

SUSTAINABLE SOIL MANAGEMENT FOR QUALITY WINES IN THE FACE OF CLIMATE CHANGE AND INTELLIGENT MANAGEMENT OF THE VINEYARD

R+D PROYECTS – C.D.T.I. 2018-2020

In the first quarter of 2018, Grupo Príncipe de Viana presented the C.D.T.I., the Spanish Ministry of Science, Innovation and Universities' Centre for Industrial Technological Development, with the project '*Sustainable management for quality vineyards and intelligent management of the vineyard*' or **BIGSOSTBIOMA** project. From these two fundamentals of sustainability and I.C.T. implementation, Grupo Príncipe de Viana proposed this project with a duration of 29 months between July 30th, 2018 and December 31st, 2020, with an approved total budget of 1,014,704€.

With this project, Grupo Príncipe de Viana aims to apply a more sustainable production through an agronomic management that reduces the negative impact on the soil as well as by establishing intelligent vineyard systems via the processing of BIG DATA.

Soil degradation is one of the great problems of agriculture today and one that is only too frequently forgotten. The continued exploitation of soils in pursuit of high economic yields is generating problems of erosion, salinity and degradation. For this reason, following a work philosophy that guarantees soil sustainability is paramount. Healthy soils, in addition to providing the essential nutrients, water, oxygen and support for the roots that plants need, maintain a biodiversity that helps control plant diseases, form beneficial symbiotic associations with the roots, and recycle essential nutrients for the plants. Healthy soils improve the structure of the plant which also has a positive impact on the soil's water and nutrient retention capacity, and improves agricultural production. They also guarantee a soil's perpetuity and lifespan.

The fight against climate change has been for years one of Grupo Príncipe de Viana's production objectives with which to obtain differentiated wines from the rest on the market. Therefore, the group's most recent project aims to advance towards a greater sustainability by developing a line of research on microbiological biodiversity in the management of soils in an intelligent vineyard environment never studied to date.

The effect of different management methods on the quality of soils and the microbiome will be thus assessed. Through the latest DNA sequencing technologies, the group will be able to accurately know the existing microbial population and in turn, influence on it positively

However, there is no clear consensus as to what the best way to manage the soils is in terms of reaching a balance between quality, profitability and soil richness or non-degradation of the soils. Keeping in mind that quality wines usually come from vineyards planted in limiting soils, poor in nutrients, which favour the production of high quality grapes, when assessing the best way to manage soils for the cultivation of the vine, balance must come first on the list. For example, the complete elimination of herbicides can result in an excessive use of tillage, with a subsequent increase of the costs of machinery work and a greater energy investment. On the other hand, plant cover clearly improves soil activity but in soils with low moisture retention or low rainfall, this can mean significant competition for vineyard cultivation, with consequent

production and even qualitative losses. In other cases it can provide a better balance. Grupo Príncipe de Viana launches BIGSOSTBIOMA and its study of soil sustainability in order to assess the best option in each case.

With the study of the soil microbiome, Grupo Príncipe de Viana also seeks to make a major leap in the management of wood diseases. Currently almost all the vineyards in the world suffer from these, derived from some fungi that weaken the plants causing premature ageing. That is why this project aims to evaluate the effect of certain innovative methods as a means to raise the health and quality of both vineyards and soils.

Also found in the soils are yeasts that can be useful in the must fermentation. Yeasts are organisms that are in the ground and the strains of the vineyard and arrive at the winery adhered to the grapes. If selected populations of indigenous yeasts are selected, isolated and multiplied prior to fermentation, they can be used as foliar fertilizer to favour the development of aromatic precursors. This results in wines originated in a controlled and sustainable way which enhances their authentic character.

Grupo Príncipe de Viana has always been committed to sustainability. In 2016, the group worked on a project to develop strategies to adapt to climate change (*'CLIMAVIN - Wine adaptation to climate change in an efficient and sustainable way'*) which already incorporated some precision viticulture tools. With BIOSOSTBIOMA, Grupo Príncipe de Viana moves in a different direction, making an effort to improve soil management in a more sustainable and specific way and incorporating new metadata management systems that give added value to their wines.

The management of information can be a key resource in the production system, which adds value to the product. When collecting data from different media, it can be difficult to compare, integrate and obtain conclusive results to use in search of a specific objective. That is why it is important to develop metadata management systems which are simple to use and which offer results that can be viewed intuitively, look for correlations that we are not normally able to find but that are there, developing new algorithms and intelligent vineyard management systems that improve the quality of the final product.

BIGSOSTBIOMA seeks to implement a BIG-DATA management system with which, based on information collected by weather stations and soil-water-plant sensors, pest and disease forecasting systems and processed information will be developed. Also, with information gathered with drones, obtain indicators at plant level on quality, needs, production and possible phytopathogenic risks, in addition to observing differences in the development of the harvest based on the tests carried out. All this would be integrated in a way that facilitates the decision making in terms of management of the vineyard as well as saving supplies and which allows to compare the results of different years, offering a future value to the productive system.

The **specific technical objectives** are:

- To study the effect of different soil management techniques on the quality of the wines, the soil microbiome and the physicochemical properties of the soil, the grape and the wine.
- To study and evaluate alternative methods of control and improvement of the health of the soil, based on ozone disinfection and inoculation of favourable microorganisms.

- To study and evaluate methods of control and improvement of wood diseases through the strengthening of plants and knowledge of the microbiome.

- To analyze the nutritional effect of applications based on native yeast lysates selected from terroir.

- To develop and implement an intelligent vineyard management system based on monitoring parameters and from a predictive model of phytopathogens, GIS databases of qualitative and quantitative historical results and the development of customized algorithms for agronomic management.

The achievement of these objectives will be of great value for the group of cellars as it will raise the efficiency of the winemaking techniques in terms of the quality of the product obtained as well as from the environmental point of view. This advance will in turn translate into a competitive advantage over other winemakers and will contribute to improving its positioning in both the domestic and foreign markets.