H2202-FNR-11-2020-Prospecting aquatic and terrestrial natural biological resources for biologically active compounds

SECRETED - Sustainable Exploitation of bio-based Compounds Revealed and Engineered from naTural sources.

SECRETed is an EU-H2020 multidisciplinary project involving multiple stakeholders and with a strong participation of SMEs to fully exploit the potential of aquatic biotechnology and produce novel industrial products for the agrochemical, pharmaceutical, cosmetic and chemistry sectors. **SECRETed will develop novel hybrid molecules with tailor-made properties obtained from the combination of biosynthetic genes of amphiphilic compounds (biosurfactants and siderophores) produced by marine and extremophilic microorganisms.** The project will focus on reutilizing sampling efforts by screening already collected microbial collections from previous European initiatives. **Machine Learning algorithms (ML) will be deployed to reveal the genetic mechanisms responsible for their biosynthesis and to expand the chemical diversity of such bio-based compounds.** To this end, databases inspection and data collected by participants will be combined to construct a unique microbial amphiphilic compound space comprehending molecular structures, physicochemical characteristics, associated bioactivities and revealed genetic mechanisms responsible for their biosynthesis. **To expand the chemical diversity and enhance the industrial sustainable exploitation of such bio-based compounds**, Biosynthetic gene clusters (BGCs) in charge of the production of these molecules will be reverse engineered by standardizing and modularizing the genetic elements comprising such clusters. Their potential benefits will be broadened by looking for Industry-driven (agrochemical, cosmetic, nutrition and health) formulations based on the engineered combinations of genetic elements expressed in suitable microbial hosts. New strains will then be designed, built and tested in an iterative process for the development of viable and sustainable industrial processes. To achieve its goals, SECRETed brings together a multidisciplinary team integrating Microbiology, Systems and Synthetic Biology (USE, ICL, LUND, MATIS, SZN, IDE, EKUT), natural product chemistry (UoA, SZN, EKUT), industrial testers (SYL, PHM, ADL, SE), industrial bioprocessing (BBEPP), sustainability assessments (VER), market analysis and knowledge exchange (AXIA).