



Ευρωπαϊκή Ένωση

Ευρωπαϊκό Ταμείο
Περιφερειακής Ανάπτυξης



Επιχειρησιακό Πρόγραμμα: Ανταγωνιστικότητα- Επιχειρηματικότητα-Καινοτομία, Δράση Εθνικής Εμβέλειας: Ευρωπαϊκή Ε&Τ Συνεργασία - Πράξη Επιχορήγησης Ελληνικών φορέων που συμμετείχαν επιτυχώς σε Κοινές Προκηρύξεις Υποβολής Προτάσεων των Ευρωπαϊκών Δικτύων ERA-NETS

Τίτλος έργου:

«Applying novel biotechnological tools to utilize compounds isolated from the red algae *S. coronopifolius* as eco-friendly Antifouling Agents-ANTIFOUL».

Συνοπτική Περιγραφή:

Biofouling is the undesirable growth of living organisms (bacteria, algae, mollusks, etc) on structures submerged in water which causes serious problems for the aquaculture and maritime industries. A number of physical and chemical technologies have been applied in antifouling (AF) paints, the most effective of them being the use of tributyltin oxide (TBTO) coatings. However, due to toxicity caused by TBTO and heavy metals, in September 2008, the International Maritime Organization (IMO) banned the use of self-polishing TBTO coatings, while there is increasing opposition to the use of copper. Preventing the settlement of fouling organisms in a non-toxic manner would be the ideal solution. To this end, there has been a multitude of physical, chemical and biomimetic approaches. Likely, a successful method for prevention of antifouling will need to combine all approaches. Over the past few years several marine metabolites were characterized for their eco-friendly antifouling potential. Among them, the halogenated diterpene bromosphaerol, isolated by our group from the red alga *Sphaerococcus coronopifolius*, has exhibited strong inhibition of barnacles' settlement. Currently, the major hurdle of the use of marine metabolites is the limited available quantities. To address this limitation, our consortium will approach bromosphaerol biosynthesis in an interdisciplinary manner utilizing all available new tools in biotechnology, genomics, bioinformatics, biochemical and chemical analysis and in-vivo assays. In preliminary work, we have applied Next Generation Sequencing (NGS) to identify several thousand of expressed genes from *S. coronopifolius*, including candidate terpenoid biosynthetic genes. In the current project we will expand the NGS approach in additional fresh material, analyze bioinformatically the expressed genes to quantify expression levels, isolate candidate biosynthetic genes, perform enzymatic analysis and metabolic modeling and flux analysis, reconstitute the biosynthetic pathway in heterologous species, refine the chemical analysis

tools to identify compounds from tiny amounts of algal material and evaluate its settlement inhibitory activity on other fouling organisms besides barnacles.

Ενδεικτικά αναμενόμενα οφέλη της συγκεκριμένης πράξης, είναι : Production of natural non-toxic Anti-Fouling compounds which can be used by the marine industry to effectively replace use of toxic banned chemicals is an important goal towards a sustainable world economy. The consortium possesses comprehensive capacity and expertise to utilise the most current biotechnological, analytical, biochemical, bioscreen tools to tackle successfully the aim of expanding production of one the top AF performing compounds known to date. The preliminary published and unpublished data provide an edge to our transnational European cooperation and a strong basis towards successful.

Στόχος της πράξης είναι : The project unfolds integrated actions aiming to alleviate the production bottleneck of bromosphaerol. This will be achieved through a) expanding cultivation efforts of *S. coronopifolius* and optimizing conditions for maximal productivity of bromosphaerol b) understanding in depth diterpene biosynthesis in *S. coronopifolius* so as to reconstitute it in vitro and in heterologous production model organisms (*E. coli*, *Saccharomyces cerevisiae*).

Προϋπολογισμός ΕΚΕΤΑ: 95.799,90 ευρώ

Το έργο συγχρηματοδοτείται από το **Ευρωπαϊκό Ταμείο Περιφερειακής Ανάπτυξης**.