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European Parliament Event

Accelerating Blue Growth through
Marine and Maritime Knowledge Transfer

SEABIOPLAS – Exploring the Use of Seaweed-Derived Biopolymers in Biomedical Technology

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 652690. This output reflects the views only of the author(s), and the European Union cannot be held responsible for any use which may be made of the information contained therein.

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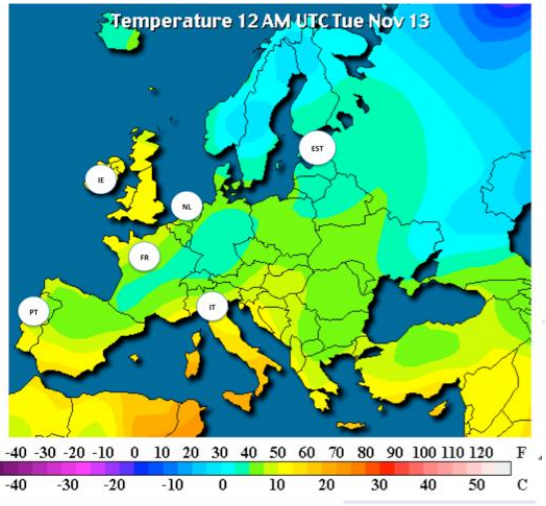
KNOWLEDGE TRANSFER FOR BLUE GROWTH



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Motivation

http://www.huffingtonpost.com/dr-reese-halter/transforming-ocean-plasti_b_5113993.html

250 million tons of non-biodegradable/non-compostable plastics are produced annually!!

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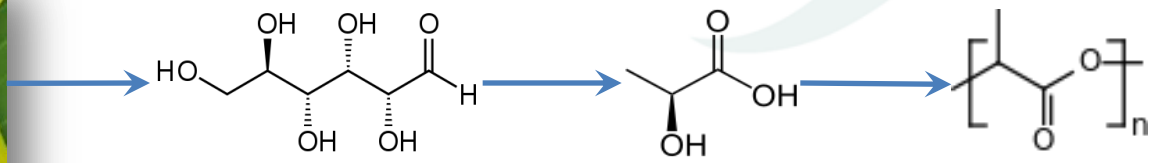
Biodegradable plastics

- Biodegradable plastic : demonstrating impressive growth rates
- Current bioplastic production: using food sources for humans and animals
  - Wheat, corn, sugar beets, sugar cane
  - Corn price : increased by 400 % in the last 6 years
- Why seaweed?
  - High accessible sugar content (up to 60% in some cases)
  - One step fermentation process possible



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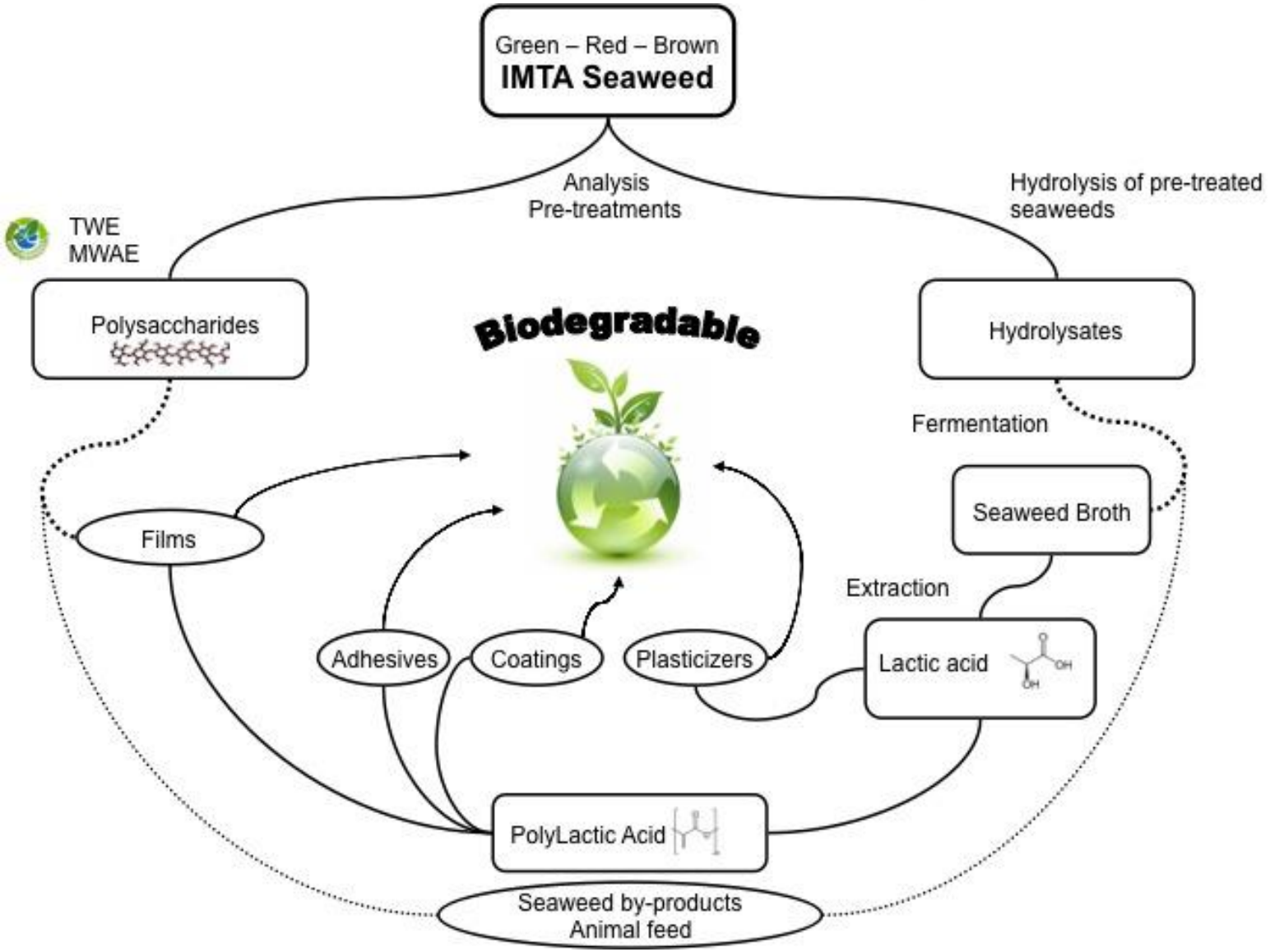
HOW?



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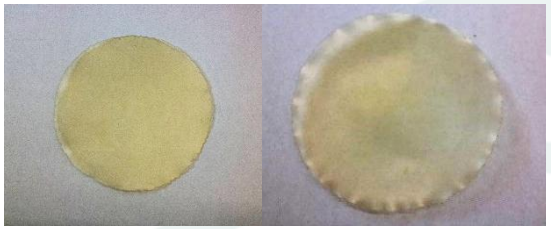
Targets reached!

- Increased sugar = more plastic
  - High levels of simple sugars important for lactic acid production
  - 17.5% *(Red seaweed)*, 15.7% *(Green)* & 14.9% *(Brown)*
  - However, 30% sugar in some batches
- After pre-treatment
  - Sugars: 50 g/L
  - To minimize by-product amounts
  - To minimize salt content
- Fermentation with micro-organisms
  - 1g Lactic acid per gram of sugar
- Polymers and products
  - Stretchable films (with the company Sleever)
  - Indoor paint (with H&H)



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Pilot production

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How far from commercial application?

Algix: Hybrids with algae

Algopack: 100% seaweed based

Cereplas + Algaeplas

http://www.wired.com/2009/02/toyota-makes-pl/

Toyota Wants to Build Car From Seaweed

Price of seaweed polymers, 3 x higher than similar polymers

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LCA

- Electricity use in land based IMTA dominates impacts
  - Not yet comparable to conventional PLA production
  - Scale-up would result in economy of scale
  - Chain integration would result in 4 – 8 times higher energy efficiency
  - Optimization of IMTA cultivation conditions (higher sugar content), would increase efficiency significantly
- Need for wise cascading approach in scale-up
  - Optimize Economics and Optimize C, N, P cycling
  - Large Environmental Impact Avoided by Valorization of Seaweed Residues for Feed Uses

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Knowledge Needs

Blue Biotech:

- Reduced research-to-application timelines
- Greater cross-sector communication within marine biotech

Medical Biotech:

- Novel and varied types of biopolymers, including polysaccharides and polylactic acids (PLA) for use in:
  - Diagnostic wound dressings
  - Odour-absorbing dressings
  - Medical and dental stents, implants, and scaffolding

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Knowledge Transfer

- COLUMBUS recognised the biomedical field as having high-potential for applications of SEABIOPLAS products
- Identified a University of Ghent researcher from the DERMA Project as a Target User
- Spurred coordination between the Knowledge Owner and the Target User that has led to the ongoing evaluation of SEABIOPLAS biopolymers for use in multiple DERMA projects

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Acknowledgements

The SEABIOPLAS Team

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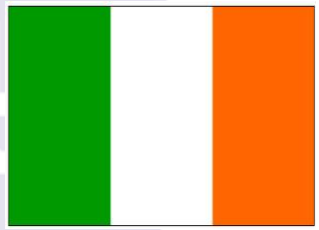

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