DEVELOPING A MULTI-CRITERIA DECISION SUPPORT SYSTEM FOR A COMMON FOREST MANAGEMENT TO STRENGHTEN FOREST RESILIENCE, HARMONIZE STAKEHOLDER INTERESTS AND ENSURE SUSTAINABLE WOOD FLOWS

NOVEL BIODEGRADABLE XANTHAN-BASED HYDROGELS TO PROMOTE PLANT GROWTH AND FOREST PROTECTION

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FULL PAPER

Introduction

CHALLENGE OF THE PROJECT: develop and deploy the technological advancements of environmental and micro/macroclimate-friendly wood-based value chains on the ground.

Violent storms, wildfires, insects and fungal proliferation and drought have become very common phenomena that have led to the deforestation of wide forest areas.

Need to repopulate forests by planting new young trees

AIM: Top-soil cover (TSC) and Soil Conditioner (SC) engineering and planting to promote plant growth

Requirements: biodegradable wood-based bio-composite, with water regulating properties

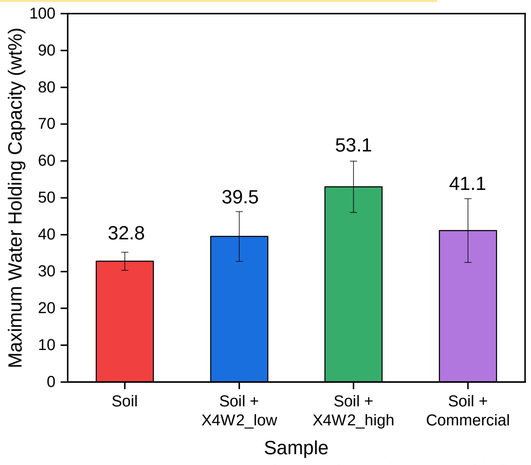
UNITN is developing:

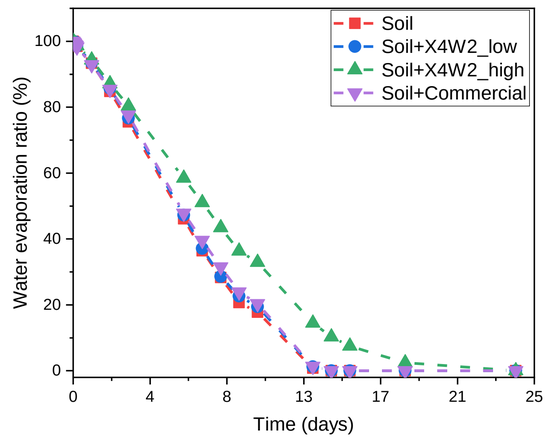
- **SC** as **hydrogels** based on biopolymer **xanthan gum (X)** dissolved in water and mixed with **cellulose pulp** (**W**).
- **TSC** as **films** based on **crosslinked** xanthan gum and wood fibers.

Results

Water regulation characteristics

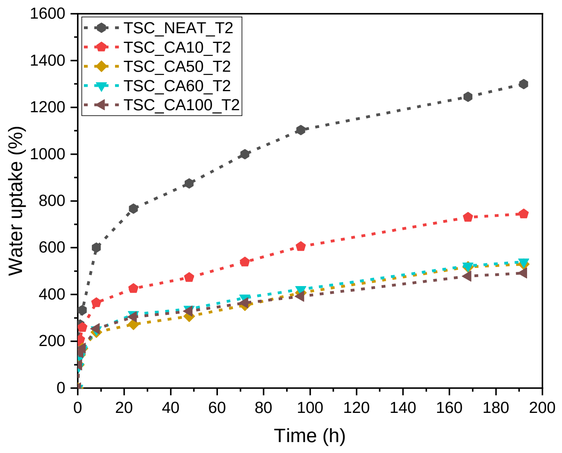
Soil + SC

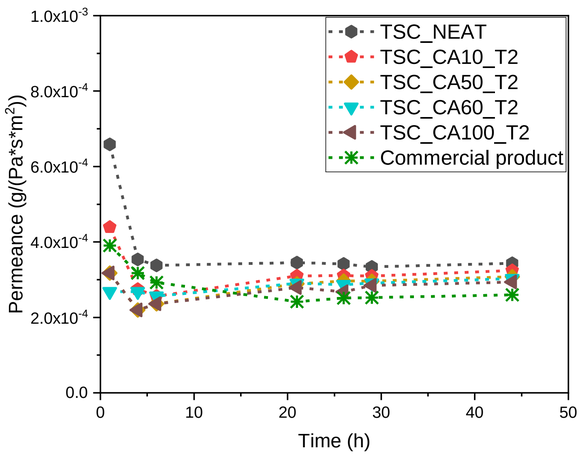




Presence of hydrogel composites in the soil **increases** the **water holding capacity** of the soil and **slow down** the **water evaporation rate**.

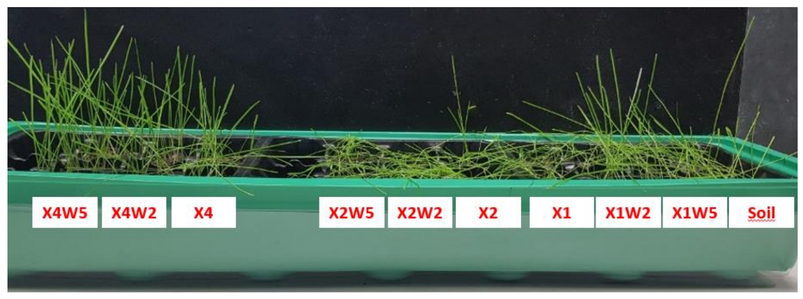
TSC



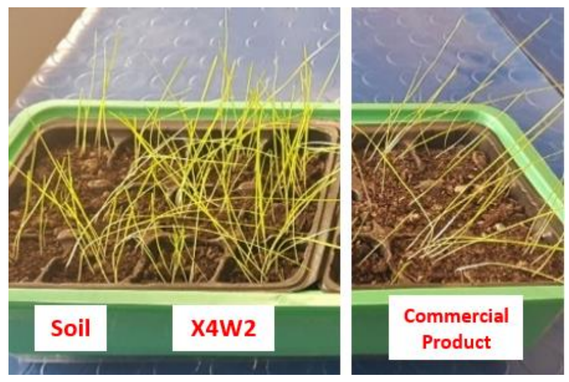


Increasing degree of **crosslinking** of TSC → decrease of water uptake, but higher **durability** and lower **water vapour permeance**

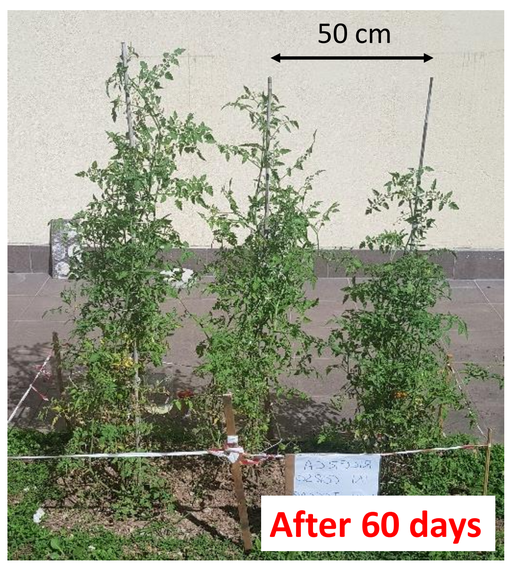
Practical applications



Soil + SC: Increases grass survival in drought conditions



Soil + SC: Higher germination rate compared to commercial product and neat soil



Soil + TSC: Higher growth for tomato plants

Conclusions

- Soil treated with the developed bio-composites showed **better soil-water characteristics**.
- Practical applications have shown that **treated plants** grow more luxuriantly, with **increased survival rates** under drought conditions.

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