

# Plant growth-promoting rhizobacteria (PGPR) and hydrogels as a sustainable strategy for improving maize growth under drought-stress



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PORTO

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## Introduction

- ✓ Maize is one of the world's most-produced cereal crops
- ✓ Drought has been negatively affecting maize growth and yield worldwide
- ✓ The use of microorganisms such as [plant-growth-promoting bacteria \(PGPB\)](#) and [arbuscular mycorrhizal fungi \(AMF\)](#) can improve maize tolerance to drought
- ✓ Hydrogels can be used to improve water retention in the soil
- ✓ The combination of hydrogels and beneficial microorganisms can improve maize resilience under climate change.

## Objective/Hypothesis

This study aims to assess the combining effect of beneficial microorganisms with hydrogel in maize growth under water deficit.

This work hypothesizes that the single application of hydrogel and bioinoculants and the mixture of both will significantly improve the growth of maize under drought stress. In addition, it is expected that the results obtained for each treatment should be equal or better than the results obtained for the control pots with fully irrigation.



## Experimental design

### 1. PGPB Isolation



Soil collected from a drought-affected area



### 2. PGPB characterization

PLANT-GROWTH IN VITRO TRAITS	IAA
	HCN
	ACC-deaminase activity
	NH <sub>3</sub>
	Siderophores



IN VITRO DROUGHT TOLERANCE



### 3. PGPB Selection



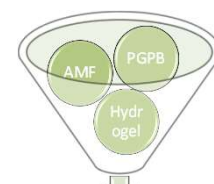
### 4. Greenhouse Experiment

A pot experiment comprising 4 treatments under two irrigation systems (medium and low irrigation) was set to compare maize growth under full irrigation:

C = control  
T1= Hydrogel  
T2= Hydrogel + Microorganisms (PGPB selected and AMF)  
T3= Microorganisms (PGPB and AMF)



75% and 50%  
of full  
irrigation



MAIZE



## On-going work

- The greenhouse experiment is ongoing. At the end of the experiment, plant biometric (e.g. elongation, biomass), nutritional (e.g. N and P) and physiological (e.g. chlorophyll content, proline, total sugars) parameters will be evaluated.

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