Biodiversity management in viticulture landscapes Demonstrating project LIFE+ BioDiVine

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Abstract. The BioDiVine project involves the study and management of biodiversity in vineyard landscapes. This project benefits of cofunding of the European initiative LIFE+ 2009/2014, it objective is to identify the interest of arrangements in wine regions and adaptation of crop management on biodiversity, landscape and overall environment. The project focuses on the management of six experimental sites (appellations of Saint-Emilion, Limoux and Costières de Nîmes in France, the Douro in Portugal and the Rioja and Penedès in Spain) and a reference site, Saumur-Champigny. The objectives of this project stem from three complementary fields: environment, agronomy and landscape. Concrete actions for conservation will be implemented at each site with the creation of semi-natural complementary areas in vineyards. Parallel with arrangements, it is planned to develop an alternative protection of the vineyard. Also, technical follow-ups and cartographic analysis will be conducted to assess the scope of these actions to conserve and enhance biodiversity through appropriate protocols for different specialties of biodiversity.

Keywords: viticulture landscapes, biodiversity, amenities, sustainable management, terroir, RBA method.

Introduction

The BioDiVine project involves the study and management of biodiversity in viticultural landscapes. This project benefits of the cofunding of the European initiative LIFE+ 2009/2014 that supports innovative activities in the field of nature conservation and biodiversity contributing to the implementation of the objectives of European Commission press release entitled "Halting the loss of biodiversity by 2010 - and beyond".

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The BioDiVine project objective is to identify the interest of plot and landscape management in wine regions on biodiversity, landscape and overall environment. It stems from three complementary fields: environment, agronomy and landscape; allowing demonstrating that a biodiversity friendly management of the landscape and an environmental action plan are compatible with high quality grape and wine production.

Two scales will be apprehended, a vision at the plot scale to ensure understanding and sustainable management of soils (soil, protection of the vineyard ...) and a broader vision, landscape-level.

Indeed, interdisciplinary research on issues such as functional biodiversity and landscape connectivity demonstrates that new options arise when systems management are approached from landscape scale. Over the last decades, many attempts have been made to enhance the quantity and quality of semi-natural elements left in the countryside such as hedges, groves or ground covers.

The project focuses on a reference site, Saumur-Champigny, located in the Loire Valley (France), which already led a program on biodiversity wine for several years, as well as six experimental sites: Saint-Emilion, Limoux and Costières de Nîmes in France, the Douro Valley in Portugal and the Rioja and Penedes in Spain.

Six different partners in the coordination and monitoring of European demonstration sites are involved in the project LIFE+ BioDiVine. The IFV (French Institute of Vine and Wine) and ARD-VD (Association for Research and Development in Sustainable Viticulture) are partners in charge of the different French sites and are technically coordinating the project activities. The Spanish partners are ICVV (Instituto de Ciencias de la Vid y del Vino) and DIBA (Diputacio de Barcelona) which will implement the project activities respectively on the site of La Rioja and Penedes. In Portugal, ADVID (Associação para o Desenvolvimento da Viticulture Duriense) will be in charge of the Douro demonstration site. Finally, Euroquality provides administrative and logistic management of the project.

Figure 1. The logo of the BioDiVine project, which shows the consideration of various aspects of vineyard landscapes, both agronomic and environmental.

Material and Methods

The BioDiVine objective is to identify interest in land development and adaptation of crop management on biodiversity, landscape and overall environment.
Different sites will be studied to determine what key actions can and will be implemented locally, adapting the actions to the context of each study area.The project comprises two operational components:

Amenities: Concrete actions of conservation will be implemented on each site. Some examples of actions:

- Introduction of ground cover plants (175 ha of grass strips and 245 ha of flowery bands in total)
- Introduction of various hedges (70km established in total)
- Upgrading or restoration of walls and other layout elements

These different actions are intended to improve the overall biodiversity, landscape structure but also to contribute to the control of pests and diseases, reduce soil erosion and runoff and reduce water contamination by pesticides. Thus, appropriate landscaping implemented locally would be an element of response to enable a positive impact on the environment, while improving product image and landscapes quality.

Parallel to conservation actions, the project plans to enhance the implementation of integrated protection of the vine, especially through the use of predictive models of disease, the development of mating disruption by pheromones, and the optimization of spraying.

Technical follow-ups: Monitoring of the result of these actions will be conducted to assess the scope of their impact on conservation and restoration of biodiversity through appropriate protocols at different levels: Arthropod monitoring through the RBA method (Rapid Biodiversity Assessment already developed in various wine regions), soil microbiology, botanical plants, birds and small mammals.

The RBA method, developed in Australia by the arthropods specialists led by Oliver and Beattie (1993), aims at assessing arthropod biodiversity, through a trapping system (combination of “combi” and pitfall), while avoiding the classical taxonomy. Thus, the measurement unit is the “morphospecies”. In 2004, Krells’ studies have confirmed and validated the scientific validity of the RBA method on arthropods. Furthermore, another study conducted in Switzerland by Duelli and Obrist (2005) confirms that the RBA is a very good indicator of biodiversity in the understanding of local trends in short and medium term.
For several years M. VAN HELDEN has been developing this method in various French wine regions both at landscapes and plot scale. This process will be established at each site and followed by trainees supervised by the ARD-VD.

In addition, a cartographic analysis will be conducted at each site to locate the main landscape units using the Corine Land Cover database, but at a much finer scale through Geographic Information Systems (GIS). These tools will facilitate analysis

and understanding of the landscape at each site from aerial photographs and field surveys.

Moreover, many public awareness activities and dissemination of the project results are planned throughout the project to interest the greatest number, but also to attract the attention of winemakers and wine professionals such as the creation of a public website (www.biodivine.eu), the implementation of information boards on sites, the publications of articles and press releases, the organization of “open days” on experimental sites, as well as training workshops.

Figure 2. The system of trapping by the RBA method for capturing arthropods by pitfall for crawling insects, and "combi" for flying insects.

Results and Discussion

Objectives: The project encompasses three general and complementary objectives that are:

-An environmental goal to evaluate the scope of every concrete conservation action implemented to curb the impoverishment of wildlife diversity according to different European biotopes (Atlantic, Mediterranean, and Continental). Indeed, the project deals with creating complementary semi-natural spaces in vineyards such as hedges, ground covers, grainland and/or low walls to host all kinds of arthropods, birds, little mammals, fungi, new plants… The idea is to increase vegetal biodiversity that supports animal biodiversity.

-An agronomic issue to assess the benefits of arthropods and fungi biodiversity for viticulture. Dynamics will be observed at a landscape scale considering this level is deciding for preserving biodiversity in agricultural areas. An organized set up of semi natural elements will help smooth out negative effects of the intensification of parcels by improving connectivity and quality of habitats, and soil biodiversity

wealth. The project aims at demonstrating that a landscape and ecological action plan can efficiently help wine makers' work while respecting biodiversity.

-A landscape perspective focusing on the most efficient landscape structures in terms of biodiversity. An appropriate landscape layout, respectful both of local biotope and regional culture, is more efficient and functional than shorter sight perspectives. Management plans will be proposed for each situation by the end of the project.

A project that starts out: Since launching of the project in late 2010, each demonstration site is being analyzed to determine the specific key actions that can be made locally thereafter. To do this, a mapping study across the landscape has been achieved with the European Corine Land Cover database to get an idea of the land use on each site. In addition, the RBA method was established on each study site and aims to look at this first year, the diversity of insects on different habitat on each site (vineyard, orchard, hedge, fallow land...) Insects catch began in mid-April, and this during the entire growing season of the vine. As to the other protocols, they are being developed with all partners and will be implemented next year.

During the project a general framework of landscape analysis will be set up in order to enable the declination of the land management measures depending on the different types of territory that exist all over Europe.

Finally, beyond the six experimental sites, the BioDiVine project aims to promote in all European countries actions supporting biodiversity that are adapted to each vineyard context (climate, geology, slope, plot type, management systems ...).

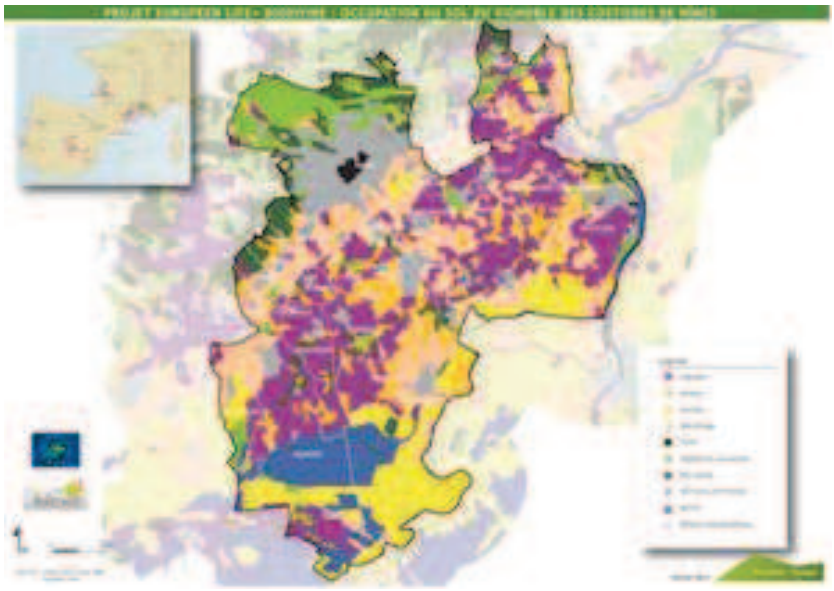

Figure 3. Land use map of Costières de Nîmes (France), using the Corine Land Cover 2006 (IGN).

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