Foreword

Agricultural research and training conducted in Montpellier (France) are tightly linked with vine growing and winemaking. At the heart of the large Languedoc wine-growing region, scientists (researchers and teachers) have long been focusing on issues related with this production, especially at times of crisis or development opportunity. These scientists were the first to identify phylloxera, the pest that devastated vineyards in France in the late 19th century. They subsequently proposed solutions against this scourge, especially via grafting onto resistant American hybrid vine plants, which ultimately saved European viticulture. Jules Émile Planchon and Gustave Foex, respectively former professors at the Faculté de Pharmacie (now the Université de Montpellier) and the École Nationale d’Agriculture (now Montpellier SupAgro), marked the history of vitiviniculture through these successes. Agricultural research and teaching were then mutually strengthened for more than a century, while developing training areas and scientific disciplines relevant to vineyard management, winemaking and wine marketing.

This research was punctuated by a series of issues, ranging from disease control, mechanization and enhancement of yield and quality to winemaking and market management. These issues now mainly concern the environmental and socioeconomic sustainability of vineyards, the tailoring of wines that meet consumer expectations, in addition to reductions in pesticide use and adaptations to climate change.

The platform set up in the sphere of Agropolis International, and led mainly by the French National Institute for Agricultural Research (INRA), Montpellier SupAgro, Université de Montpellier (UM) and the National Research Institute of Science and Technology for Environment and Agriculture (IRSTEA), has mobilized over 130 scientists on these issues. Local research development and experimentation stakeholders such as the French Institute for Vine and Wine (IPV), the Institut Coopératif du Vin (ICV Group), chambers of agriculture and many start-ups—all closely associated—are also involved. Agropolis International is thus now one of the leading international research and training platforms on viticulture and wine while clearly having substantial potential for further progress.

Studies conducted by a dozen joint research units on viticulture and wine are firmly underpinned by a full spectrum of scientific disciplines: plant science, agronomy, processing science, mathematics and social science. This disciplinary support is essential for knowledge building on scientific fronts and ensuring the consistency of targeted research programmes for the sector. Research carried out by teams working on viticulture and wine is geared towards enhancing knowledge on the grape genome, the response of vine plants to stress, the biogenesis of compounds in grapes (for different grape crop uses), soil erosion and input dynamics, yeast physiology or the physico-chemical characteristics of wines. Issues regarding the organizational aspects of the sector; its regulation and market functioning are also investigated.

The continuum of disciplines involved in the platform has also enabled the development of integrated approaches to address major challenges facing the sector. The expertise of the teams is thus utilized in interdisciplinary programmes focused on complex prospective issues, such as climate change adaptation, grapevine dieback, the development of sustainable cropping practices or the management of alcohol and acidity levels in wines.

Management of these projects is facilitated by the availability of resources and infrastructures of excellence, especially a globally unique grapevine germplasm collection that pools exceptional genetic resources, a high-throughput plant phenotyping platform, a polyphenol analysis platform, as well as a technology centre for winemaking. These highly internationally appealing features have led to unprecedented advances in research programmes while supporting the international outreach objectives of Agropolis.

Moreover, the Labex Agro Laboratory of Excellence, coordinated by Agropolis Foundation, supports the structuring, aspirations and scope of the scientific community. It is focused on plant science and sustainable agriculture.

The viticulture and wine research carried out is highly receptive to concerns and involvement of the business world, with many projects carried out within the framework of partnerships with industry, technical institutes, interprofessional stakeholders and other organizations in the sector. Links with IPV have thus been strengthened via three joint technology units (Géno-Vigne, QUALINNOV and ECHOTECH-VITI), which are essential interfaces for the transfer or co-construction of innovations for the sector. Moreover, the research benefits from the Qualiméditerranée competitive cluster and various services that facilitate their activities, such as Agro-Valo Méditerranée for INRA and Montpellier SupAgro.

Viticulture and wine research of the platform has mainly been developed in a cooperation setting through scientific programmes at regional, national and international levels. The teams are involved in several emblematic projects and networks (LACCAVE and INNOVINE projects, FIDELE joint technology network, etc.). They are regularly incorporated in international research and training networks with major centres in different wine-growing countries—University of California (Davis), American Association of Wine Economists, Australian Wine Research Institute, OENOVITI International, the Groupe international d’experts en systèmes vitivinicoles pour la Coopération, the European Master of Science of Viticulture and Enology (EMaVE Consortium), the Association universitaire internationale du vin (AUIV), etc.

A bibliometric analysis of recent publications (see figure next page) highlighted the wealth of collaborations with other research centres in France, especially with the Bordeaux platform. These two platforms complement each other, thus enhancing their international appeal, through joint scientific initiatives, co-supervision of PhD thesis candidates and co-certified international Master’s candidates.

Education and training programmes for engineers, oenologists, BSc, MSc and PhD candidates attract students from around the world, who come to acquire advanced knowledge and a business-friendly interdisciplinary and international culture. In a setting of constant technical progress and a highly specific regulatory framework, the expertise of these graduates, engineers, researchers and teachers is regularly tapped by institutions in the
viticulture and wine sector at regional, national and international scales.

This Agropolis International Dossier is designed to enhance awareness on the wealth of training programmes and the diverse range of research topics focused on in the laboratories of the viticulture and wine platform in Montpellier. The overall thrust is to improve the structure and visibility of this platform. It aims to showcase the initiatives under way to organizations in the sector, businesses and local authorities, to facilitate the development of links with other research and training stakeholders of the national and international scientific community and those involved in research and development. It could thus be of interest to all sectoral stakeholders and students for which it is targeted.

The Dossier is organized in eight main chapters. The first four chapters address aspects related to grape genetic diversity, cropping systems, oenology, sectors and markets. The next two present the mathematics and information science contributions, as well as integrated approaches implemented around major issues (climate change, sustainable viticulture and product diversification). While the last two chapters deal with the organization of partnership, innovation and training arrangements.

Bruno Blondin, Hervé Hannin, Thierry Simonneau, Patrice This & Jean-Marc Touzard

* LACCAVE Project: Long-term adaptation to climate change in viticulture and oenology.
** INNOVINE Project: Combining innovation in vineyard management and genetics for sustainable European viticulture.
*** FIDELE joint technology network: fermented and distilled products.