



Deliverable title	D6.3 At least 1 soil amendment produced by composting of sea fennel crop residual biomass
Deliverable Lead:	UNIBRE
Related Work Package:	WP6
Related Task:	Task 6.3 (R&D) Composting of residual sea fennel biomass
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Dissemination level	CO
Due Submission Date:	MONTH 35 (30.03.2025)
Actual submission:	30.03.2025
Start date of project	30.05.2022
Duration	36 MONTHS
Summary of Deliverable D6.3 – Soil Amendment from Composting Sea Fennel Residues	Deliverable D6.3 explored an essential step toward zero-waste farming systems: the composting of residual sea fennel biomass left after harvest and extraction of bioactive compounds. Instead of being discarded, these by-products were tested as a feedstock for soil amendments, turning waste into a circular resource for agriculture. At the Institute for Adriatic Crops, researchers set up composting trials mixing sea fennel residues with tomato plant waste (green fraction) and pruned materials from olive and cherry trees (brown fraction). Two formulations were tested: one with 50% sea fennel and another with 30%. Over six months, compost piles reached temperatures up to 60 °C, remaining active and warmer than the environment for more than 100 days. Monitoring showed a steady increase in pH and a decrease in dry matter, confirming proper decomposition dynamics. The resulting composts were stable, with water-holding capacities comparable to commercial peat substrates. However, their pH was relatively high (9.1–9.4) and electrical conductivity slightly elevated, suggesting the need for blending with peat or additional nitrogen supplementation before use. A complementary experiment with compost teas showed that nutrient release (particularly potassium and magnesium) depended on the sea fennel ratio and extraction time, while no nitrate or ammonium was detected. When tested for seedling production (lettuce, endive, tomato, pepper, cucumber), commercial peat outperformed sea fennel compost in terms of germination and growth. Still, the trials demonstrated that sea fennel compost can be successfully integrated into mixed substrates, where its structure and water retention are advantageous.

Versioning and Contribution History

Version	Date	Modified by	Modification reason
v1.0	20/08/2023	Christian Magné	First version
v2.0	30/03/2025	Christian Magné	Comments after peer reviewing
process			

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1. Report on soil amendment produced by composting of sea fennel crop residual biomass

No information of sea fennel as material for composting

Composting was done at the Institute for Adriatic Crops at the end of August.

Materials and Methods

Composting was done at the Institute for Adriatic Crops at the end of August.

Three types of material were used:

- sea fennel plants after harvest at the end of August
- whole processing tomato plants after harvest (green/N material)
- material from pruning cherry, olives... (brown/C material).

Composting was done in compost bins with two treatments mixing 3 types of materials volume:volume:

Treatment 1: 50% seafennel + 15% tomato + 35% pruned material

Treatment 2: 30% seafennel + 20% tomato + 50% pruned material



Temperature was measured in compost piles with sensors connected with data logger WatchDog series 1000. Temperature reached maximum level of 60°C in both treatments and piles were warmer than outside temperature for more than 100 days.

During composting process samples collected from the piles were taken for pH, EC and other analyses.

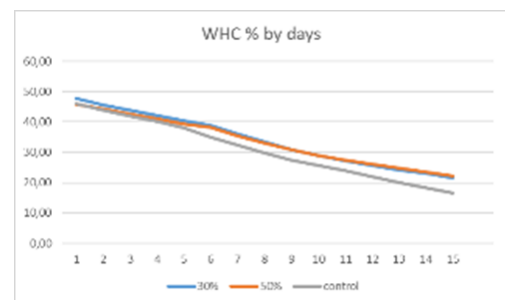
Compost pH had increasing trend through the time, while dry matter percentage was decreasing.

Results

- Composts were taken from bins after 6 months, sieved and prepared for further analyses
- Water holding capacity was similar to commercial peat substrate
- Compost with 30% seafennel had average pH 9,14 and EC 1350 mS/cm, while 50% compost had pH 9,4 and EC 1550 mS/cm (prepared in 1:5 - compost:water solution)



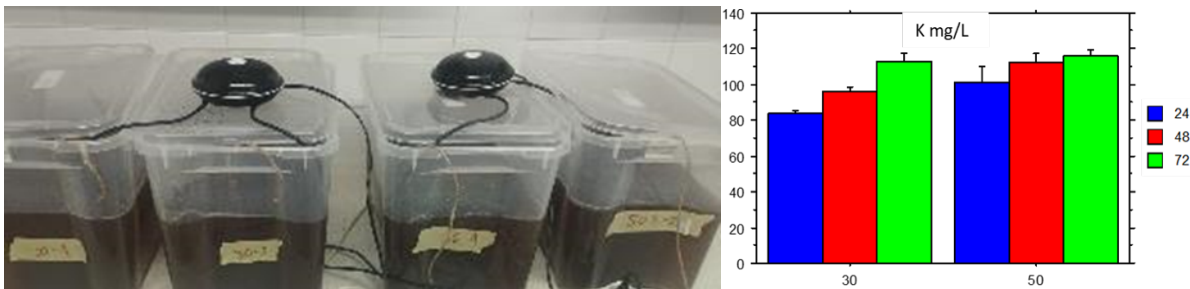
A) Composts with 30% and 50% of sea fennel respectively.



B) Water holding capacity graph

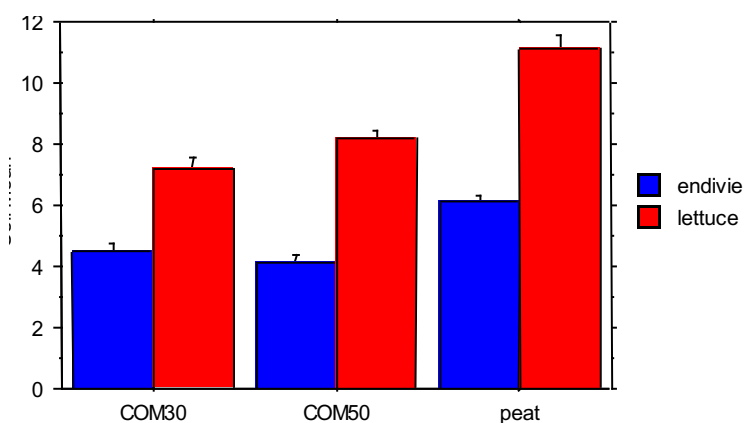
- Compost tea was prepared in 10:1 aerated water solution for 24, 48 or 72 hours

- Tea solution analyses by ionic chromatography showed that seafennel ratio and time had significant influence on K and Mg concentrations, while for other nutrients no differences were found. It can be noted that in all solutions nitrate or ammonium ions were not detected.



- Seafennel composts and commercial substrate were used for vegetable seedlings production in ebb and flow system.
- Lettuce, endive, tomato, pepper and cucumber seeds were sown in commercial substrate and 2 ours prepared composts with 30 and 50 % initial seafennel plant parts.
- All species had better germination and growth in commercial substrate.
- For possible future use of compost derived from seafennel plants it can be recommended to make mix with peat or peat based substrates to lower pH. Additional nitrogen input should be done,





Fresh weight of lettuce and endive seedlings grown in seafennel compost (COM 30 and COM 50) and peat commercial substrate