



Circular Economy and Sustainable solutions  
for Agrifood in the Mediterranean



Valorization of agri-food residues  
as functionalised compost

# PyreneesMediterranean SUSTAINABLE AGRI-FOOD INNOVATION DAY

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2 JULY 2026 LA CITÉ, TOULOUS



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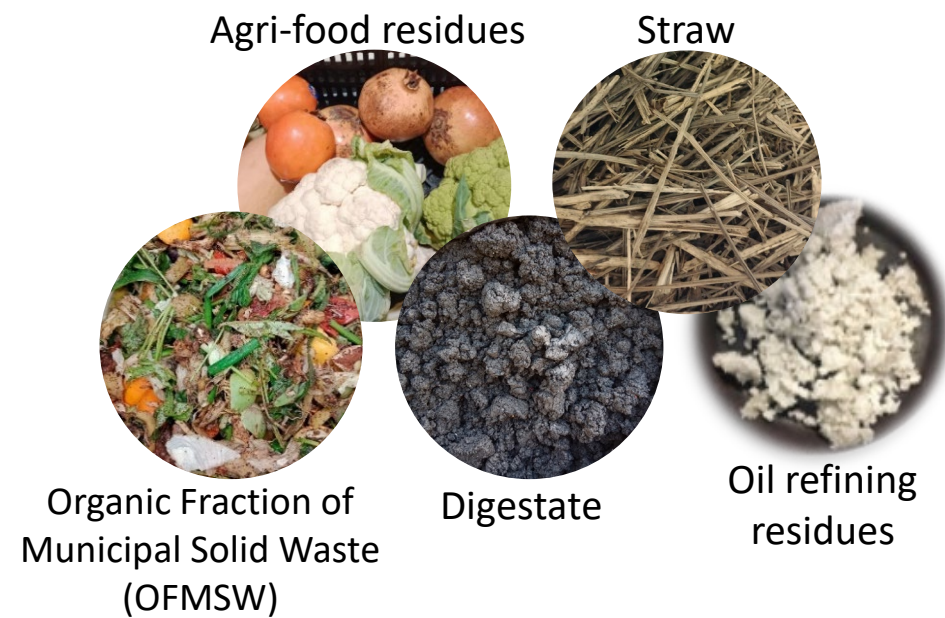


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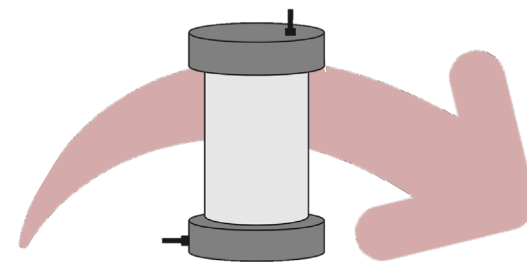


Valorization of agri-food residues  
as functionalised compost

SSOIL aims to increase the sustainability of the agri-food sector through the design of a compact and robust solid-state fermentation (SSF) system for the on-site valorization of agri-food waste (including pruning residues), producing a material similar to compost



### Solid-State Fermentation



Bioreactor

#### Bioproducts:

- ✓ Biosurfactants
- ✓ Biopesticides
- ✓ Biostimulants
- ✓ Enzymes...

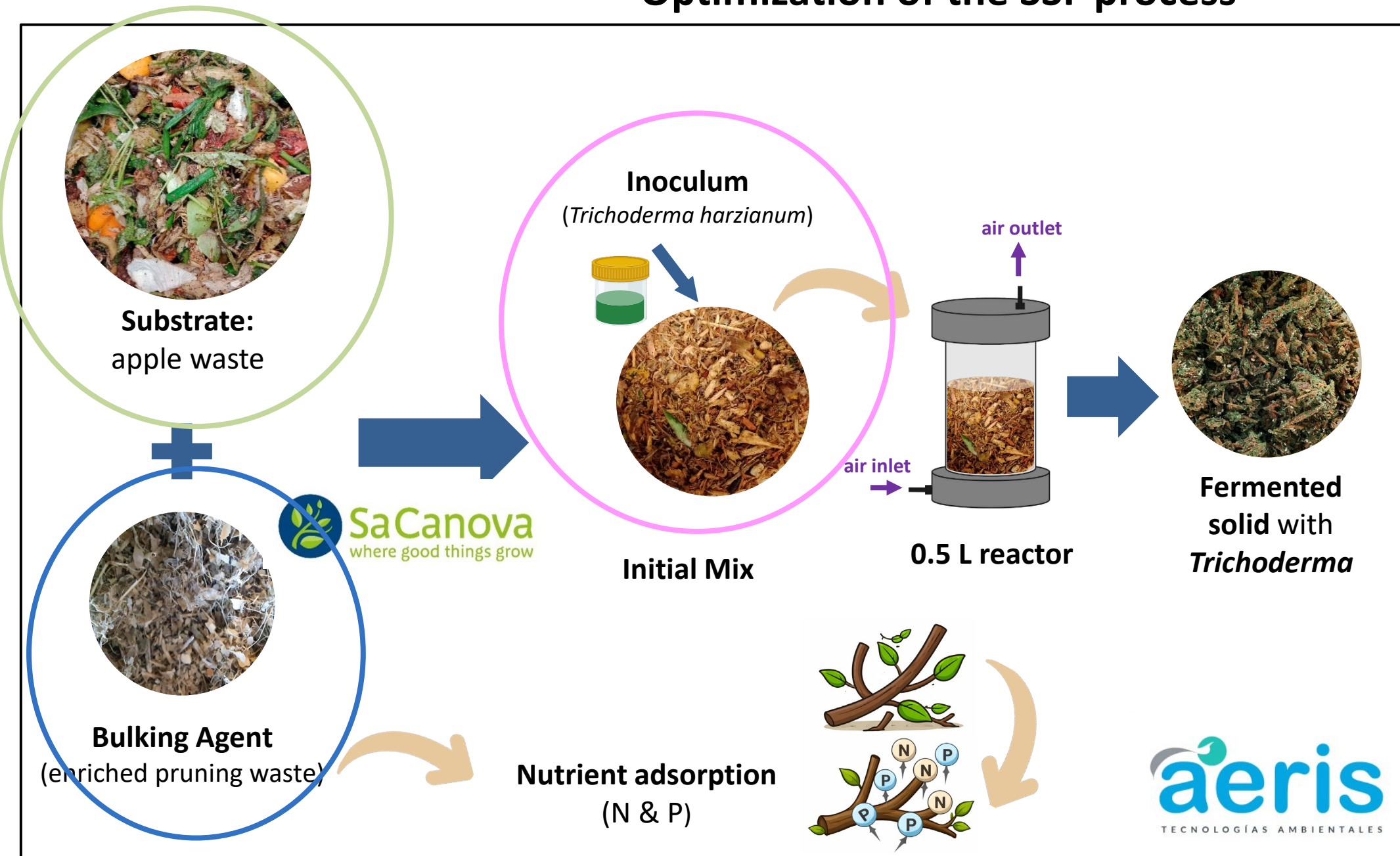
**Solid-State Fermentation (SSF)** is a **biotransformation** process that takes place in a **solid matrix** in **presence of oxygen** and **complete** or **near-complete absence of free water** where the organic substrate acts as a both support and nutrient source



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## Optimization of the SSF process



**Substrate** →→ Year-round availability + low intrinsic porosity (bulking agent required)

**Apple waste**

**Inoculum** →→ biopesticide and biostimulant properties

**Trichoderma harzianum**

**Bulking Agent** →→ Season availability + suitability for SSF

**Pruning waste**

- ✓ **Substrate-to-bulking agent ratios:** 85:15 and 75:25
- ✓ **Monitoring of key physicochemical parameters:** pH, dry matter, organic matter, and the C/N ratio
- ✓ **Biological activity** assessed through **oxygen consumption monitoring:** Specific Oxygen Uptake Rate (sOUR; g O<sub>2</sub> kg<sup>-1</sup> DM h<sup>-1</sup>)
- ✓ **Microbial growth** monitored through the production of *T. harzianum* spores



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TRL 6-7



SSOIL amendment – enriched bulking agent



SSOIL amendment – natural bulking agent

Agronomic test – Verbena



Scaling-up of the SSF process – 22 L



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## CONCLUSIONS

- ✓ A new collaborative partnership has been established between Catalonia and the Balearic Islands.
- ✓ SSF has proven to be a versatile and robust technology for the valorization of apple waste and pruning residues using *Trichoderma harzianum*.
- ✓ The SSF trials have demonstrated the strong potential of this technology for transforming agri-food waste into valuable resources.
- ✓ The successful scale-up experiments pave the way for the implementation of the process at the farm level, bringing this innovative solution closer to real-world agricultural applications.

The SSF process supports the transition toward a circular economy in the agri-food sector through on-site waste valorization



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