Press release

Developing sustainable strategies to reduce plastic pollution

Significant advances in the degradation of plastics by induced selection in microcosms

One of the pioneering lines of work of the RECOVER project focuses on obtaining microbial consortia capable of degrading linear low-density polyethylene (LLDPE), a type of plastic that has been scarcely studied in terms of biodegradation.

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Synthetic plastics derived from petroleum have become a fundamental part of our society due to their durability and versatility, thus displacing natural products in a wide range of industrial sectors, especially in food and agriculture.

The use of these synthetic polymers derived from petroleum has experienced an exponential increase, reaching 370 million tonnes per year in Europe in 2016, with a forecast of 800 million tonnes per year by 2040.

This high production has resulted in the generation of large quantities of plastic waste that is highly resistant to biodegradation, mainly due to its molecular structure composed of long carbon chains.

Increasing pollution by microplastics and filmed plastics has become a growing concern due to their small size, which facilitates their ingestion by a wide range of organisms and their subsequent accumulation in food chains. The lack of efficient methods of recycling plastics has led to a significant accumulation of this waste in the environment, creating an emerging concern for human health and natural ecosystems.

The RECOVER project addresses this challenge by developing sustainable strategies to reduce plastic pollution. In particular, the focus is on the search for biological tools that enable the efficient degradation and transformation of plastics, thus preventing their harmful accumulation in the environment.

According to recent research, the use of microbial consortia has been shown to improve the biodegradation of plastics. In this sense, one of the pioneering lines of work of the RECOVER project focuses on obtaining microbial consortia capable of degrading linear low-density polyethylene (LLDPE), a type of plastic that has been scarcely studied in terms of biodegradation. This is achieved by induced selection and proliferation of plastic-degrading microorganisms in artificially contaminated microcosms, such as soil samples where LLDPE is buried.

The research team has focused its efforts on the selection and characterization of a stable plastic-degrading microbial consortium from plastic-contaminated soil microcosms. In addition, the plastic degradation efficiency of the consortium members has been verified, as well as their molecular identification and enzyme profiles related to the degradation of recalcitrant plastics.

The strategy used has proven to be highly effective in obtaining stable microbial consortia capable of degrading LLDPE. The sequential and selective enrichment protocol from artificially contaminated microcosms has been proposed as an excellent technique to obtain microbial consortia able to grow at the expense of LLDPE in film or powder form.

In addition, the results have revealed that the powdered plastic favours microbial growth compared to its film form. These findings open new perspectives to address the biodegradation of crystalline plastics such as polyethylene and contribute to the scientific knowledge in this crucial field.

About Recover

Bio-based Industries Consortium
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Horizon 2020
European Union Funding
for Research & Innovation

The RECOVER project aims to provide innovative solutions to the challenges posed by agri-food plastic waste, thus establishing a new cross-cutting connection in the bioeconomy encompassing waste management and biotechnology. In addition, this project is expected to have a positive environmental impact by decreasing the generation and dispersion of plastics, reducing the amount of plastic buried in landfills or incinerated, and minimising the associated greenhouse gas emissions.

The RECOVER project, a multidisciplinary collaboration comprising 17 partners, started on 1 June 2020 and will run for four years. This project has received funding from the Bio-based Industries Joint Undertaking under the European Union's Horizon 2020 research and innovation programme (grant agreement no. 887648).

For more information on the RECOVER project and its advances in plastics degradation, please visit www. https://recover-bbi.eu/.

More information: Ana Plaza Simón
Communication Management
ana.plaza@asaja.com
+34 670 507 621

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