RECOVER

Development of innovative biotic symbiosis for plastic biodegradation and synthesis to solve their end of life challenges in the agriculture and food industries

Summary

Plastics dominate the packaging sector, and their use in the agri-food value chain dominates the demand for plastic packaging. Of a global production of 350 million metric tonnes, the sector consumes 50 percent of output. However, the use of plastics, particularly in packaging, is becoming an increasing cause of environmental concern because of its longevity and challenges in recycling. Currently, only 31 percent of plastic is recycled, with some 30-40 percent going to landfill.

In agriculture, one of the issues in increasing recycling is that affordable biodegradable plastic alternatives do not degrade in soil, but require composting. This adds a significant economic hurdle to the already-greater material cost and lower performance compared to fossil counterparts. There is also the issue of contamination; more than half of food packaging in municipal wastes contains leftover products, making it more difficult to recycle. Almost 80 percent is buried in agri-fields, landfills or the natural environment as a result.

To address these challenges, the RECOVER project will provide novel biotechnological solutions, using microorganisms, novel enzymes, earthworms and insects to degrade conventional plastic packaging and agricultural film waste streams. It will also create new feedstocks for the bio-based industries such as chitin-chitosan, a high-value bioplastics raw material. In addition, the RECOVER project will also help address the issue of microplastic pollution in both industrial composting and soil.

Type of Action:
Research & Innovation Action

Value Chain:

Start date: 01 June 2020

End date: 31 May 2024
BBI JU contribution: € 4,399,363

Objectives

The overarching objective of the RECOVER project is to demonstrate and upscale novel bio-based approaches to dealing with the problem of agri-food waste plastics (AWPs). The project also has a number of specific objectives falling under this. It will:

- Quantify and characterise AWPs, in order to select the appropriate ones for the project and define feasible logistics for collection, sorting and pre-treatment. This will involve a comprehensive inventory and report on plastic types, collection strategies, cost, quality, safety and sustainability of the plastics and their collection and potential need for pre-

Expected impacts

By achieving its overall objective, the RECOVER project will make a valuable contribution by offering solutions to the major problems posed by AWPs. In addition, it will also make contributions to specific BBI JU KPIs through:

- Establishing a new circular cross-sectoral interconnection in the biobased economy, specifically involving waste management and biotechnologies. It will also strengthen existing interconnections between the bioplastics, packaging/agriculture and agri-food sectors.
- Creating three new effective bio-based value chains. It will link standard plastics with insects/microorganisms and enzymes

treatment.
- Select microbial communities, novel synthetic enzymes, earthworms and insects with the greatest capacity for AWP biodegradation.
- Upscale and combine the successful candidate solutions.
- Use the successful candidates to upscale and monitor their biodegradation capacities.
- Develop the process to extract chitosan (from the waste insects) as an additive for plastics used in packaging and for mulching films with antimicrobial properties as well as biofertilizer derived from vermicompost and insect manure.
- Ensure that risks, safety and potential environmental impacts are fully assessed.

providers and remodel existing value chains, substituting petrochemical-derived products with biofertilizers, agricultural biofilms and food packaging.
- Validating a new and improved processing technology, by producing, for the first time, AWP-degrading enzymes and microorganisms in sufficient quantities to treat waste plastics.

In addition, the RECOVER project will have a positive environmental impact. It offers huge potential advantages by reducing the generation and dispersion of microplastics in our fields, by providing biotechnological solutions for degrading conventional plastic packaging and agricultural films waste. This will help reduce the large amount of plastic currently being buried in landfill or incinerated, with the implications this has for GHG release.

Consortium

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- Brunel University London (UK)
- Universidad Miguel Hernandez de Elche (Spain)
- Fachhochschule Albstadtsigmaringen (Germany)
- Naturplas Plasticos Agricolas SL (Spain)
- ASA Spezialenzyme GmbH (Germany)
- Nutrinsect Srl (Italy)
- Iris Technology Solutions SL (Spain)
- Organic Waste Systems NV (Belgium)
- Idelux Environnement (Belgium)
- Femto Engineering Srl (Italy)
- Ingredient Odyssey LDA (Portugal)
- Carton Bros (Ireland)
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Project coordination

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