

# Effect of microbial and biochar application on sunflower growth and metal accumulation

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## Aims and Scope

Mining activities are responsible for soil metal(loid) contamination being a worldwide issue that affects ecosystem functioning and human health

Plant-based techniques (phytotechnologies) stands out as sustainable alternatives for the remediation of mining areas

Phytotechnologies' efficiency can be enhanced by the addition of soil amendments (e.g. Biochar) and microbial inoculants such as Plant Growth Promoting Rhizobacteria (PGPR) and Arbuscular Mycorrhizal Fungi (AMF)

This work aimed to evaluate the effect of biochar and microbial inoculants on growth and Cu accumulation in sunflower plants grown in a mining metal-contaminated soil

## Experimental Design

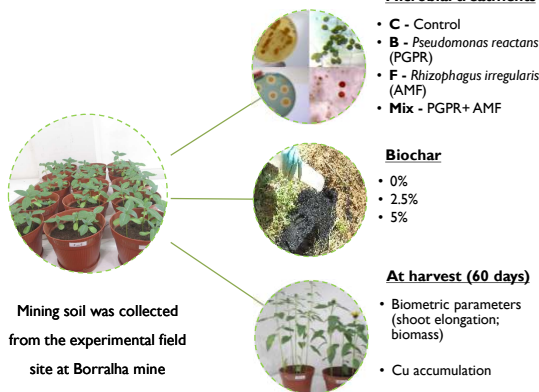


SITE	BORRALHA MINE
<b>Sources of contamination</b>	- Former mine activity: tungsten production - Tailings and ponds exposed to climatic conditions
<b>Soil Main contaminants (ppm)</b>	Cu (825), Zn (140), Cd (3), As (44), Pb (92)

Experimental field site established under the scope of Phy2SUDOE project

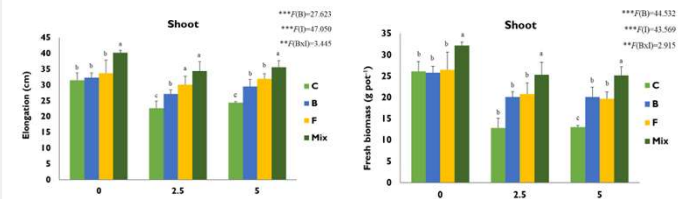


## Greenhouse experiment



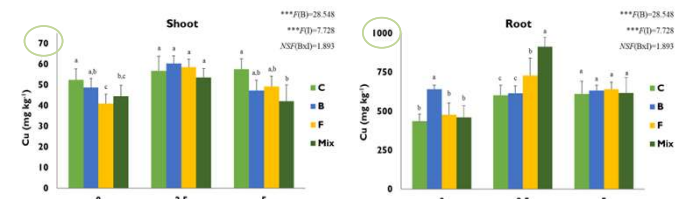
## Results

### Elongation and Biomass



- Increasing biochar doses significantly reduced shoot elongation and fresh biomass
- Microbial inoculation (especially Mix treatment) enhanced sunflower's growth

### Cu accumulation



- Plants accumulated higher concentrations of Cu in roots than in shoots
- Plants amended with 2.5 and 5% of biochar showed higher Cu accumulation in roots
- Microbial inoculation had a marginal effect on Cu accumulation

## Conclusions

- Bioinoculants promoted shoot elongation and biomass of sunflower plants
- The combined inoculation of PGPR and AMF was the most efficient treatment in improving sunflower growth
- Biochar increased the accumulation of Cu in roots causing a reduced plant growth
- The addition of biochar should be carefully analysed, particularly if the aim is producing high amounts of biomass, since its addition seems to decrease plants' growth due to the higher metal accumulation in plant organs

## Acknowledgements

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