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Evaluation of the environmental impact of two different soil management systems in olive growing through the Carbon Footprint analysis



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1. Objectives

1. CARBON FOOTPRINT

Calculate the **CARBON FOOTPRINT** related to the production of **1 liter of olive oil** using two soil management systems:

- Cover crop (*Vicia faba* L. var. *minor*)
- Spontaneous cover crop



2. CARBON SEQUESTRATION

Evaluate the **CARBON SEQUESTRATION** of grass cover by the two soil management systems.

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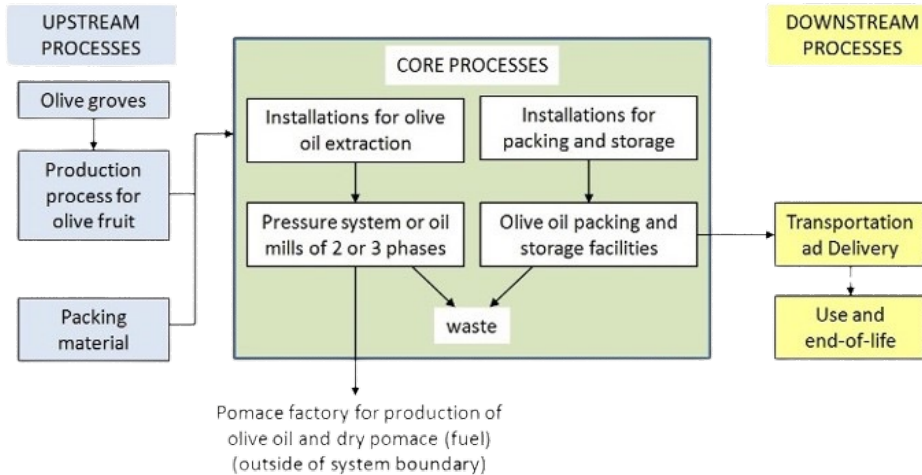
2. Material and Methods



The Carbon Footprint was evaluated using the **LIFE CYCLE ASSESSMENT (LCA)** approach with **SimaPro** software.

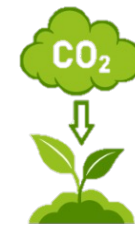
This study adopts a "**cradle-to-grave**" approach, covering the entire lifecycle of olive oil, from production to end-of-life phase.

The functional unit is **1 L of olive oil**, inclusive of its packaging.



The analyzed parameters to understand the **CARBON SEQUESTRATION** and the **SOIL GREEN COVER CHARACTERISTICS** were:

- **TOTAL DRY BIOMASS OF THE GREEN COVER**
- **GRASS HEIGHT**
- **AVERAGE AREA COVERED BY GRASSLAND**
- **COMPOSITION OF THE ABOVEGROUND GREEN COVER BIOMASS**



3. Results and Discussions

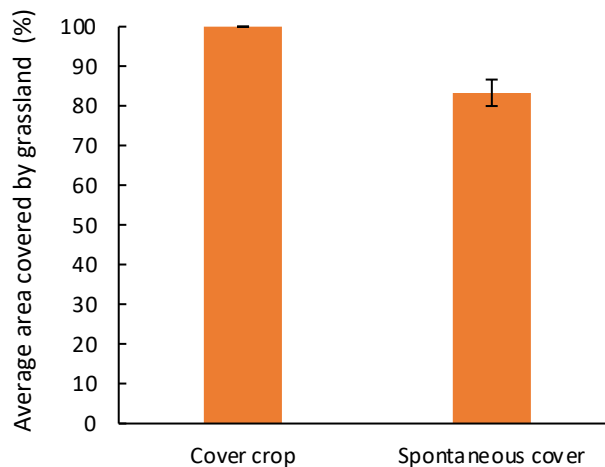
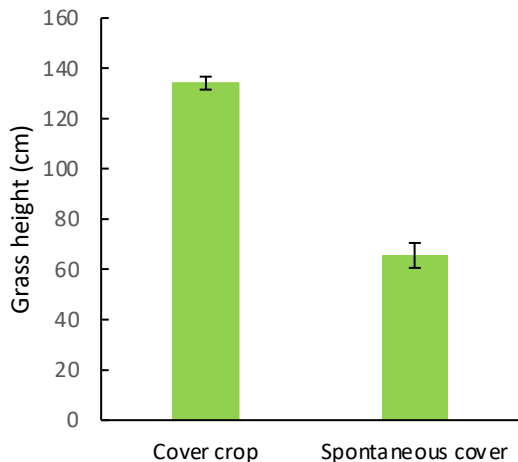


CARBON FOOTPRINT

The soil management with the green manure of *Vicia faba minor* has a lower environmental impact, due to the reduced use of fertilizers and fuel, compared to the soil management with spontaneous cover crop.

Impact category	Unit of measure	Olive Oil – Spontaneous CC Scenario	Olive Oil – <i>Vicia faba minor</i> Scenario
FOSSIL	kgCO _{2eq} /l	3,08	2,99
BIOGENIC	kgCO _{2eq} /l	0,02	0,02
LAND TRANSFORMATION	kgCO _{2eq} /l	0,01	0,01
TOTAL	kgCO _{2eq} /l	3,11	3,02

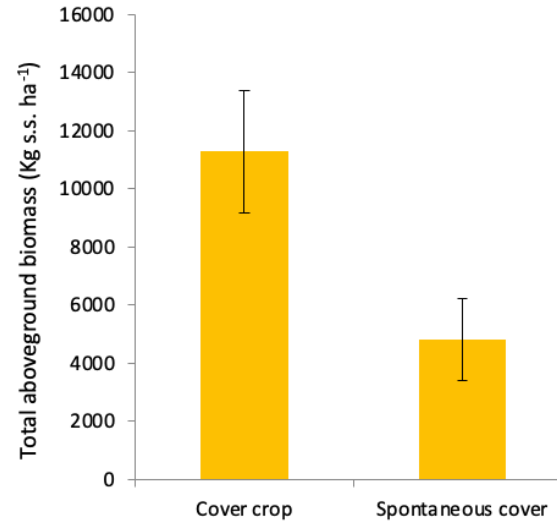
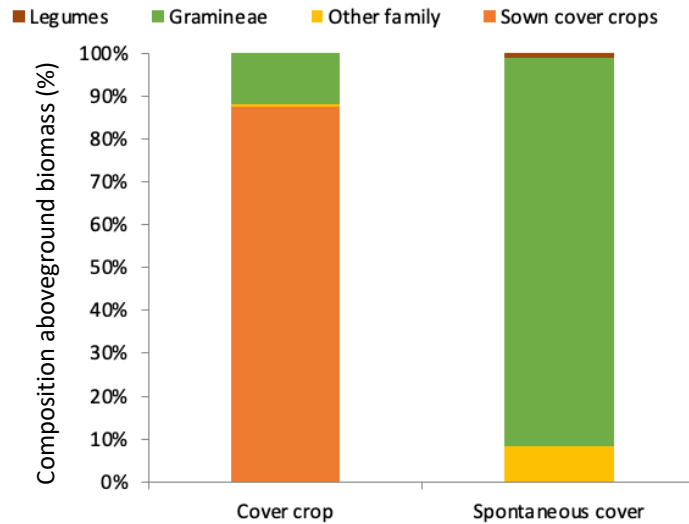
SOIL GREEN COVER CHARACTERISTICS and CARBON SEQUESTRATION



- a) The values on the green cover height and average area covered by the grassland showed a homogeneity of the grassland.
- b) In both graphs, the cover crop values are higher than the values of spontaneous cover crop.



3. Results and Discussions



- c) The aboveground biomass in the spontaneous cover crop is mainly represented by grasses and minimally by legumes and other botanical families. Instead, the seeded cover crop is mostly made up of sown cover crop.
- d) The total dry aboveground biomass was significantly higher in the cover crop with *Vicia faba minor* than in the spontaneous cover reaching values around 12 t/ha.
- e) The total carbon sequestered by the sown cover crop is 5.6 t/ha, while that of the spontaneous cover crop is 2.4 t/ha.





4. Conclusions and Perspectives

The soil management system with *Vicia faba minor* is an excellent practice for soil management in olive groves, because it has been demonstrated to:

- 1 DECREASE EMISSIONS IN OLIVE OIL PRODUCTION
- 2 INCREASE CARBON SEQUESTRATION



Acknowledgements



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