

## LOCAL RCM: Development of a Prototype for a Mobile Pilot Plant for On-Site Concentration and Rectification of Grape Must to Replace Imported Sugars in Sparkling Wine Production

### Summary

The cava sector of the Catalan wine production industry faces various technological, economic, and environmental challenges. In cava production, the addition of sugar is required for the second fermentation and for the liqueur expedition. This generates a demand for sugar, typically sourced from outside Europe, which has a significant economic and environmental impact on the wine sector.

Simultaneously, in the Penedès region, there is an overproduction of grapes leading to substantial economic losses. From surplus grapes, rectified concentrated must (RCM) can be obtained. This is a dense, high-sugar-content, colourless, clean, physically and chemically stable liquid of high purity.

This product can replace sugar in the cava production process, leading to positive environmental and economic impacts, and promoting circular economy principles. Currently, the RCM used in the majority of Catalan wineries is produced by companies outside of Catalonia, specifically in Castilla-La Mancha, and sometimes even from the surplus must of Catalan wineries.

The distance between the wineries and the RCM production centres necessitates must stabilization (sulphitation) and the transportation of must and RCM, resulting in a considerable environmental impact caused by the sector. Based on the results of a previous project stemming from collaboration between INNOVI, Eurecat, and

Penedès wineries under the 'Competitive reinforcement initiatives - IRC2020 (ACCIÓ)' call, the potential for local RCM production in the Penedès region was identified through laboratory-scale tests. These aimed to define the best technologies for RCM production, alongside a preliminary study of economic and environmental feasibility. Moreover, this previous study highlighted the need to verify the process's functionality on a pilot scale, defining parameters such as energy consumption, reagent usage, and production and quality of wastewater, before constructing a full-scale mobile plant.

The goal of the present proposal is to demonstrate the technical, economic and environmental viability of a compact,

mobile process for RCM production in Penedès wineries, thereby reducing economic costs and the associated carbon footprint relative to using sugar or RCM produced outside the application territory.

This demonstration will be done by constructing a pilot plant to evaluate rectification and concentration technologies for grape must within wineries. Additionally, it entails designing a compact and transportable system, theoretically scaling the technology, and assessing the technical, economic, and environmental feasibility of its real-scale implementation.

### Objectives

The aim of this project is to demonstrate the technical, economic, and environmental viability of a compact and mobile process for RCM concentration within Penedès wineries, thereby reducing economic costs and the associated carbon footprint compared to the use of sugar or externally produced RCM. The pilot will consist of three technological modules (ultrafiltration, ion exchange resins, and evaporation). With the presence of the pilot plant at the wineries during harvest, there would be no need to stabilise the must with sulphite, and the economic cost of reagents used in resin regeneration, which saturates rapidly with sulphite, would be reduced. For this reason, the project will include a phase for treating sulphited must and another for untreated must. Furthermore, the project will involve a theoretical scaling of the technology to assess its technical, economic, and environmental feasibility for real-scale implementation.

The specific objectives of the project are as follows:

- Design and construct a mobile pilot plant with an approximate production capacity of 500 litres of RCM per week.
- Treat a minimum of 100 m<sup>3</sup> of must during the project to generate 20 m<sup>3</sup> of RCM.
- Demonstrate the technical, economic, and environmental viability of on-site RCM production in 3 Penedès wineries.
- Demonstrate the technical, economic, and environmental viability of on-site RCM production during the harvest period using untreated must (without sulphite stabilisation).
- Determine the volumes and costs of the necessary reagents for RCM production (e.g., cleaning products for the "clean-in-place" system and for regenerating ion exchange resins) and the production of generated wastewater.
- Design a mobile plant for on-site pilot-scale production.
- Conduct a study of the technical, economic, and environmental viability of implementing a mobile plant on a real scale.
- Reduce the environmental impact derived from RCM production compared to sugar purchase or externally produced RCM in terms of CO<sub>2</sub> emissions and contribution to climate change (reduction exceeding 70%).

### Description of Planned Actions in the Project

To achieve the objective, the proposal comprises five distinct and interconnected activities:

- The first step of this activity will involve establishing the functional requirements by the wineries.
- Prior to operating the pilot plant, each stage of the process will be investigated separately (ultrafiltration, ion exchange resins, and thermal evaporator) to study the best configuration and operational conditions for each of them.
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- Once the pilot has been fine-tuned, it will be operated within various wineries to produce MCR on-site.
- An economic study will be conducted using the results obtained from pilot operation to evaluate and, if necessary, adjust the stages in question. This will determine the technical and economic feasibility of the process.

### Expected Results and Practical Recommendations

The primary outcome of the project is to ascertain the technical, economic, and environmental viability of local RCM production based on the results obtained from the pilot prototype.

To achieve this main result, a series of intermediate steps are taken, which also yield other outcomes. Noteworthy among these are:

- Design and construction of a pilot plant.
- Compilation of an operational manual for the pilot.
- Environmental, product quality, and economic assessment of MCR usage in comparison to sugars currently in use.
- Study of the technical, economic, and environmental viability of local RCM production.
- Design of a mobile plant, including the transportation platform and auxiliary equipment, with investment cost

and technical/operational requirements.

### Operational Group Leader

ENTITY: GONZÁLEZ BYASS SA (VILARNAU)

### Operational Group Coordinator

ENTITY: AEI INNOVI ASSOCIATION

### Other members of the operational group (grant recipients)

ENTITY: JUVÉ Y CAMPS SA

ENTITY: GRAMONA SA

### Other members of the operational group (grant non-recipients)

ENTITY: EURECAT

### Subject Area(s) of Application

- Agricultural production system
- Agricultural practice
- Agricultural equipment and machinery
- Livestock and animal welfare
- Plant production and horticulture
- Landscape / Territory management
- Pest and disease control
- Fertilisation and nutrient management
- Soil management
- Genetic resources
- Forestry
- Water management
- Climate and climate change
- Energy management
- Waste and byproduct management
- Biodiversity and natural environment management
- Food quality / processing and nutrition
- Supply chain, marketing and consumption
- Agricultural and forestry competitiveness and diversification
- General

### Territorial Scope

PROVINCE(S)	COUNTY(IES)
Barcelona	Alt Penedès

### Communication about project (publications, workshops, multimedia...)

News related to project advancements will be posted on the INNOVI.CAT website, and the project will be publicised through INNOVI and partner social media networks.

### Project Website

<https://innovi.cat/news/mcr-local/>

### Additional Project Information

PROJECT DETAILS	TOTAL BUDGET
Start Date: July 2021	Total Budget: €212,754.72
Current Status: In Progress	DACC Funding: €98,389.02
	EU Funding: €74,223.30
	Own Funding: €40,142.40

### Financed by:

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*Order ARP/113/2021, of 20 May, approving the regulatory bases for innovation cooperation grants by fostering the creation of operational groups of the European Agricultural Innovation Partnership in the field of agricultural productivity and sustainability and the implementation of innovative pilot projects by these groups, and Resolution ACC/1660/2021, of 27 May, making the call for the aforementioned grant.*

