OT-44

New microalgae strains for wastewater biorremediation and biomass production

ULPGC Universidad de Las Palmas de Gran Canaria | Fundación Parque Científico Tecnológico

OTRI Oficina de Transferencia de Resultados de Investigación

TYPE OF R+D RESULT

New technology
New product
New service
New knowledge or skill

COMMERCIAL MATURITY LEVEL

Conceptual idea
Proof of concept (design)
Validated in a controlled environment
Validated in a real environment
Successfully implanted

PROTECTION LEVEL

Non- applicable
Patent
Software
Know - how
Utility model

Invention title	Method for producing biomass from a microalgae
File number	P2020300030; EP21740974.7; US 17/793,116
Priority date	17.01.2020
Status	Pending
Country	Spain; Europe; US

The Problem

To this day, urban wastewater is processed in treatment plants, and it is subsequently discharged into the sea or rivers, after a series of complex purification treatments. The purification process generates residues as well, and there is a water fraction, called the effluent, that is very contaminated and cannot be discharged, instead, it returns to the treatment plant.

The removal of polluting substances from this effluent is very expensive and laborious. However, solutions are being developed for the bioremediation of these contaminants.

Some of these solutions are based on using the contaminated fraction of water as nutrient sources for microalgae; this way, the contaminants are transformed into biomass that can be used in different applications. There is a limited number of microalgae strains used for this purpose, restricted to the genera Chlorella, Scenedesmus and the cyanobacteria Phormidium bohneri., and despite these strains providing good results, it is important to broaden the diversity of microalgae species used for industrial application.

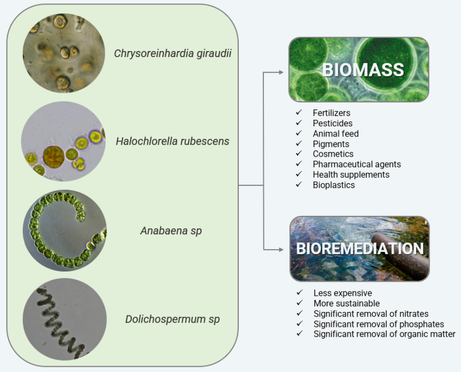
The fact of using new strains can help to improve the efficiency of the bioremediation process as well as obtain biomass with added value. In order to achieve this, researchers at the University of Las Palmas de Gran Canaria have developed a method to produce biomass from strains of microalgae and cyanobacteria not previously characterized, which consists of using the contaminated effluents from wastewater treatment plants diluted in seawater as a nutrient broth for these.

Technology description

The researchers have developed a bioremediation process for the contaminated effluents of wastewater treatment plants based on previously unknown microorganisms.

The researchers have isolated and characterized new microalgae and cyanobacteria strain from the genera Anabaena, Dolichospermum, Chrysoreinhardia, Halochlorella. With these strains, a biomass production method using effluent from wastewater treatment plants mixed with seawater has been developed.

The effluent acts as a rich source of nutrients for these strains as it contains adequate proportions of compounds such as ammonium or sodium, and metals such as boron or copper which are necessary for algae growth. Biomass can be obtained from these strains and therefore generate products with added economic value, such as fertilizers, pesticides, animal feed, pigments, pharmaceutical agents, and health supplements, amongst others



Microalgae and cyanobacteria used in the research and proposed industrial applications.

Benefits

This novel method provides many benefits:

- **Diversification of species:** The strains used are original ones, not previously known, and thus never used before for biomass production or bioremediation.
- More **sustainable remediation method** than current technologies: effluent is diluted in seawater instead of freshwater supporting a greener economy.
- Biomass production can lead to the development of multiple **applications with added economic value:** Amongst the most interesting, pigments, or molecules that can be used in diverse industrial sectors.
- Effluent waters can be successfully treated to eliminate contaminants, l**imiting problems due to contamination.**
- The process is **easy to scale.**

Stage of development

The new strains have been isolated and characterized. Then, microalgae cultivation (and subsequent effluent treatment) tests have been carried out in 100L - 400L bioreactors, depending on the strain. These tests have shown promising results when analyzing the water, effluent and biomass produced. Due to its advanced level, it is very easy to scale up the method.

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