

Composting of garden wastes in higher education institution

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Worldwide, waste production has increased, and it is estimated that from 2018 to 2050 there will be a 70% increase if no significant changes are made. Also in Europe, waste production is significant, with municipal solid wastes (MSW) representing around 9.4% of total wastes produced, corresponding to 513 kg of MSW per capita in 2022, less 19 kg than in 2021, but more 46 kg than in 1995 (Eurostat, 2024). Therefore, MSW are an environmental problem, especially in urban areas that have high population densities.

In Portugal, 5.323 million t of MSW were produced, in 2022, represented an increase of around 0.24% compared to the previous year. MSW have different fractions: plastic (10%), paper/cardboard (9%), sanitary textiles (9%) and glass (7%), with the largest fraction represented by biowaste (39%) (APA, 2024). According to the European legislation, Portugal must improve the biowaste treatment until 2030, in order to achieve recycling targets and reducing the amount of biowaste sent to landfill (Resolução do Conselho de Ministros n.º 30/2023). In order to promote recycled at source local treatments such as domestic composting must be implemented. In this way, it's possible to contribute to circular economy through the application of composting products (compost) in gardens. Decentralized biowaste treatment solutions have numerous advantages, including reducing transport costs and environmental impacts.

Several studies have been carried out in higher education institutions because they are suitable places to disseminate knowledge about biowaste composting and because biowaste is also produced in these places, namely in gardens and canteens (Vázquez *et al.*, 2020; Torrijos *et al.*, 2021; Filho *et al.*, 2023).

Due to the specificities of each institution and in order to keep composting running on campus over the years, it is necessary to develop further studies.

The present work issue is to study the process of composting of garden waste produced in a Portuguese higher education institution campus. The biowastes were grass, tree leaves and small trunks. The grass is usually cut once a month from November to December and twice a month in the remaining months. The composter has a capacity of 1800 L and was built with wooden pallets (Figure 1).

During the composting tests, the composter content was analysed, through the determination of various parameters (for example, temperature, pH, moisture, solids, etc.). The compost obtained during the tests will be applied in the campus gardens and a part will be distributed to campus users.



Figure 1. Composter for garden waste: a) outside view and b) inside view

The composting tests results revealed that it possible to achieve the thermophilic phase of the composting process of garden waste, with temperatures near 60°C. This temperature is essential to ensure the destruction of pathogenic microorganisms. In these tests several contaminants were found, mainly plastics, in smaller quantities when compared to previous composting tests with food waste carried out at the same institution. The garden

composting process is a relatively slow process, taking around 5 to 6 months to obtain stable compost. This study is still under development.

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