Bin2Bean

D7.3 – Practice abstracts – batch 1

ETA

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Executive Summary

The **Deliverable 7.3** is part of the Communication and Dissemination activities of the BIN2BEAN project (WP7). It gathers the first seven Practice abstracts that the project has produced in the first 16 months of the project and has uploaded in the EU CAP network website, a forum that brings together National CAP Networks, organisations, administrations, researchers, entrepreneurs and practitioners. Within this forum, Horizon Europe projects can create their own page and publish small pieces of information - "practice abstracts"- contributing to sharing knowledge and information about agriculture and rural policy.
The publication of practice abstracts is an integral part of BIN2BEAN C&D strategy as it allows to share project findings and knowledge within farmers, a crucial target group for the project that is not however always easy to reach.
This deliverable set up BIN2BEAN activities on this platform, building the basis to reach the project objective of **35 practice abstracts** by the end of the project (**D7.5**).

Introduction to the Practice abstracts

In July 2024, ETA created the Bin2Bean project page on the EU CAP network website. The Network is a forum through which National CAP Networks, organizations, administrations, researchers, entrepreneurs and practitioners can share knowledge and information (e.g. via peer-to-peer learning and good practices) about agriculture and rural policy. The Network, set up by the European Commission, supports the design and implementation of CAP strategic plans (CSPs), innovation, and knowledge exchange, including EIP-AGRI, and evaluation and monitoring of the CAP.

By publishing brief reports on project results – *practice abstracts* – on this website, the BIN2BEAN project aims to contribute to knowledge and innovation sharing towards agriculture and rural policy. At the same time, this network represents an opportunity for the project for networking and exchange with farmers and other stakeholders interested in agriculture, forestry and rural areas across the European Union, widening the dissemination of BIN2BEAN results in relevant networks.

Between August and December 2024, ETA published a total of **7 Practice abstracts**, with the first one introducing the Bin2Bean approach while the other 6 were essentially drawn from D2.1 – "Handbook of recommendations and good practices – a European perspective" and focussed on specific aspects addressed in that deliverable and that are relevant to the agricultural sector. The project **aims to publish 35 abstracts** within its duration. As the first part of the project was focused on setting up the project methodology especially at city level, it is expected that the majority of practice abstracts will be published in the second part of the project when more concrete solutions for each LL with a direct impact on soil and agriculture will be developed. An updated version of this deliverable will be published in M34 (**D7.5**).

The practice abstracts, with a characters' limit of 2000, published so far are reported in the following pages as they have been published on the EU CAP Network website. The practice abstracts will be also disseminated through social media and other online communication tools.

1. The Bin2Bean approach

The Bin2Bean project will support European cities by promoting innovations that aim to valorise bio-waste and optimising their recycling into soil improvers through innovative and economically viable value chain. Partners follow the PLAN-DO-CHCEK-ACT approach outlined below

PLAN - MAPPING CONTEXTS AND OPPORTUNITIES
Beginning with an in-depth analysis of local, national, and EU contexts regarding bio-waste collection and recycling into soil improvers, the project will first assess the state-of-the-art within cities, identifying challenges and opportunities that the project could address and proposing scenarios to guide the selection of the most suitable approach for their context. For each LL, 5-10 solutions will be selected for a further screening and implementation.

DO - DEVELOPING AN IMPROVED EVALUATION FRAMEWORK
The development and validation of an improved evaluation framework for safe and sustainable soil improvers from bio-waste, based on social, economic and environmental indicators and adapting to local contexts, is a relevant and crucial step for the selection of the most valuable selected solutions.

CHECK - TESTING THE PERFORMANCES OF SOLUTIONS
After testing the performance of soil improvers on experimental sites and assessing end-user acceptance, data will feed into decision tools for cities and end-users— a scoring system and FARM MAPs—to select the most suitable and promising solutions

ACT - LOCAL BUSINESS MODELS AND STRATEGIES
Local business models and go-to-market strategies will be developed for selected solutions and end-users acceptance and willingness to adopt will be assessed in order to increase their market uptake and the transition from innovation to practical implementation.

ACT - ADVISING CITIES
Advise cities on boosting the production of soil improvers from bio-waste at the local level is at the core of the BIN2BEAN project which will update local regulations and policy actions based on project results and support the creation of new local funding opportunities to foster the development and deployment of selected solutions. As one of the main project output, the project will deliver a toolbox for cities will include a roadmap, guiding local authorities to implement the BIN2BEAN approach in their cities.

2. Biowaste in the EU legislation: an overlooked enabler for Agriculture

The cornerstone of European legislation defining 'organic waste,' more specifically 'biowaste,' is the Waste Framework Directive (2018). This directive, particularly in Article 22, requires EU member states to ensure proper management of biowaste. This includes separating and recycling biowaste at its source or collecting it separately to prevent contamination with other waste types.

The directive categorizes biowaste as follows:

Biodegradable garden and park waste. Food and kitchen waste from homes, restaurants, catering services, retail stores, and food processing facilities.
It is important to highlight that the definition excludes forestry and agricultural residues, manure, sewage sludge, and other biodegradable waste such as natural textiles, paper, and processed wood.

In addition to the definition, the Waste Framework Directive introduces the "waste hierarchy," a priority order for waste management and disposal. The hierarchy stipulates that waste prevention is the absolute priority, followed by reuse, ecycling, and other forms of recovery. Landfilling is the last resort, to be used only when all other options have been exhausted.

In summary, the European regulatory framework for bio-waste is based on two fundamental principles:

● Obligation of separate collection: Bio-waste must be separated from other waste to allow for its recycling and eventually the production of high-quality compost and digestate. These products can then be used in agriculture to restore soil health.

● Waste hierarchy: Waste prevention is the priority, followed by reuse and recycling. Landfilling is the last (and least preferred) option.

The Waste Framework Directive provides a general framework, leaving Member States the freedom to adopt specific measures for managing bio-waste based on their needs and local context. However, the common goal is to promote an effective and efficient bio-waste management system that contributes to environmental protection, soil health, and food safety.

3. Separate biowaste in the right way to make the best out of it

The right separation of biowaste is a crucial step in an efficient and sustainable waste management system. This can positively influence the quality of the biowaste (less impurities), thus making the quality of the derived compost or digestate superior.

Tools for Separation

Biowaste bins - These are small containers, generally 5 to 10 liters, placed in the kitchen to collect organic waste produced at home. The small size of the bio-bucket encourages frequent emptying, reducing bad smells and hygiene problems.

Bags - These can be used inside biowaste bins to facilitate the emptying and transport of organic waste. Compostable bags, certified according to the EN 13432 standard, are recommended by some municipalities and waste management operators. However, the use of compostable bags is a subject of debate, as their presence can affect the composting process.

Waste bins for separate collection -These are larger containers placed outside of homes or at collection points, used by waste management services to collect bio-waste. The size of the bins varies depending on the type of collection, population density, and the amount of bio-waste produced.

Main collection methods

Door-to-door collection: Door-to-door collection is considered the most efficient method for collecting bio-waste, as it ensures greater citizen participation and better quality of the collected material.

Street collection points: This method involves placing containers for the collection of bio-waste at strategic points in the territory. Although cheaper than door-to-door collection, collection using street collection points can lead to a lower quality of the collected material and a greater presence of impurities.

Collection centers: Collection centers, or eco-islands, offer citizens the opportunity to dispose of various types of waste, including bio-waste, in a separate manner. This method is particularly useful for collecting bulky waste (like prunings) or waste produced in limited quantities.

4. Why should you separate biowaste and why it matters for the agriculture?

The effectiveness of source separation of biowaste depends on several factors, including:

Awareness and information: Correctly informing citizens about the environmental benefits of bio-waste separation, the guidelines to follow, and the treatment processes is fundamental to ensuring high participation and good quality of the collected material. In Rural context, it is pivotal to make clear that biowaste streams are a precious resource that can be exploited and the land can benefit from it.

Convenience: easy access to collection systems, collection frequency, the practicality of separation tools, and the management of hygiene aspects are crucial factors in encouraging citizen participation.

Trust in the system: transparency in waste management processes and demonstrating the use of compost and digestate derived from bio-waste help to increase citizens' trust in the effectiveness of separation.

Social norms: the perception that other people are correctly separating bio-waste and social approval of this behavior can encourage participation.

Conclusions
Source separation of biowaste is an essential process for creating a sustainable and efficient waste management system. By adopting an integrated approach that combines information, incentives, and measures aimed at increasing convenience and trust in the system, it is possible to maximize citizen participation and ensure effective recycling of biowaste.

5. Specific benefits of soil improvers #1

The distinction between fertilizers and soil improvers is fundamental to understanding how to care for the soil and promote healthy plant growth. Fertilizers, as the name suggests, have the primary purpose of providing nutrients to plants to promote growth. They are like an immediate "meal" for plants, rich in essential elements such as nitrogen (N), phosphorus (P), and potassium (K).

Soil improvers, on the other hand, work in a more holistic way, focusing on improving the physical, chemical, and biological properties of the soil itself. Instead of providing an immediate injection of nutrients, they work to create a healthy and fertile environment in the long term. Soil improvers, like compost, do not just "feed" the plants but "feed" the soil, promoting a vibrant and resilient ecosystem.

The Benefits of Soil improvers: Increased Organic matter

Soil improvers, especially compost, are rich in stable organic matter, which significantly contributes to the soil's organic matter content. Organic matter is the lifeblood of the soil, playing a crucial role in a number of essential functions, including:

Nutrient supply: Organic matter acts as a slow-release nutrient reservoir for plants. While fertilizers provide an immediate injection, organic matter releases nutrients gradually over time, ensuring a constant and balanced supply.

Soil structure: Organic matter improves soil structure by binding soil particles into stable aggregates. This creates a porous environment that promotes air circulation, drainage, and root penetration. A well-structured soil is less prone to compaction and erosion.

Water retention: Organic matter acts like a sponge, absorbing and holding water in the soil. This is especially important in arid or drought-prone regions, improving plant resistance to water scarcity.

Biological activity: Organic matter provides food and habitat for a wide range of beneficial soil organisms, including bacteria, fungi, earthworms, and insects.

6. Specific benefits of Soil improvers #2

Another very important benefit of Soil improvers is the capability to increase carbon sequestration

Carbon sequestration: Compost plays a crucial role in carbon sequestration, a process that helps mitigate climate change. This process is defined as a persistent increase in soil organic carbon resulting from the removal of carbon dioxide from the atmosphere. The repeated application of compost can increase the soil organic carbon content by up to 90% compared to unfertilized soil and up to 100% compared to treatments with chemical fertilizers. Studies have shown that, over a period of 4-12 years, between 11% and 45% of the organic carbon applied to the soil as compost remained as soil organic carbon.The main benefits of soil carbon sequestration include:

- Mitigating climate change: Soil carbon sequestration reduces the amount of carbon dioxide in the atmosphere.
- Improving soil health: Soil organic carbon contributes to soil structure, water retention, and fertility.
- Reducing methane emissions: Applying compost to soil can reduce methane emissions from the decomposition of organic waste in landfills.

The effectiveness of carbon sequestration through compost application depends on several factors, including the amount of compost added, the maturity and stability of the compost, and soil conditions. It is important to note that the soil's ability to sequester carbon does not increase linearly with the application of compost.

The greatest benefits are observed in the first 20 years or so, after which the increase in soil organic carbon slows down as a new equilibrium is reached.

7. Specific benefits of soil improvers #3

Soil improvers, such as compost, can help suppress plant diseases. This occurs through the promotion of beneficial microorganisms in the soil that compete with pathogens. The effectiveness of disease suppression depends on several factors, including:

Compost inclusion rate: High amounts of compost, often with inclusion rates below 20% v/v in the soil, are often necessary to achieve significant disease suppression in the field.

Type of compost: Different types of compost can have varying disease suppression capabilities. For example, compost derived from green waste may be effective in suppressing certain soil pathogens.

Soil type: The effectiveness of disease suppression can vary depending on the soil type.

Type of disease: Compost may be more effective in suppressing certain types of diseases than others. Some examples of pathogens suppressed by compost, include Fusarium oxysporum and Pythium spp.

Most of the research on disease suppression by compost has been conducted in lab environment, and further research is needed to fully understand the effectiveness of compost in suppressing diseases in field conditions. In general, the use of soil improvers like compost can help create a healthier and more resilient soil environment, which can help reduce the incidence of plant diseases. However, it is important to use compost appropriately and in combination with other disease management practices to achieve the best results.

Key points:

- Compost promotes beneficial microorganisms that compete with plant pathogens.
- The effectiveness of compost in disease suppression depends on factors like the amount of compost used, the type of compost, soil type, and the specific disease.
- More research is needed to understand how compost works in larger, field-based environments.

- Using compost in combination with other disease management practices is recommended for optimal results.

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