



Deliverable title	D6.4 Recommendations and guidelines for preparation of soil amendment by composting of sea fennel residual biomass
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Summary of Deliverable D6.4 – Guidelines for Composting Sea Fennel Residues	<p>Deliverable D6.4 translates experimental results into practical recommendations for turning sea fennel crop residues into a valuable soil amendment. The guidelines provide farmers and practitioners with clear instructions on timing, materials, process management, and application, showing how composting can close the loop in sea fennel cultivation and contribute to circular agriculture.</p> <p>The process should begin shortly after harvest, ideally at the end of the growing season, using compost bins or piles with proper aeration and drainage. To ensure a balanced carbon-to-nitrogen ratio, sea fennel biomass should be mixed with other agricultural residues: tomato plants as a green fraction and pruned wood from olive or cherry trees as a brown fraction. Two successful formulations were tested - one with 50% sea fennel, and one with 30% - both leading to effective composting dynamics.</p> <p>During the six-month composting process, piles must be regularly turned and monitored with temperature probes. A proper cycle is confirmed when the material reaches thermophilic conditions (~60 °C) and stays warmer than the environment for over 100 days. As decomposition proceeds, pH rises and dry matter decreases, typical signs of compost maturation. The end product, after sieving, offers a water-holding capacity comparable to commercial peat substrates, supporting horticultural use.</p> <p>The guidelines also introduce compost teas, prepared by diluting compost in water (10:1) and aerating for 24–72 hours. Analyses showed that potassium and magnesium release depends on both sea fennel content and aeration time, making teas a promising tool for tailored nutrient</p>

	supplementation. Trials with lettuce, tomato, pepper, and other seedlings confirmed that sea fennel compost and teas can effectively support growth in hydroponic systems.
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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

Table of Contents

Versioning and Contribution History.....	2
1. Recommendations and guidelines for preparation of soil amendment by composting of sea fennel residual biomass	2

1. Recommendations and guidelines for preparation of soil amendment by composting of sea fennel residual biomass

1. Timing and Location

Composting of sea fennel residual biomass should be carried out shortly after harvest, ideally at the end of the growing season (e.g., late August), to maximize the nutrient value of the biomass. The process may be conducted in compost bins or dedicated composting areas with appropriate aeration and drainage.

2. Selection and Composition of Compost Materials

To achieve an optimal carbon-to-nitrogen (C/N) ratio and effective composting process, it is recommended to combine sea fennel biomass with complementary green and brown materials. The following material types and mixing ratios are suggested:

- Green (N-rich) materials:
 - Fresh sea fennel plants (post-harvest)
 - Whole tomato plants (post-harvest)
- Brown (C-rich) materials:
 - Pruned wood material (e.g., from cherry, olive trees)

Suggested treatments (volume-based ratios):

- Treatment 1: 50% sea fennel + 15% tomato + 35% pruned material
- Treatment 2: 30% sea fennel + 20% tomato + 50% pruned material

3. Composting Process and Monitoring

- Composting should take place in well-ventilated bins or piles with regular turning to ensure adequate aeration and uniform decomposition.

- Monitor internal compost pile temperature using data loggers (e.g., WatchDog Series 1000). The pile should reach thermophilic conditions (approximately 60°C) and remain warmer than ambient temperatures for at least 100 days.
- Collect samples at intervals during the composting process to analyze pH, electrical conductivity (EC), moisture content, and other key parameters.
- Expect an increase in pH values and a decrease in dry matter content over time, which are typical indicators of compost maturation.

4. Compost Maturation and Use

- After a composting period of approximately 6 months, the material should be sieved to remove larger particles and then prepared for use.
- Mature compost derived from sea fennel biomass has shown comparable water holding capacity to commercial peat-based substrates, making it suitable for seedling production and horticultural use.

5. Compost Tea Preparation and Use

- Compost tea can be prepared by diluting mature compost in water at a ratio of 10:1 (v/v), followed by aeration for 24, 48, or 72 hours.
- Nutrient analyses indicate that both the sea fennel content in the compost and the aeration time influence potassium (K) and magnesium (Mg) concentrations in the compost tea.
- For best results, tailor compost tea application based on target crop needs and desired nutrient supplementation.

6. Application and Crop Trials

- Sea fennel compost and compost teas have been successfully used in an ebb and flow hydroponic system for seedling production of various vegetables, including lettuce, endive, tomato, aubergine, and pepper.
- These results indicate that sea fennel-based compost is a viable soil amendment and substrate alternative, supporting sustainable horticultural practices.