

# Developing Novel Cellulose-Based Materials to Mitigate Drought in Soil

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## Background

Drought, also known as moisture stress, is a major problem, which limits the growth and productivity of crops.

Therefore, utilizing water resources effectively for soil applications is important by providing the appropriate water management techniques.

To reduce moisture stress and ultimately maintain a huge amount of water in the soil for longer periods, there is a great demand for additional materials in the soil.

These materials are also known as moisture retention materials, which tend to provide a reservoir of soil water to plants.

## Project aim

This project aims to convert different agricultural waste biomass resources to cellulose-based materials for their potential applications in soil – specifically for drought.

Cellulose-based materials will further be treated to develop materials such as Cellulose nanocrystals and CNC-based hydrogels.

The chemical, structural, thermal, and water retention properties of the cellulose-based materials, CNCs, and hydrogels will be accessed.

The final applications of the developed products in the soil will be accessed.

## Method and Final Products

The pre-treatment of biomass was done i.e., grinding biomass into 60 mesh, drying at 80°C washing it for 2 hours at 90°C.

Later, bleaching was conducted where 5% NaClO<sub>2</sub> solution was mixed with biomass and stirred at 80-90°C for two hours.

Finally, delignification was performed where the bleached sample was dispersed into 5% NaOH solution and stirred for 2 hours at 80-90°C.

The final products after the treatment are shown in the figures.

