

Development of local biocontrol products adapted to Mediterranean crops

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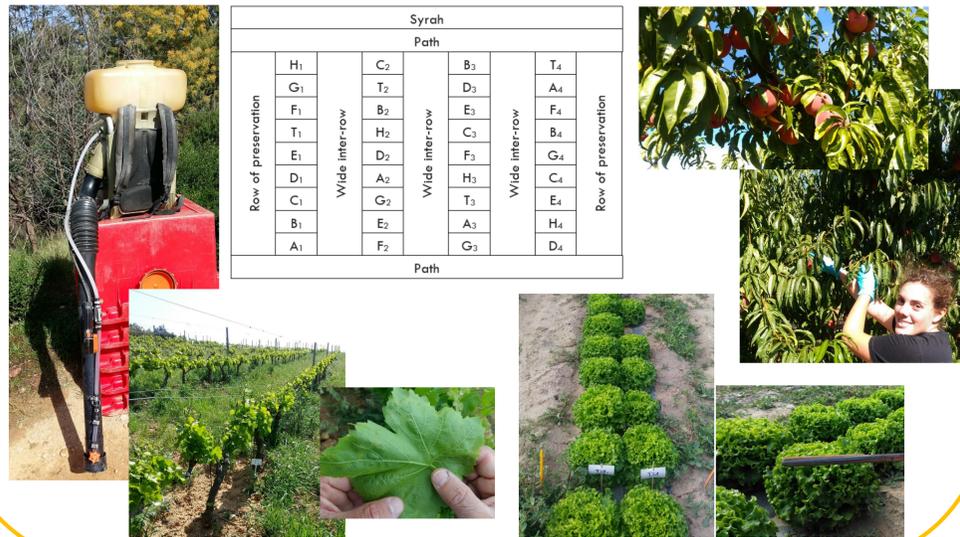
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CONTEXT

Consumers as well as farmers are supporting the decrease of conventional pesticides use in favor of the employment of biocontrol products. To meet those expectations, French and Spanish governments promote the biocontrol products market: it recorded a growth rate of around +15% in a year. Nevertheless, references regarding technical efficacy and ecotoxicity are lacking. To fill that gap, the PALVIP project (local Mediterranean crops' alternative protection) associates universities and technical structures to **develop new biocontrol products (BP) for organic farming and to develop new tools in order to set up biopesticides approval processes**. The purpose is to 1) characterize biocontrol products adapted to Mediterranean crops (wine, fruits and vegetables growing), 2) give advices to farmers about the use of these products, and 3) enhance the development of biocontrol industry and sustainable agriculture. To reach that goal, the biopesticides selected in the project will be studied according to their efficiency through field experimentations (Chambre d'Agriculture 66, INCAVI), their environmental impact (Université de Perpignan Via Domitia, Universitat de Girona, Futureco Bioscience) and their effect on plants (Universitat de Girona, Universitat Autònoma de Barcelona).

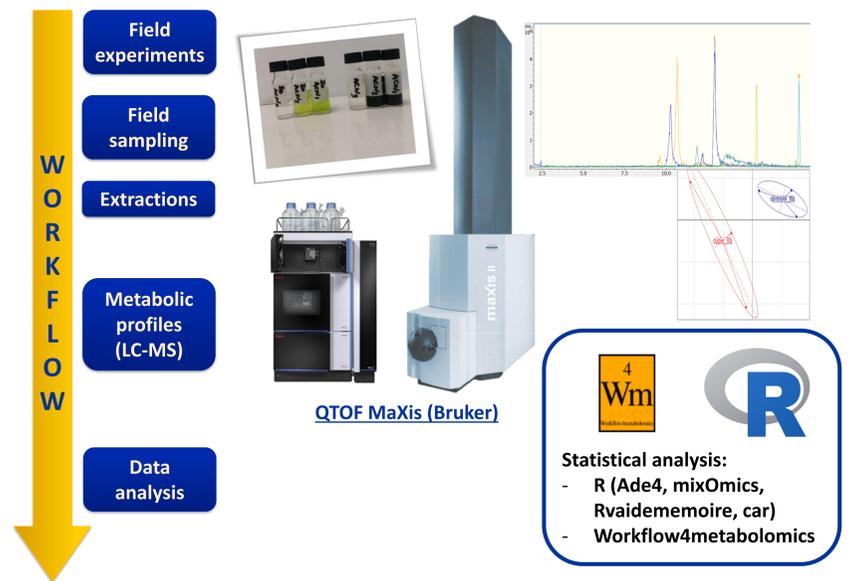
FIELD EXPERIMENTS

Crops and pests selected in the PALVIP project were chosen regarding the products developed by the partners and the local needs. **The field experiments were done to study the efficacy of the BP products:** i) on vine against downy mildew, powdery mildew and gray mold (with an organoleptic evaluation of the wine); ii) on peach tree against brown rot; iii) on apricot tree against flowers' drying up caused by *Monilia laxa*; iv) on cherry tree against flies; and v) on salad production against weeds. Samples are picked for environmental and health impact study as well as plant response analysis.



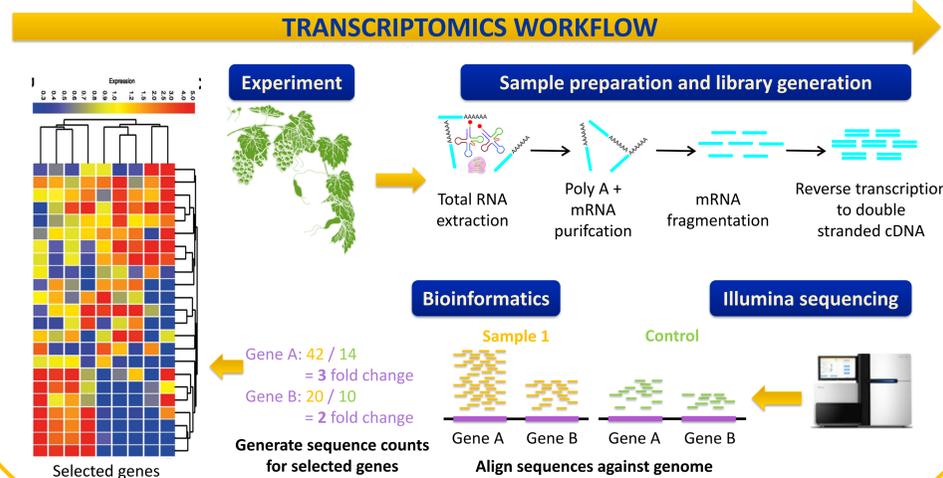
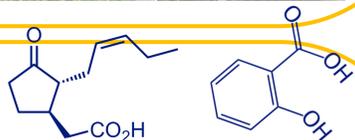
ENVIRONMENTAL AND HEALTH IMPACT

An innovative approach is used based on metabolomics (LC-MS), the Environmental Metabolic Footprinting (EMF). The EMF gives rise to: **(1) a new integrative proxy, the resilience time** that corresponds to the time delay needed for the compound dissipation and its effects on the matrix - **(2) the preharvest interval (PHI)** that corresponds to the time delay needed to have no residue difference between the treated sample and the control.



PLANT RESPONSE ANALYSIS

The objective of this part is to characterize plant response after different applications of the studied alternative products. Those biocontrol products have distinct mechanisms of action; they can **(1) act as a physical barrier** preventing fungal penetration and avoiding infection processes, **(2) trigger the hypersensitive response** by increasing the levels of plant hormones (salicylic acid and jasmonic acid) as well as the biosynthesis of infection related substances (phytoanticipins, phytoalexins). This response will be studied using **transcriptomics** and **metabolomics** in order to investigate the change in total phenolic compounds, resveratrol and defense hormones.



COMMUNICATION

In order to disseminate the results and reach all the targets - (i) public authority, (ii) higher education and research, (iii) SMEs, (iv) schools and training centers, (v) general public, (vi) international organizations and (vii) farmers and agricultural advisers - various communication supports and events are used:

- Scientific congresses
- Project newsletter
- Technical sessions
- Publications
- Posters
- Website
- MOOC



EXPECTED OUTCOMES

Biocontrol products tested in the project are currently in development, in a pre-commercial stage or in a commercial stage and we are expecting to make them pass to a new stage to the registration process. In order to reach that goal PALVIP will provide: Validation of field efficiency and characterization of environmental fate and impact
Characterization of products' mechanisms of action on/in the treated plants
Development of new analytical tools based on metabolomics and transcriptomic in order to facilitate the evaluation and registration of the biocontrol products.

Also, we are expecting that this project will allow reinforcing the cross-bordering innovative research network.