

# Testing a novel technique, geotubes with mycotechnosoil, to mitigate post-fire erosion and enhance ecosystem recovery

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## Background

- Wildfires **enhance the hydrological and erosion responses of** forest ecosystems, which not only promotes **soil (fertility) loss** but also **impacts the downstream values-at-risk** such as, roads, hydraulic infrastructures, and the water quality of reservoirs and rivers.
- From the existing state of-the-art emergency stabilization measures, **mulching** has showed to be **more effective than barrier-based methods**, especially in the case of high intensity rainfall storms.

## Objective

- Test an **innovative barrier-based technique**, geotubes with a mycothechnosol, to mitigate post-fire soil erosion and promote vegetation recovery in burnt areas.

## Geotubes with mycothechnosol

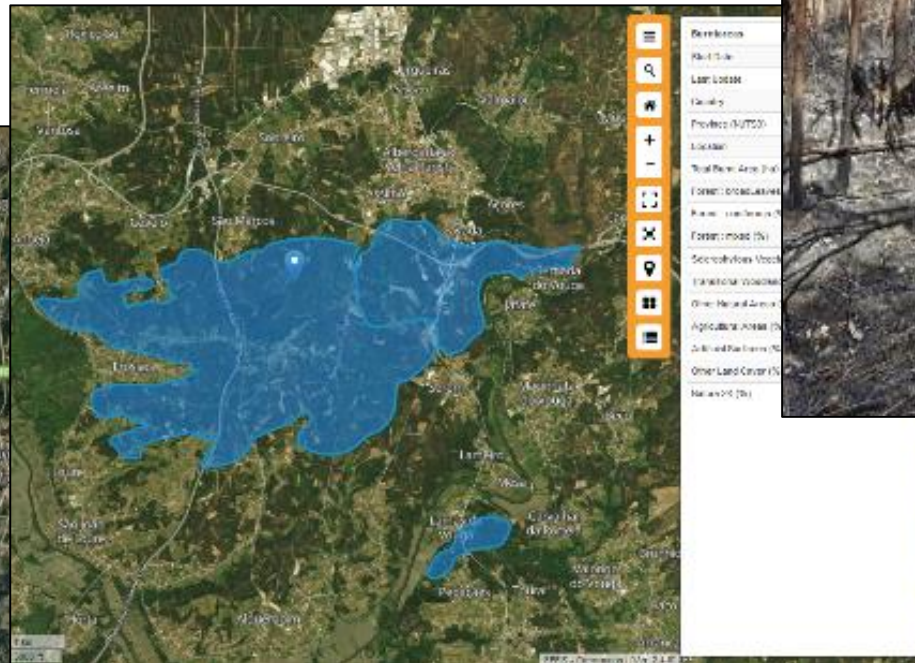
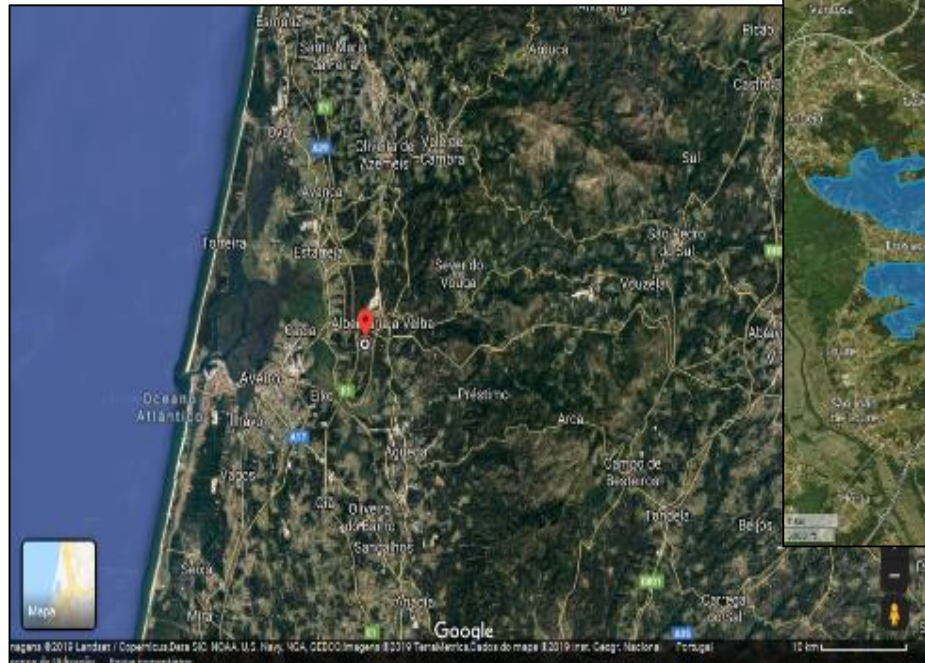


- The REFOREST **geotubes contain seeds and a mycotechnosoil** composed of wheat straw, compost (urban and agrifood sludge) and wood splinter inoculated with fungi.



## PILOT SITE: Portugal

- Fire: 5/09/2019 – 7/09/2019 (1492 ha)
- Albergaria-a-Velha, Aveiro, North-Central Portugal
- Eucalypt site on schist
- Moderate severity fire



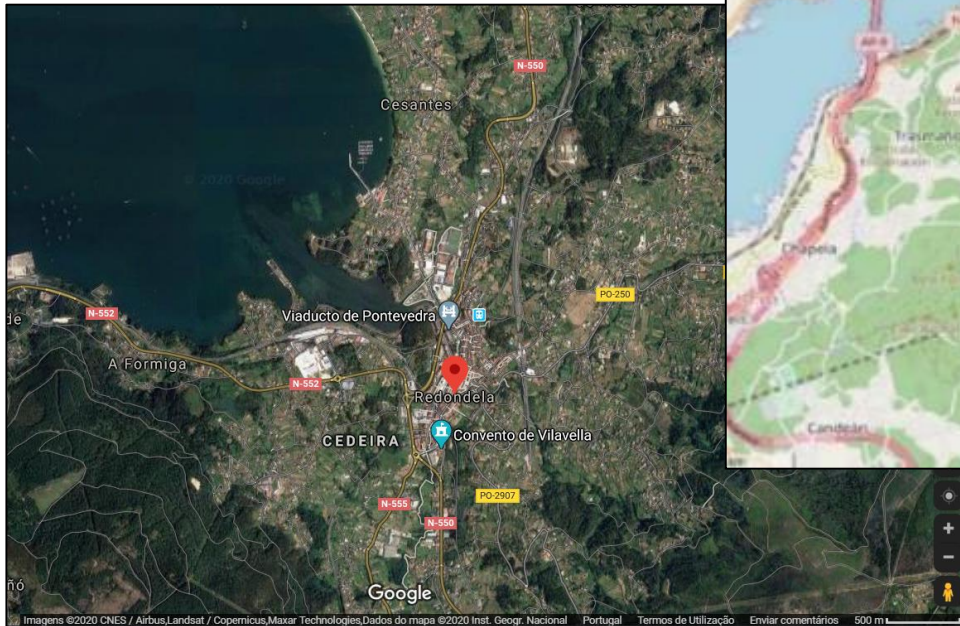
September 2019

Source: Effis  
<https://effis.jrc.ec.europa.eu/>



## PILOT SITE: Spain

- Fire: 14/09/2019 – 15/09/2019 (~10 ha)
- Redondela, Coruña, Galicia
- Pine site on granite
- Moderate severity fire



September 2019

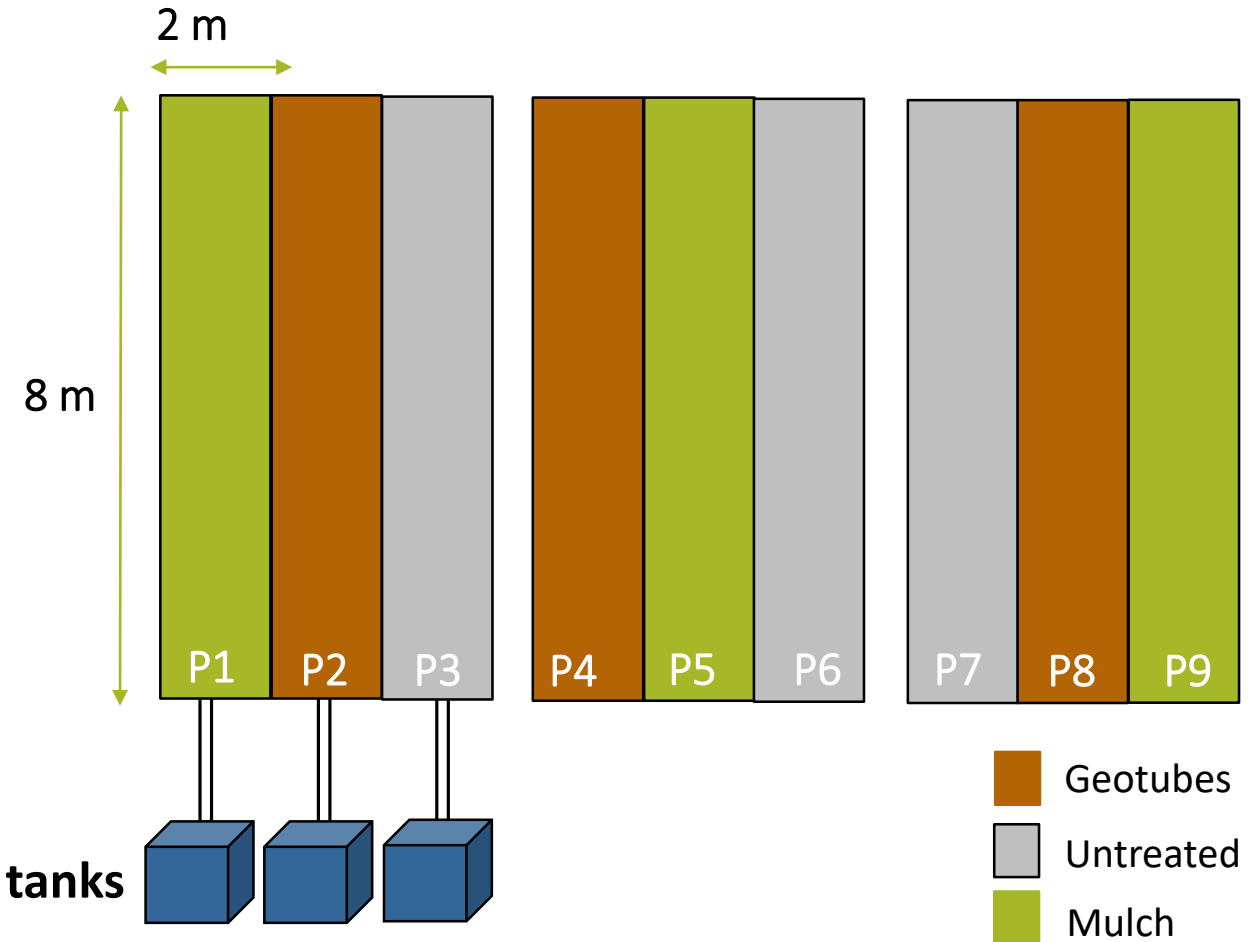
Source: Effis  
<https://effis.jrc.ec.europa.eu/>

## EXPERIMENTAL DESIGN

- **9 bounded erosion plots** of 2 x 8 m
- **3 treatments** to be tested:
  - 3 plots with mycotechnosols
  - 3 plots with mulching (eucalypt logging residues or pine needles)
  - 3 plots untreated
- **Sediment-fences at the bottom of all plots** to collect eroded sediments

Water samples analysed for pH, EC, TSS, nutrients (N and P) and metals

← **Runoff tanks**





## PILOT SITE: Portugal

**Treatments  
application in  
Albergaria**  
(October 2019)





## PILOT SITE: Spain

**Treatment  
application in  
Redondela  
(October 2019)**





## PORTUGAL's PILOT SITE: Ground cover



September



October



November



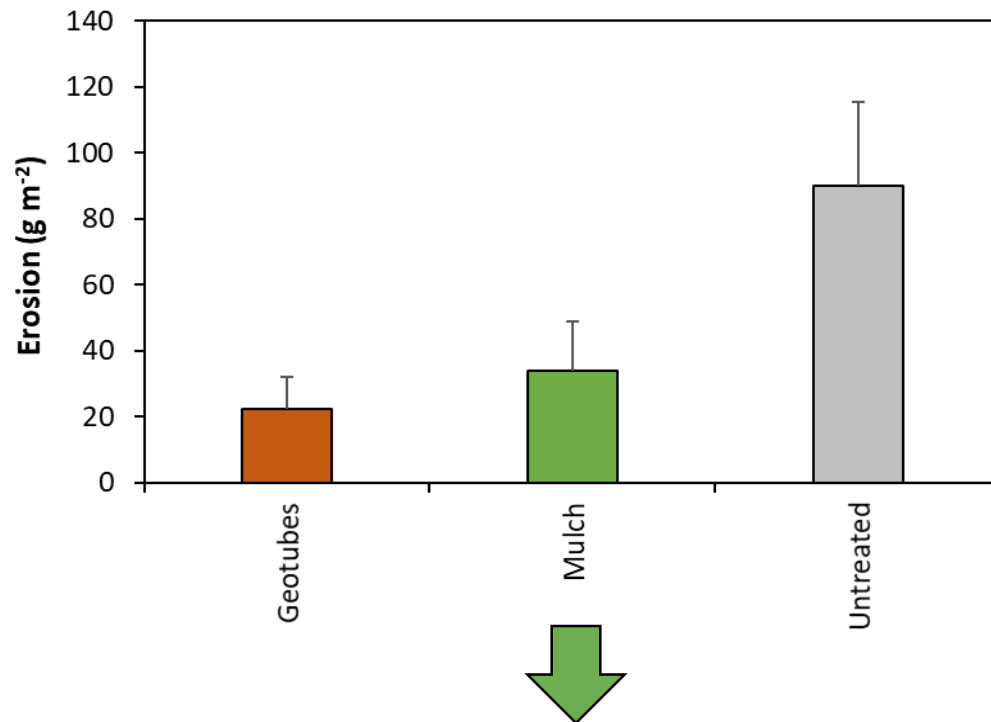
December



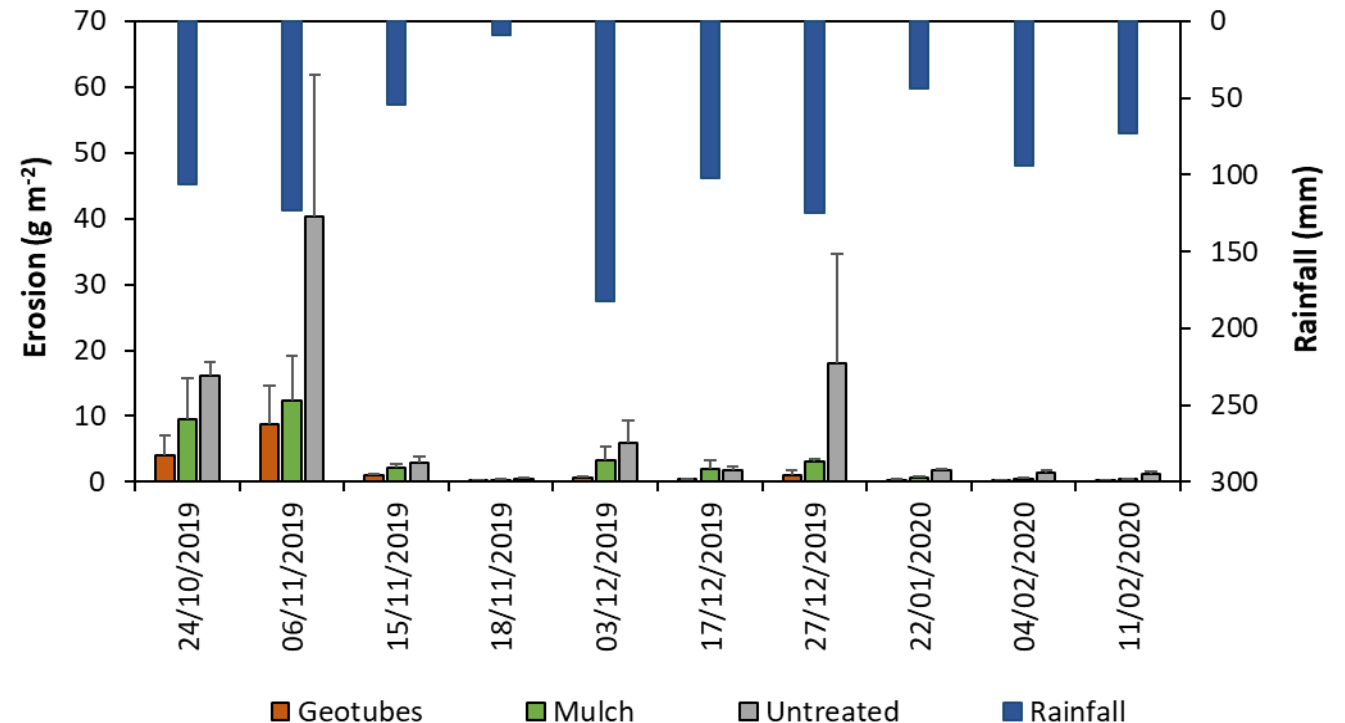
- 3 months after fire, there were signs of natural vegetation recover in all the experimental plots
- Seeds in the geotubes had also re-sprouted

## PORTUGAL'S PILOT SITE: Erosion

### Overall erosion



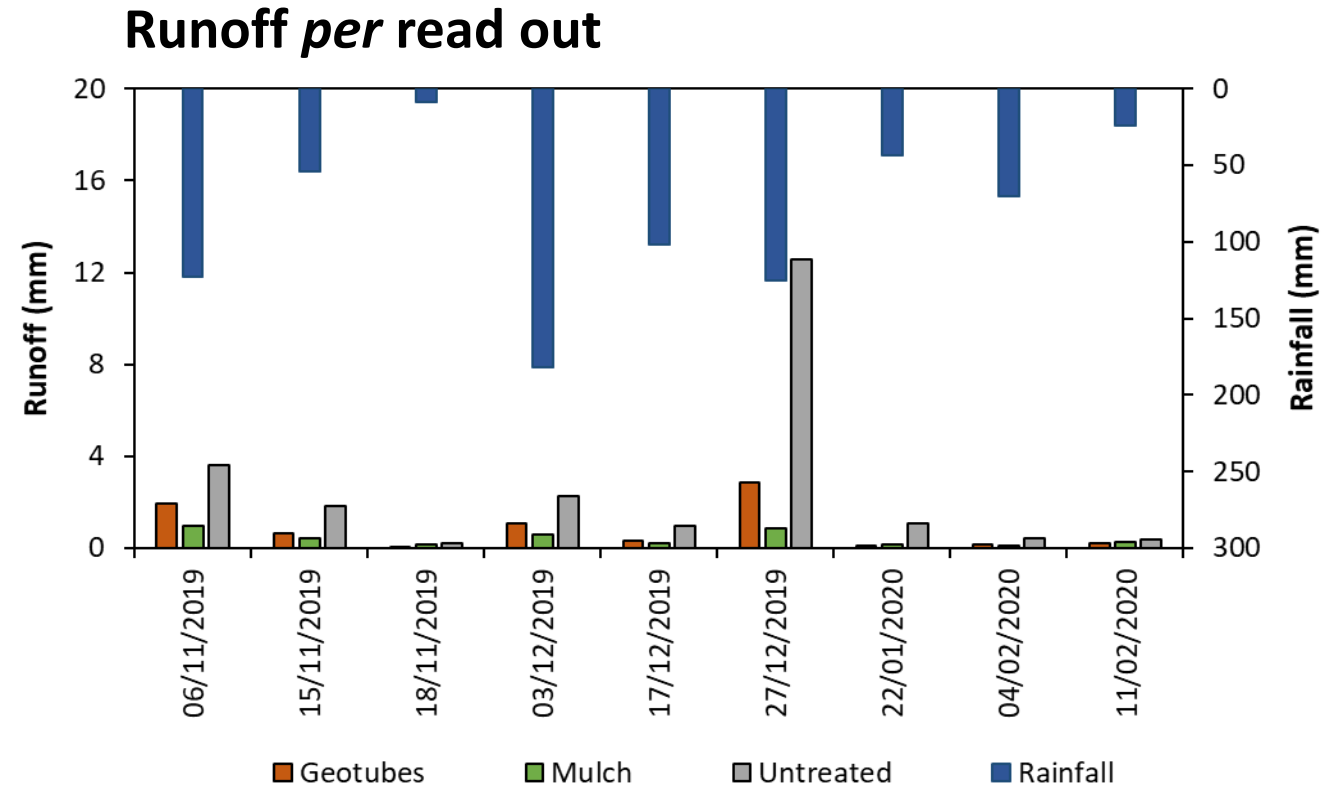
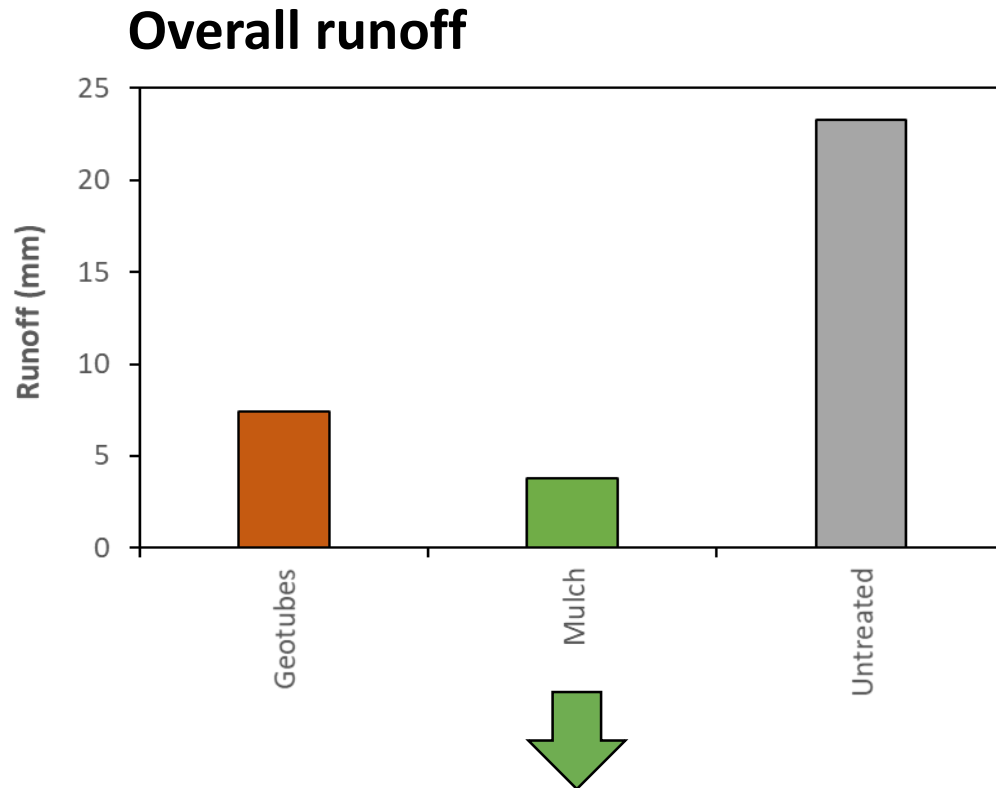
### Erosion *per read out*



- **Untreated plots** presented the **highest erosion rates** in the first 4 months after fire
- **Mulch** was **slightly more effective** than **geotubes** in reducing post-fire soil erosion



## PORTUGAL'S PILOT SITE: Runoff



- **Untreated plots** presented the **highest runoff volumes**
- **Geotubes** were **slightly more effective** than **mulch** in reducing post-fire runoff

- ❖ **A soil protective layer** is important for **minimizing the hydrological and erosive response** of burned forest areas
- ❖ As **the effectiveness of geotubes and mulching was similar**, treatment selection should depend on the characteristics of burnt hillslopes



# Thank you!



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