# *Green solutions for treating groundwater pollution to meet drinking water directive standards*

LIFE18 ENV/ES/000199

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*@Lifespot2*

## THE PROJECT OBJECTIVES

*"SPOT aims to promote the sustainability and resilience of animal farming and tourism sectors in rural areas through nature-based solutions and algae waste valorization".*

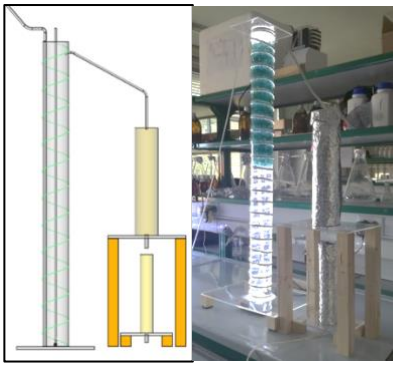
Main objective of LIFE SPOT is to develop a new treatment process able to remove nitrates and micropollutants from groundwater to produce drinking water of good quality that meets the Directive 98/83/EC requirements. This will be applied in rural areas (50 inhabitants or <10$m^3$/d, very small water supplies) of the Mediterranean region, promoting the sustainability and resilience of rural areas, agriculture and tourism sectors.

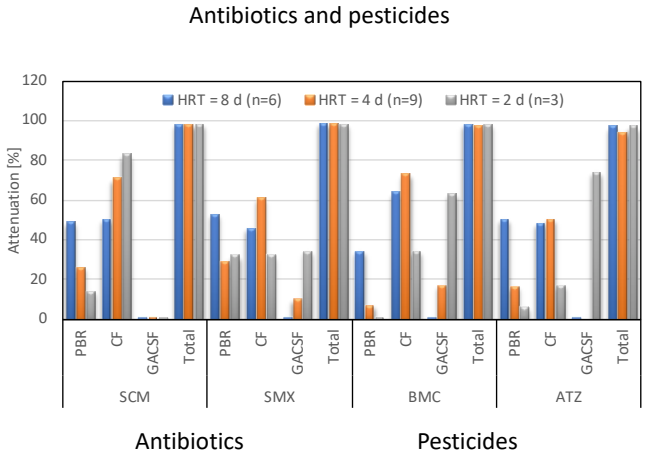
The project will be developed in two countries, including 3 sites (Caldes de Montboi and Nules in Spain and Perpignan in France).

## 1-KICKOFF MEETING


The kickoff meeting celebrated the 29th of October 2019 in the IRTA facilities was used to introduce the different partners involved in the project and plan the next project actions. The project LIFE SPOT involves 6 partners (IRTA, CSIC, EURECAT, PROTECMED, FACSA and NENUPHAR) that will work together during the next 4 years to achieve the target.

## 2-LABORATORY-SCALE PROTOTYPE TESTING



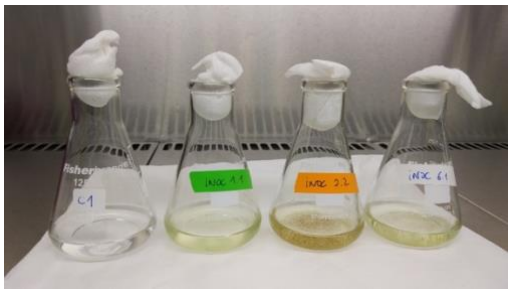


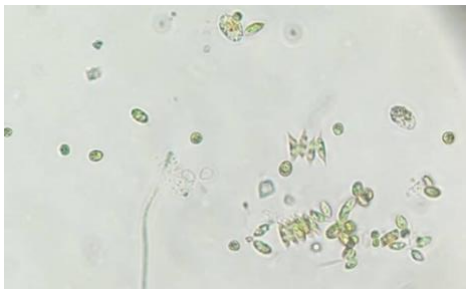

CSIC partner tested a lab-scale prototype to check out the effectiveness of the microalgae-cork technology for removing nitrates and organic microcontaminants (pesticides and antibiotics) from groundwater. The results are very promising, with attenuation efficiencies of above 80% for all tested organic microcontaminants at all tested hydraulic residence time (HRT from 8 to 2 days). Nevertheless, although the performance of the system for removing nitrates was greater than 80% at a HRT of 8 days it decreased to less than 20% at HRT of 2 days. Cork filter parameters (particle size, porosity…) will need to be optimized in action B1 to solve this issue. IRTA partner observed the a high denitrifying bacteria content (***nosZ)*** in both photobioreactor and cork columns (***ACTION A.3***).

## 3-PHYSICOCHEMICAL AND BIOLOGICAL CHARACTERIZATION OF GROUNDWATERS

Sampling campaigns for the characterization of groundwater from FACSA, IRTA and NENUPHAR sites has already started. First results show the presence of bromacil as the most abundant pesticide in FACSA site, whereas atrazine, diethyl atrazine, simazine were detected in both FACSA and IRTA sites (SPE-GC-OrbiTrap-MS). Antibiotics sulfamethazine, ciprofloxacin and enrofloxacin, as well as the antibiotic resistance gen ***sul 1*** were only identified in IRTA site (SPE-UPC-MS/MS). The greater presence of pesticides (bromacil) in FACSA site are in agreement with the use of the pesticides in the areas, whereas the presence of antibiotics in IRTA site is due to the manure application (***ACTION A.3***).

## 4-MICROALGAE CULTURES



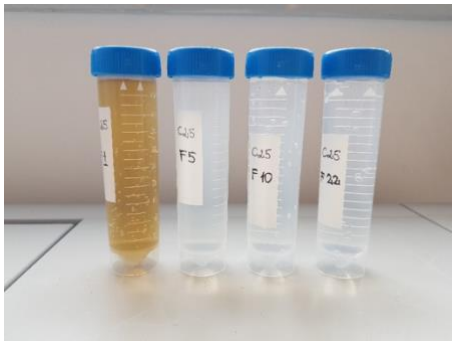


IRTA partner is carrying out microalgae cultures for the inoculation of the photobioreactor. The first objective is to find out which microalgae culture is the most effective (***ACTION B.1.1***).

## 5-SECOND PROJECT MEETING


Pilot photobioreactor was installed at the IRTA site the same day we had the visit of the EASME monitor (4 March 2020), and just before the outbreak. IRTA partner is now starting to assess the effectiveness of this plant on the treatment of nitrates from IRTA's groundwater.

## 6- COLUMN EXPERIMENTS FOR THE PROPER DESIGN OF THE CORK FILTER



EURECAT is conducting the preliminary experiments at lab-scale, necessary for the design of the cork filter. Batch isotherms and column experiments will serve to design the best cleaning procedure of the cork, previous to their operation, with the aim of leach as maximum dissolved organic carbon (DOC) as possible during this cleaning step to avoid this leaching during the normal operation, taking into account that the produced water will be used as potable water. Therefore, DOC in the effluent must be kept below 7 mg/L. Moreover, in that column experiments, all the necessary data for the proper design of the cork filter, taking into account dimensions and operational conditions, will be tested (***ACTION B.1.2***).