

# BIOVEXO – Biocontrol of Xylella and its vector in olive trees for integrated pest management

## Deliverable 3.1.

### Optimised lab-scale formulations of biopesticide products

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## Publishable Summary

Based on MS1 (First decision on promising compounds), the selected active ingredients and microbial strains with activity against *Xylella* or the vector from WPs 1-2 have been formulated individually with appropriate components, carriers, and additives.

In the process of formulating biopesticides for agriculture, the selection and adjustment of ingredients and processing parameters, such as agitation, temperature, storage conditions, etc., are decisive to ensure stability, extend the shelf life of the formulation and fulfil the quality standards. Plant-protection products are composed of an active principle that exerts the desired effects on a specific target, accompanied by other ingredients that add specific characteristics to the product. Each substance can be presented in different media (aqueous extracts, oily, soluble powder, etc.) and influence the others.

For this reason, this deliverable aims to detail the optimisation process and establish the parameters for the product formulation of the X- and V-biopesticides tested in BIOVEXO, through compatibility studies of several components with the active ingredients, followed by the assessment of the influence of the above-mentioned components on the final stability.

Specifically, in the case of the solutions based on vegetable extracts, the compatibility with the following components has been evaluated: adjuvants, whose function is to homogeneously solubilise the onion extract in aqueous solutions; amino acids, natural hydrolysates, which have a stimulating action on plants and are essential to meet the necessary legal requirements; and different amino acids that are not incorporated in the hydrolysate used.

On the other hand, the components that were evaluated with the solutions based on microorganisms were: fixative agents, which have film-forming capacity; amino acid hydrolysates of natural origin; wetting agents, that lower the surface tension and ensure full coverage, carriers and additives with protectant properties.

For the V-biopesticides, prototype formulations of fungal spores were optimised and delivered for virulence testing. The formulation of the plant waste extract-based product was finalised and is being tested in accelerated storage stability tests. Finally, the product based on a bacterial mixture showed problems with storage stability which are being followed up further.

Based on the results of these studies, the use of protection technologies, such as emulsions, lyophilisation, encapsulation, or microencapsulation has been evaluated. In order to guarantee the microorganism viability of X-biopesticides, and V-biopesticide compounds and the

stability of the vegetable extracts, the necessary analytical methods have been put in place for the correct quality control and traceability. Therefore, some tests have been carried out according to the physical-chemical properties of the products and the methodology and application protocols have been defined for up-scaling in T3.2.

Finally, prototype formulations in different supports have been developed in order to improve the activity of the different compounds and adjust the dose and application conditions of the final products. The results of this deliverable will supply information about the different formulations developed for the large-scale field trials in WP4.