



**Project title:** Sustainable Microbial Valorisation of Waste Lipids into Biosurfactants (Waste2Surf)

**Project No.** 1.1.1.1/19/A/047

**Project leading partner:** University of Latvia

**Project partners:** JSC "Biotehniskais Centrs"

**Project report on the tasks completed in the period from 01.01.2021. till 31.03.2021.**

During the reporting period, work on the project continued with an in-depth analysis of the scientific literature on the use of yeasts for the production of bio-surfactants from primary and used cooking oils and fats. Based on the literature analysis, a series of laboratory experiments was conducted to test the production of bio-surfactants in the presence of various carbon and nitrogen sources. Various analytical methods for quantifying bio-surfactants *on site* were continued to be sought and adapted directly in the culture solution (medium), reducing the number of extraction steps as far as possible. The use of potassium iodide, stalagmometry and Victoria Pale Blue methods were tested for quantifying bio-surfactants. In parallel, work on the development of genome-scale stoichiometric models was continued. The modelling focused on testing and applying *Yarrowia lipolytica* genome-scale model to simulate the production of bio-surfactants by adding the missing metabolic pathways that show in detail the uptake of rapeseed oil components in the microorganism. Model validation was initiated with the published experimental data.

Also, during the reporting period, the development of specifications for the necessary materials and equipment for fermentation of bio-surfactants was continued. Parameters for separating membranes of oxygen contactor and bio-surfactants were identified. Based on the information collected from scientific literature, a market study was launched aimed at identifying potential suppliers of equipment elements. In addition, two fermentation experiments with *Starmerella bombicola* were carried out. One of the experiments succeeded in stimulating the synthesis of sophorolipids.

An in-depth assessment of the impact of waste oil composition and pre-treatment on the production process and final products was carried out. Information on the characteristics and uses of bio-surfactants was also collected in order to identify potential uses of bio-surfactants to be obtained. Data for life cycle inventory analysis have been collected. The work will continue with the life cycle analysis of the fermentation process. The project team continued its work on preparing the review paper of the use of yeasts for the production of bio-surfactants from used cooking oils and fats, the properties and applications of bio-surfactants. Finally, the concept of sustainable metabolic modelling was developed, described and submitted for publication.

**Information about the project at the partner's website:** <https://www.bioreactors.net/wastetosurf>

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