

# Life Olea Regenera

## AFTER LIFE PLAN

(LIFE17 ENV/ES/000189)

Valorization of bio-waste resulting  
from the olive oil extraction  
process

(Valorización de los bio-residuos  
procedentes del proceso de  
extracción del aceite de oliva)



**Life**  
Olea Regenera





## After LIFE plan

### 1. PROJECT SUMMARY

**Title:**

**“Valorization of bio-waste resulting from the olive oil extraction process”**

**Coordinating Beneficiary:**

**FERTILIZANTES Y UNTRIENTES ECOLÓGICOS, S.L. (FYNECO)**

**Associated Beneficiaries:**

**ORUJO FRÍO, S.L.**

**SOLEX IBERICA DE SECADOS GRANULARES, S.L.**

**CEBAS (CSIC)**

**OLIVAIS DO SUL, S.A.**

**Project duration: 01/09/2018- 31/12/2022**

**Project budget: 1.824.730 €**

**Project eligible costs: 1.658.992 €**

**EC Contribution: 995.395 €**

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**Project Website: <https://lifeolearegenera.com/>**

## 2. INTRODUCTION

The European Union is the world's largest olive oil producer, accounting for the 65 to 75% of the world's olive oil production (3.22 million tonnes in 2019/2020 season), and has plantations and processing facilities in 8 member states with a total production value of over EUR 7 billion, which highlights the strategic economic importance of the olive oil sector in the EU and its influential position in the international arena.

However, the olive oil extraction process which is currently used in Europe is not sustainable: only about 22% of the mass of the olive can be extracted as olive oil and the rest is discharged in a mass called *alperujo*, a mixture of vegetation water, olive skin, olive pulp and crushed olive pits. This residue is transported long-distance by road (usually hundreds of kilometres) to *orujeas* (secondary extraction factories where the olive mill waste is treated to obtain biomass and low-quality oil), so that, after passing through dryers where its humidity is reduced from 80% to 10%, pomace oil is extracted by chemical processes.

The process is not environmentally acceptable either because, during the *alperujo* drying process with forced evaporation, suspended particles and other compounds of degradation are emitted by the chimneys of *orujeas*, well above the thresholds allowed by the current regulations, even though filtering solutions are used. In fact, air pollution is so severe around *orujeas* that most of those located nearby urban places have been closed.

If a solution is not quickly sought to the unsustainability of these emissions, *orujeas* will not be able to process the more than 12 billion tonnes of *alperujo* that are generated each year in Europe as a result of olive oil production, which may collapse the production process and threaten this economic activity.

The LIFE OLEA REGENERA project aims to demonstrate a technical solution for the management of *alperujo*, eliminating the amount of waste to be sent to *orujeas* and transforming this pollutant waste into valuable by-products.

## 3. PROJECT SCOPE AND OBJECTIVES

The main objective of the **LIFE OLEA REGENERA** project has been to demonstrate the valorisation of the bio-waste resulting from the olive oil extraction process, **the *alperujo***, by transforming it into new by-products that can be used as functional animal feed or biostimulants for crops.

The project is based on the patent "*Industrial process for the treatment of by-products from the production of olive oil* (101331522/8)" processed and obtained by ORUJO FRÍO. This patent allows the *alperujo* separation through a low energy consumption physical procedure obtaining, always working under 20°C, a solid phase (S1, which was initially sent to *orujeas*) and a liquid phase. Then, the liquid phase was stored in decantation tanks and L3 (a liquid fraction rich in phenols) and S2 (a solid fraction rich in fats) were obtained. At the beginning of the project only S2 and L3 were to be destined for their conversion into valuable byproducts.

However, the technical solution was substantially improved during the project implementation compared to what was foreseen in the project proposal. Although initially only 60% of the *alperujo* was to be process with the project solution, this scenario was proven not to be compatible with obtaining stable by-

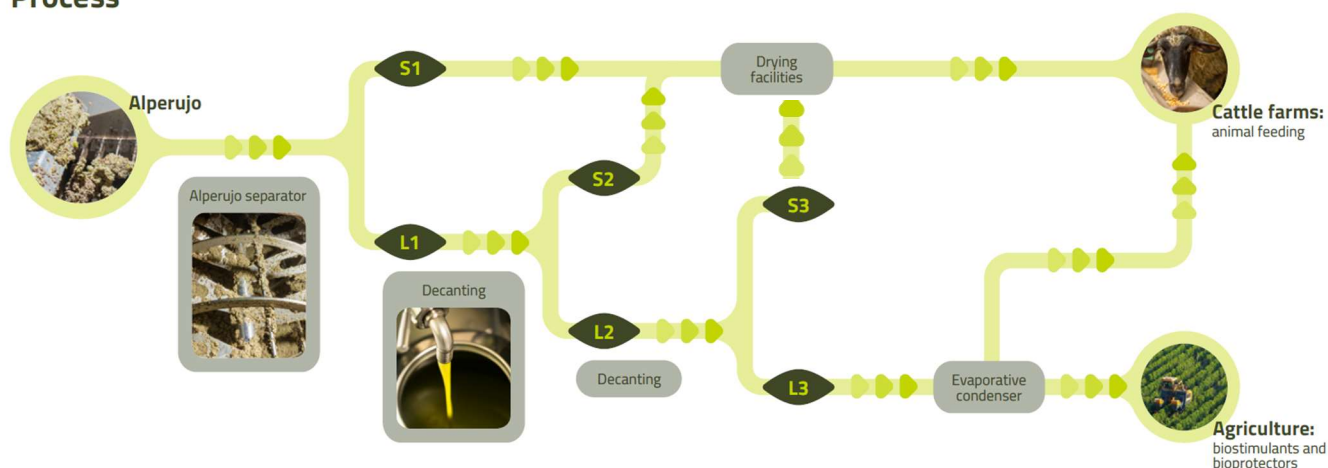
products, since it contemplated the recirculation of alperujo and, if the properties of the alperujo at the entrance vary, so do the by-products at the exit.

In order to find a solution to this problem, the partner SOLEX joined the project consortium, as they developed a dryer that was able to remove the moisture from the olive pits so that they could be used as biomass and that could be also used for the drying of the solid phase. This collaboration allowed us to process 100% of the alperujo, transforming the all the solid byproduct into animal feed (100% vs the initial 8.8% of efficiency) and therefore convert it into value-added by-products and water.

Thus, S1 and S2 can be processed together in order to granulate the solid and eliminate the olive pit, so both of them can be used as enriched animal food.

On the other hand, the L3 has to be perfectly characterised and concentrated in order to maximise its content in phenols and keep them constant during the year and along the olive campaigns. This process has to be done in an evaporative condenser.

## Process



Final alperujo separation process

## Expected results and environmental benefits

The project will have very positive impacts at environmental and economic levels, thanks to this project it is possible to value and introduce into the market a product that is currently treated as a waste. This will also contribute to minimise the serious environmental problem caused by the presence of harmful pollutants in the gases emitted in orujeras, with a high cost over human health and air quality.

With the new alperujo separation process, LIFE OLEA REGENARA **reduces up to 100% the olive oil extraction waste** that currently goes to orujeras. The system proposed produces a solid fraction composed by S1 and S2 which can be used as animal food, a liquid fraction called L3 which can be converted into biostimulant or supplement for animal feed, and water.

Additionally, the alperujo separation process installed in Vadolivo facilities allows:

- The reduction in 5000tn/year of the alperujo sent to orujeras, as the alperujo separation system has been designed to be installed in olive mills, reducing also the CO2 emissions derived from

transport by road. This figure will be higher if replication activities are successful and more alperujo separation systems are installed in additional olive mills.

- The reduction in orujeras's emissions and energy consumption, as they treat less amount of alperujo.

Other project results are:

- Definition of protocols of production of the new solid fraction S1+S2, with low production costs and high concentration of vegetable fat of excellent nutritional quality.
- Definition of protocols of production of the new liquid fraction L3, with low production costs and high concentration of hydroxytyrosol (polyphenol).
- Prototype and parametrization of the necessary equipment to achieve the by-products from alperujo.
- Technical and economic feasibility studies to install the alperujo separation process in other olive mills and replicate the process.
- Cost-benefit analysis, market study, business plan and exploitation plan of the proposed system and by-products.
- Socioeconomic and business benefits for the participating companies that aims to commercialise new products whose characteristics will make them unique in the global market.

### **Expected longer term results**

Once the viability of the alperujo separation process and the by-products have been assessed, and its positive impact on the environment has been proven, great interest in implementing this technology is expected in the olive industry. The profit that is expected to be achieved after the commercialization of the alperujo separation process and the by-products will create an obvious economic interest that will allow the project replication in the years beyond the project.

Thus, after 5 years of project implementation, it is expected to:

- Replication of the alperujo separation process in at least 5 olive mills.
- To process at least 259,200 tons of alperujo in those 5 olive mills.
- To reduce the air pollutant emissions of the processing of these 259,200 tons of alperujo in a 100%.
- To produce more than 29,000 tons of L3 (before concentration)
- To produce more than 90,000 tons of S1+S2.
- To reduce the CO2 emissions produced by the transport by road of alperujo to orujeras by 943 tons.

To generate more than EUR 9,000,000 of incomes thanks to the commercialization of the alperujo separation process and the by-products.



#### 4. TIMETABLE AND BUDGET OF THE AFTER-LIFE COMMUNICATION ACTIONS PER BENEFICIARY

The After-Life plan of LIFE OLEA REGENERA PROJECT uses the following objectives for the future management

Nº	OBJECTIVES AND ACTIONS	RESPONSIBLE BENEFICIARY	TIMETABLE	BUDGET (€)
1	compra del condensador evaporativo / purchase of evaporative condenser	ORUJO FRÍO /SOLEX	1 año /1 year	€€€€
2	construcción de un techado para proteger el subproducto del sol y la Lluvia /construction of a roof to protect the by-product from sun and rain	ORUJO FRÍO /SOLEX	1 año /1 year	€€€
3	Análisis de los productos cárnicos / Analysis of meat products	ORUJO FRÍO /SOLEX	1 año /1 year	€€
4	Replicación del proceso en otras dos almazaras / Replication of the process in other two mills	ORUJO FRÍO /SOLEX	5 años /5 years	€€€€
5	Obtención del certificado de materia prima para pienso del L3 / Obtaining the certificate of raw material for L3 feed	ORUJO FRÍO /SOLEX	1 año /1 year	€
6	Extensión de la patente europea a otros países / Extension of the European patent to other countries	ORUJO FRÍO /SOLEX	3 años /3 years	€€
7	Implementar la estrategia de transferencia y replicación / Implement transfer and replication strategy	ORUJO FRÍO /SOLEX	5 años /5 years	€€€€
8	Organización visitas in situ / Organization of on-site visits	ORUJO FRÍO /SOLEX	5 años /5 years	€
9	Comunicación de resultados en ferias y eventos (ej. Expoliva) / Communication of results at fairs and events	ORUJO FRÍO /SOLEX	5 años /5 years	€
10	Inicio de la comercialización del L3 / Start of commercialization of L3	ORUJO FRÍO /SOLEX	2 años /2 years	€

Leyenda / Legend:

Fondos necesarios: € = hasta 5000 euros; €€ = entre 5000 y 10000 euros; €€€ = entre 10000 y 50000 €; €€€€ = más de 100000 euros.

Budget needed: €= up to 5000 euro; €€= between 5000 and 10000 euro; €€€= between 10000 y 50000 euro; €€€€= more than 100000 euro.

Nº	OBJECTIVES AND ACTIONS	RESPONSIBLE BENEFICIARY	TIMETABLE	BUDGET (€)
11	Inicio de la comercialización de los formulados / Beginning of the commercialization of the formulations	FYNECO	1 año /1 year	€
12	Certificación eco de los formulados / Eco certification of the formulations	FYNECO	1 año /1 year	€
13	Búsqueda de alianzas comerciales para la venta de subproductos / Search for commercial alliances for the sale of by-products	FYNECO	1 año /1 year	€
14	Mantenimiento de la web durante 5 años / Website maintenance for 5 years	FYNECO	5 años /5 years	€
15	Implementar la estrategia de transferencia y replicación / Implement transfer and replication strategy	FYNECO	5 años /5 years	€€
16	Comunicación de resultados en ferias y eventos / Communication of results at fairs and events	FYNECO	5 años /5 years	€
17	Colaboración con Algar BBE LIFE / Collaboration with Algar BBE life	FYNECO	5 años /5 years	€

Leyenda / Legend:

Fondos necesarios: € = hasta 5000 euros; €€ = entre 5000 y 10000 euros; €€€ = entre 10000 y 50000 €; €€€€ = más de 100000 euros.

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Nº	OBJECTIVES AND ACTIONS	RESPONSIBLE BENEFICIARY	TIMETABLE	BUDGET (€)
18	Implementación del proceso completo / Implementation of the complete process	OLIVAIS DO SUL	5 años /5 years	€€€€
19	Organización de visitas in situ / Organization of on-site visits	OLIVAIS DO SUL	5 años /5 years	€
20	Comunicación de resultados en ferias y eventos / Communication of results at fairs and events	OLIVAIS DO SUL	5 años /5 years	€
21	Producción y comercialización de subproductos / Production and marketing of by-products	OLIVAIS DO SUL	5 años /5 years	€€

Nº	OBJECTIVES AND ACTIONS	RESPONSIBLE BENEFICIARY	TIMETABLE	BUDGET (€)
22	Publicación del último artículo presentado / Publication of the last article presented	CEBAS	1 año /1 year	€
23	Acciones de Comunicación en congresos y eventos / Communication actions in congresses and events	CEBAS	5 años /5 years	€

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