

Title:

ALGAECAN - Adding sustainability to the fruit and vegetable processing industry through solar-powered algal wastewater treatment

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Abstract:

The LIFE+ ALGAECAN project will demonstrate feasibility of applying solar-powered algal treatment to the effluents generated by fruit and vegetables processing industry (FVPI). The purpose is to reduce environmental impact of FVPI sector with the algal wastewater treatment as well as generate valuable algae-based market products from the biomass.

Sustainable treatment model of the highly loaded effluents will be based on a cost-effective heterotrophic algae cultivation. The collected microalgae will be treated with spray drying to obtain a product of commercial interest as a raw material for the production of biofertilisers, animal feed, bioplastic, etc. The prototype will be powered by renewable energies (solar energy supported by biomass), which will minimise the carbon footprint and operating costs. The treatment will be tested on the wastewater from two FVP companies in Spain and Slovenia. The findings will be subsequently transferred to follower facilities in Greece and Germany.

To enable successful heterotrophic treatment in the final installation, algal growth in the wastewaters had to be first tested in the laboratory. In the literature, microalgae were mostly researched for their heterotrophic growth in the pure cultures with variable culturing and growth/production parameters. Although many species can grow successfully heterotrophically, effective growth in the wastewater is very problematic due to bacterial overgrowth. Some successful culturing was performed in diluted and sterilised or artificially prepared wastewater, sometimes additionally treated with antibiotics. In a real case scenario, sterilisation is not cost-beneficial, so we have to find other solutions.

Trying to overcome these challenges, we tested several algal species and mixtures, already acclimated to the wastewater conditions (AlgEn bank, algal pond installation for treating biogas plant digestate - AlgaeBioGas.eu, Saltgae.eu). The "digestate culture" and *Chlorella* sp. proved to be best for the treatment at lab stage. Further adjustments are being tested in 10L reactors.