

BIOVINE final project summary



Project purpose

BIOVINE will develop natural solutions based on plant diversity to control pests (harmful organisms, including arthropods, nematodes, oomycetes and fungi), reduce pesticide dependence, increase plant health and services provided from the ecosystems to humans.

BIOVINE will exploit plant diversity in the vineyard to control pests in order to provide farmers with alternative solutions to pesticides. Solutions proposed will be tested in Italy, France, Romania, Spain, Slovenia and Switzerland.

Final project summary

The main activity during the BIOVINE project was to develop new viticultural systems based on increased plant diversity within (eg, cover crops) and/or around (e.g., hedges, vegetation spots, edgings) vineyards by planting selected plant species for the control of arthropod pests, soil-borne pests (oomycetes, fungi, nematodes), and foliar pathogens. In particular, plant species were identified across a wide literature review of altogether more than 130 published papers (see details in Del 2.1.1 - 3.1.1 - 4.1.1 - 5.1.1) as:

- potential trap crops for *Drosophila suzukii* as well as repellent plant extracts to push *Lobesia botrana* away from grapevines (WP2);
- repellent for soil-borne nematodes (WP3);
- able to control and/or limit the spread of foliar pathogens (WP5);
- able to increase plant health through mycorrhizal fungi (WP4).

The solutions proposed for the innovative viticultural systems from each country were evaluated by UCSC through the multiple indicators analysis and several on-farm experiments were set up in France, Italy, Romania, Spain, and Switzerland. These experiments were focused on different soil management comparison to evaluate the effect of different selected cover crops combination in enhancing pest control and increasing biodiversity in the organic vineyards.

Each experiment conducted by different partners has interesting overall results. There was lower infestation by *L. botrana* in plots treated with extract from selected cover crops in Romania. Moreover, beneficial effect of cover crops was observed on pollinator and predator arthropods. Spore trap experiments led by UPV showed positive results in terms of spore dispersal reduction when using cover crops. Cover crops mixtures that were tested in Romanian and Italian vineyards resulted with significant reduction in some foliar diseases compared to control plots and traditional organic farm practice. Field trials conducted in Slovenia, resulted in significant reduction of *Xiphinema index* nematode population after biofumigation with selected cover crops (*Brassica* species). Moreover, glucosinolates effect was also observed to suppress downy mildew infection, under laboratory conditions experiment. Results from arbuscular mycorrhizal fungi (AMF) analysis conducted in France showed that perennial cover crops were more colonized by *R. irregularis* compared to annual plants and arbuscule percentage was higher in Fabaceae than for Poaceae, which are common cover crops. The systems tested are now available for growers (in each Country) that may adopt them as solutions to reduce a specific pest (i.e. *Lobesia botrana* in Switzerland, downy mildew in Italy, nematodes in Slovenia).

Analysis of viticultural systems conducted by UCSC showed that the most affected aspect of sustainability by the innovative systems proposed was the environmental one and it was increased at least one score in most of countries involved. Altogether, the innovative practices tested during the BIOVINE project, affected different EcoSystem Services (ESS):

- food production;
- pest and disease management pollination;
- erosion protection;
- carbon sequestration;
- nutrient cycling and soil fertility habitat quality;
- fresh water storage;
- landscape quality;
- recreation and tourism.

In particular, a feasibility study of the payment for ecosystem services (PES) mechanism was carried out for two ESS (pest and disease management, and pollination) considering both a public scheme and a private one for each of them.



CORE Organic Cofund is an ERA-NET funded by the European Commission's Horizon 2020 Framework Programme for Research and Innovation Contract No. 727495.