

LIFE+ TL-BIOFER Project

LIFE + Program	2007-2013 → LIFE+ 2013 "the Financial Instrument for the Environment"
Total Budget	1.097.092 €
EC Co-funding	548.546 €
Project duration	2014 - 2018
Beneficiaries	EMPROACSA · UNIVERSITY OF COLOGNE · BIOMASA PENINSULAR S.A (Coordinator Partner)
Contact Person	Inmaculada González
e-mail	igonzalez@bpeninsular.com
Postal address	Biomasa Peninsular, C/ Constanca 38, 28002 Madrid, SPAIN
Phone	+34 913 560 181
Web	www.tlbiofer.com



Objectives

The **LIFE+ TL-BIOFER project** aims to demonstrate the feasibility of an advanced nutrient removal technology by using microalgae immobilized culture in a Twin-Layer system to address the environmental problem of point-source pollution from small and medium size urban agglomerations, to simultaneously closing the global biogeochemical cycle of Nitrogen and Phosphorus deeply affected by anthropogenic activities and to serve as tertiary treatment model to remove Nitrogen and Phosphorus in medium and small WWTPs.

Key drivers of LIFE+ TL-BIOFER project:

- Protection of natural water from eutrophication by reducing N and P in the effluent of small and medium-size wastewater treatment plants.
- To foster the compliance of the Directive 91/271/EEC for discharges on sensitive areas through advanced microalgae culture technology for tertiary treatment.
- To facilitate the recovery of nutrients through advanced microalgae based bio-fertilizers.

The Twin - Layer Prototype

Twin-Layer Prototype has been operated as tertiary treatment inside a greenhouse which has been constructed at "El Viso Villaralto" Wastewater Treatment Plant facilities, managed by EMPROACSA, Cordova, Spain.

Layers have been inoculated with *Scenedesmus sp.* in different storage conditions to evaluate the differences in nutrient uptake and microalgae growth: Fresh microalgae, lyophilized microalgae and Microalgae stored at 4 °C. To close Phosphorus and Nitrogen cycles, the agronomic evaluation of bio-based fertilisers derived from microalgal biomass has been carried out.



Main Outcomes

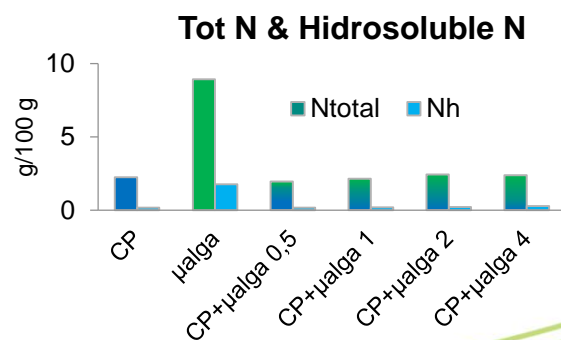
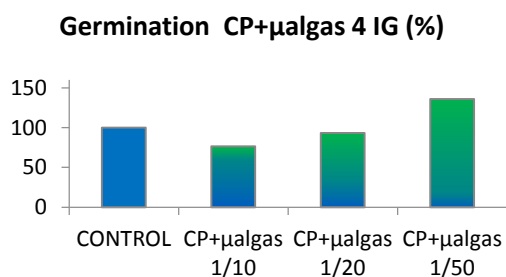
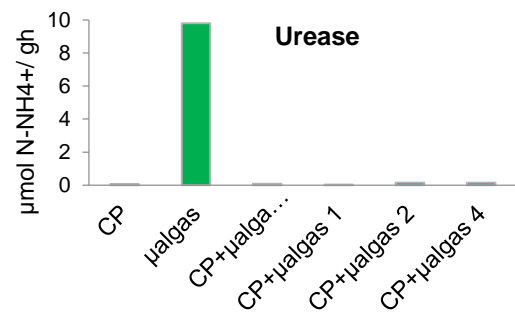
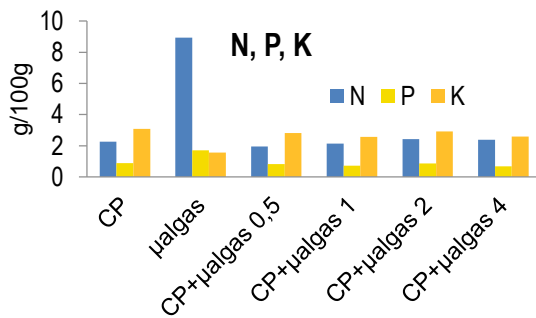
Nutrients Removal from Wastewater

High removal rates of soluble Nitrogen in the form of ammonium ion were observed (87 - 98 %). In the case of soluble Phosphorus, the removal rates ranged between 28 - 58 %. It is foreseen that, in stable operational conditions, higher nutrient removal efficiencies could be reached to meet regulatory requirements for discharge in sensitive zones.

		Influent	Layer 1 Fresh microA	Layer 2 Fresh microA	Effluent Layer 3 lyophilized microA	Layer 5 Microalgae stored at 4 °C	Layer 6 Microalgae stored at 4 °C
Ammonium ion (N-NH ₄ ⁺)	mg/L	24.7	3.15	1.37	1.73	0.45	1.02
Phosphate (P-PO ₄ ³⁻)	mg/L	5.4 ± 0.1	3.9 ± 0.1	3.4 ± 0.1	2.9 ± 0.1	2.3 ± 0.1	2.9 ± 0.1
Total Carbon	mg/L	174 ± 1	121 ± 1	107 ± 1	114 ± 1	97 ± 1	102 ± 1
Inorganic Carbon	mg/L	124 ± 1	78 ± 1	67 ± 1	66 ± 1	51 ± 1	67 ± 1
Total Organic Carbon	mg/L	50 ± 1	43 ± 1	40 ± 1	48 ± 1	46 ± 1	35 ± 1
Total Nitrogen	mg/L	57 ± 1	31 ± 1	21 ± 1	23 ± 1	18 ± 1	23 ± 1
Total Nitrogen removed	%	-	46	63	60	68	60
N-NH ₄ ⁺ removed	%	-	87	94	93	98	96
P-PO ₄ ³⁻ removed	%	-	28	37	46	58	46

Microalgae as Component of Bio-based Fertilizers

The results obtained from the agronomic evaluation of microalgae biomass demonstrate its biostimulant properties. The microalgae sample contains the highest value of enzymatic activities involved in the carbon, phosphorus and nitrogen cycles. Moreover, from a nutritional point of view, microalgae present high Nitrogen and Phosphorus content.





LIFE13 ENV/ES/000800
<http://tlbiofer.com>



NUTRIENTS and REGENERATED WATER RECYCLING in WWTPs through
 TWIN-LAYER MICROALGAE CULTURE for BIOFERTILIZERS PRODUCTION

Information about TL BIOFER Final Workshop

Registration form:

https://docs.google.com/forms/d/e/1FAIpQLSdcsjK2eln2rb_tB4lON-RnyvKEhURKvW0cTM61twkTilC-vA/viewform

Workshop location:

CEBAS-CSIC, Salón de Actos
www.cebas.csic.es

Campus Universitario de Espinardo.
 Espinardo. Murcia. 30100. Spain.



Dissemination Activities and AFTERLIFE Communication Plan

TL-BIOFER results have been disseminated at national and international level through the website, scientific reports, technical workshops in Córdoba and Murcia, Layman report, press releases and educational talks in schools “1 GOTA x 1 VIDA”. Besides, networking activities have been carried out with other R&D Projects. Socio-economic impacts have been evaluated through a specific questionnaire that has been distributed using a Stakeholders database of 2,000 professionals related to wastewater and fertilizers field. These activities will continue after the end of the project following the AFTER LIFE Communication Plan.

