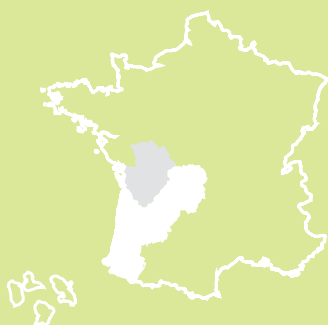


UMR 1287

UMR EGFV

ISVV

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Head of unit

Serge Delrot, directeur

Philippe Vivin, directeur-adjoint

Key figures

- 26 INRA staff members
- 19 staff members from University of Bordeaux and Bordeaux Sciences Agro
- 14 PhD students and postdocs

Joint Research Unit

Ecophysiology and Functional Genomics of Grapevine (EGFV)

Missions and objectives

The scientific project of UMR EGFV aims to understand and control the impact of the environment on the biological and physiological processes that control the development, yield and content of grapes in response to the climate, in particular in the context of global change. The research is organised around a modelling project focusing on the plant, the various organs, and cell metabolism. The root system and rootstocks are among the key-targets of interest. The project involves skills in vineyard agronomy, bioclimatology, ecophysiology, biochemistry, molecular biology, and genetics.

From an operational perspective, this research aims to produce knowledge and tools to answer questions arising from professional structures, particularly the wine-growing industry. To ensure the success of the research, UMR EGFV has 2000 m² of greenhouses and related equipment. The unit has established a phenotyping platform equipped with 150 scales in a greenhouse in which the same water stress can be imposed on a large number of plants. Finally, the UMR possesses experimental plots dedicated to long-term research programmes: VitAdapt, planted in 2009, comprising 52 varieties grafted on a single rootstock and five blocks of 10 plants for each variety; GreffAdapt, since 2015, comprising 50 rootstock genotypes grafted with 5 different varieties. Several interspecific and intraspecific grapevine progenies are also available at the UMR. The plots are managed in association with the Wine-Growing Experimental Unit on the Grande Ferrade site.



Scientific areas

The UMR EGFV organises its research around two major themes: rootstock/graft interactions and berry quality.

Analysis and modelling of rootstock/graft interactions. Application to studying the effects of the rootstock on the adaptation of the grapevine to water stress.

There is a lack of fundamental knowledge regarding the physiological mechanisms involved in rootstock/graft interactions in relation to the environment which is curbing the development of new rootstock genotypes more adapted to current and future environmental conditions. The scientific objectives are therefore to:

- acquire more fundamental knowledge on the physiological and molecular mechanisms involved in the genetic and environmental determinism of the vigour conferred by the root system, notably under water stress conditions;



- integrate this information in a mechanistic approach to model the functioning of the grafted plant;
- explore the possibility of using this ecophysiological model to link the phenotypic complexity to the genetic traits and thus provide a new molecular marker-assisted varietal selection tool for rootstocks.

Study and modelling of berry quality in relation to climate change

This multidisciplinary research topic aims at understanding the physiological and molecular origins of coupling between sugar import, primary metabolism, and synthesis of secondary metabolites in response to the environment. The research is conducted on several levels:

- at population level, with the search for descriptors and phenological models taking into account the genetic variability to study the development of flowers and fruit;
- at plant level, with the study of the impact of the carbon/nitrogen ratio on the metabolism of the berry in diverse climatic and genetic contexts with the aim of modelling the metabolic flows, enzymes, and regulators involved;
- at berry level, with the identification and study of target genes (coding transporters, regulatory enzymes or proteins) of primary and secondary metabolism, and the study of their expression and variability in various environmental and genetic backgrounds.

Scientific collaborations and partnership

Internationally, the UMR has developed numerous collaborations, in particular with Germany, Australia, Chile, China, Spain, the United States, Italy, New Zealand, and Portugal. A pivotal member of the Bordeaux-Aquitaine Vine and Wine Institute of Science (ISVV), the UMR EGFV collaborates with other research units: Oenology (unit under contract), and the Joint unit research Vineyard Health and Agroecology (SAVE).

The UMR EGFV also works with several member laboratories of the **Federative Research Structure for Integrative Biology and Ecology** (SFR BIE), and more particularly with the Fruit Biology and Pathology Research Unit (UMR BFP).

Finally, the UMR EGFV is a member of **LabEx COTE** which develops a global integrative vision of interactions between different ecosystems (forests, agrosystems, hydrosystems, soil) in the Aquitaine region in a context of climate change and limited resources.

Outstanding projects

French leader in research dedicated to interactions of the grapevine with the environment in a context of climate change, the UMR EGFV co-coordinated, with the UMR Innovation (Inra Montpellier), **the national LACCAVE project (Long-term impacts and Adaptations to Climate Change in Viticulture and Oenology)** part of the Institute's Adaptation of Agriculture and Forests to Climate Change (ACCAF) metaprogramme. This project used a comprehensive multidisciplinary approach to study the impact of climate change and the long-term adaptation strategies for viticulture and wine production in France.

Several other projects were and are related to this topic as the **European programme KBBE Innovine** (2013-2016).

Today the UMR EGFV is participating actively to the **national plan to fight grapevine decays** launched by the Ministry of Agriculture and Grower associations from the main French wine regions.

The unit co-initiated and is participating in the **French-German University UFA-DFH graduate school on climate change and special crops** with Geisenheim (Germany) and is in the process of establishing a Joint International Laboratory (LIA) with the Institute of Botany in Beijing (Chinese Academy of Science).

