Mulching+

Soil biodegradation of nutrients enriched cellulose- and chitosan-derived mulching films for sustainable horticulture

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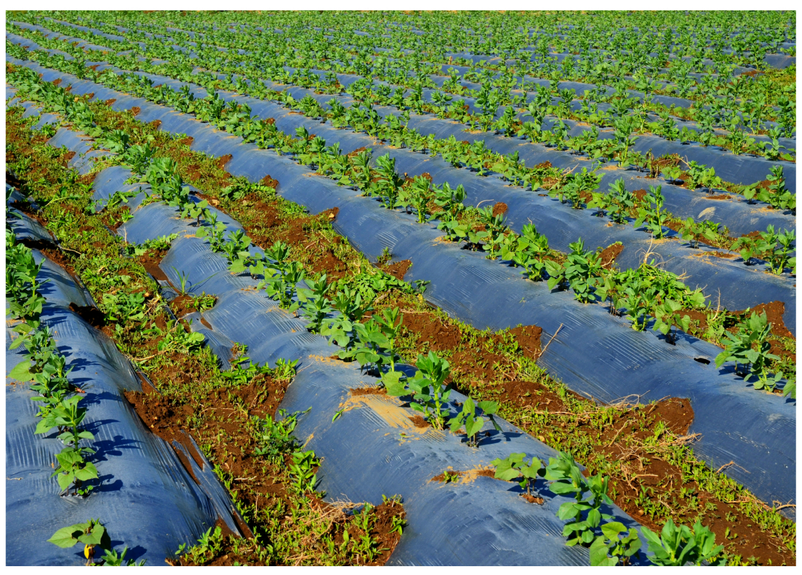


INTRODUCTION

Mulch films are the major cause of plastic contamination in agricultural soils.
In recent years, the need to face declining soil quality has pushed the community scientific in search of novel bio-based biodegradable polymer films for use as soil mulching.

The core idea of the MULCHING+ project is the preparation of **innovative biodegradable biopolymer mulching films (BPMFs)** made up of cellulose and chitosan enriched with inorganic salts of N and P so that soluble nutrients are being released during their biodegradation in soil, thus maintaining C-resources and soil fertility.

MATERIAL AND METHODS

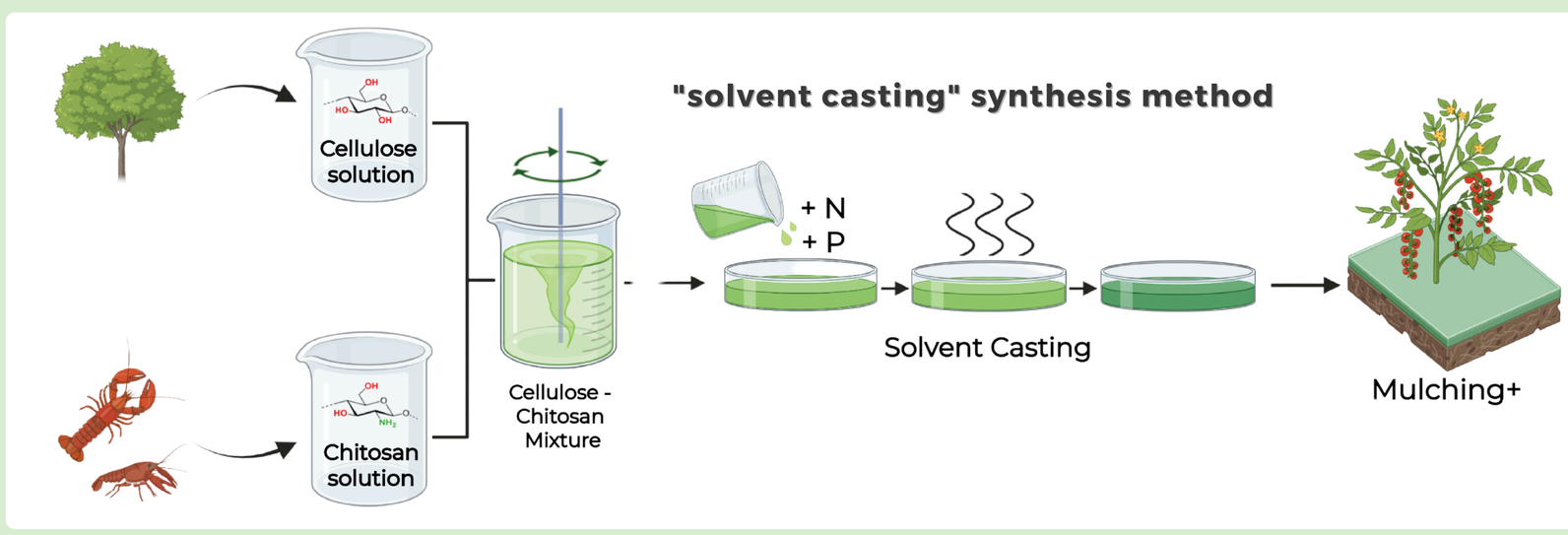
The research activity will focus:

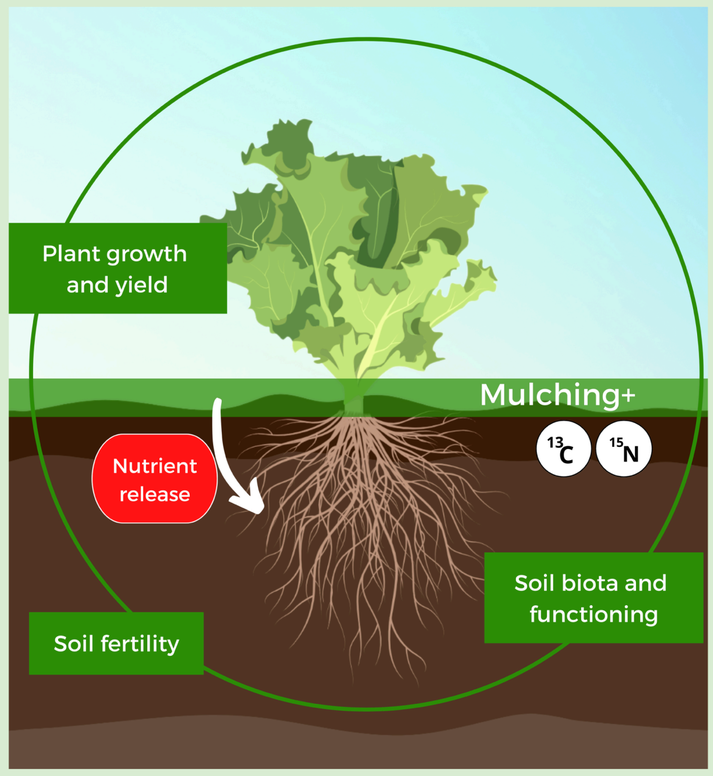
- Primarily on the development of an effective methodology for the **preparation of BPMFs** enriched with inorganic salts of N and P, as well as with plasticizers, crosslinkers or fillers useful to confer or improve the mechanical, thermal, optical and functional properties and on the release kinetics of soluble salts in order to select the most promising films.

- Subsequently, the **impact** of the selected BPMFs on soil nutrient cycling and crop growth and yield, as well as their effect on soil microbial and microarthropod communities, will be evaluated.

- Then, to **accelerate the biodegradation** of BPMFs, these will be sprayed with microbial inocula selected from soil microorganisms and earthworm intestines;

- Finally, innovative BPMFs enriched with N and P will be evaluated using **LCA/LCC methodology.**





PROJECT DEVELOPMENT

The innovative BPMFs will fulfil the need to reduce environmental pollution, including soil, and will reduce the external input for soil fertilization.
Although a variety of biodegradable biobased mulching films are nowadays available on the market, those proposed by MULCHING+ project go beyond their simply use as mulching films. This because, the **addition of N and P** will stimulate, in the short term, soil microbial growth and activity with positive feedback on the decomposition of the BPMFs in soil whereas, in the long term, it is expected to foster soil biodiversity and functioning with **beneficial effect on the overall soil fertility.**
Moreover, the development of an innovative formulation to be applied on BPMFs to speed-up their biodegradation could open new applications with potential impact in **limiting/preventing the environment pollution**.

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