains' impacts**, increase of competitiveness through innovations and better market orientation through cooperation.
• **Economies' impacts**, reduction of negative and increase of positive external effects.
• **Policy makers' impacts**, introduction of quality scheme.

Participants:

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

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

VitiSmart

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Toward a sustainable viticulture

The authors would like to thank the EU and Research Promotion Foundation of each country/partner for funding, in the frame of the collaborative international consortium "Vitismart" financed under the ERA-NET Cofound FACCE SURPLUS Call of Horizon 2020. This ERA-NET is an integral part of the Joint Activities developed by the Agriculture, Food Security and Climate Change Joint Programme Initiative (FACCE JPI).