Position Paper on Soil Organic Matter

Organic matter for the preservation of soil health and fertility

Introduction

The development of separate collection schemes for bio-waste and high-quality recycling has made available a large quantity of mature, safe and healthy **compost** and **digestate** estimated to be in the region of **12 to 16 million tonnes** every year across Europe[1],. Compost and digestate are effective soil improvers, however, farmers struggle to use them properly for technical and economic reasons.

European agricultural soils have become degraded following many decades of use, resulting in both reduced quality and productivity. The unsustainable use of chemical inputs has also led to water and air pollution. The European Commission could guide and support the improvement of soil through a coordinated and harmonized approach in all Member States. This position paper points out the importance of stimulating the utilisation of high-quality **compost** and **digestate** to:

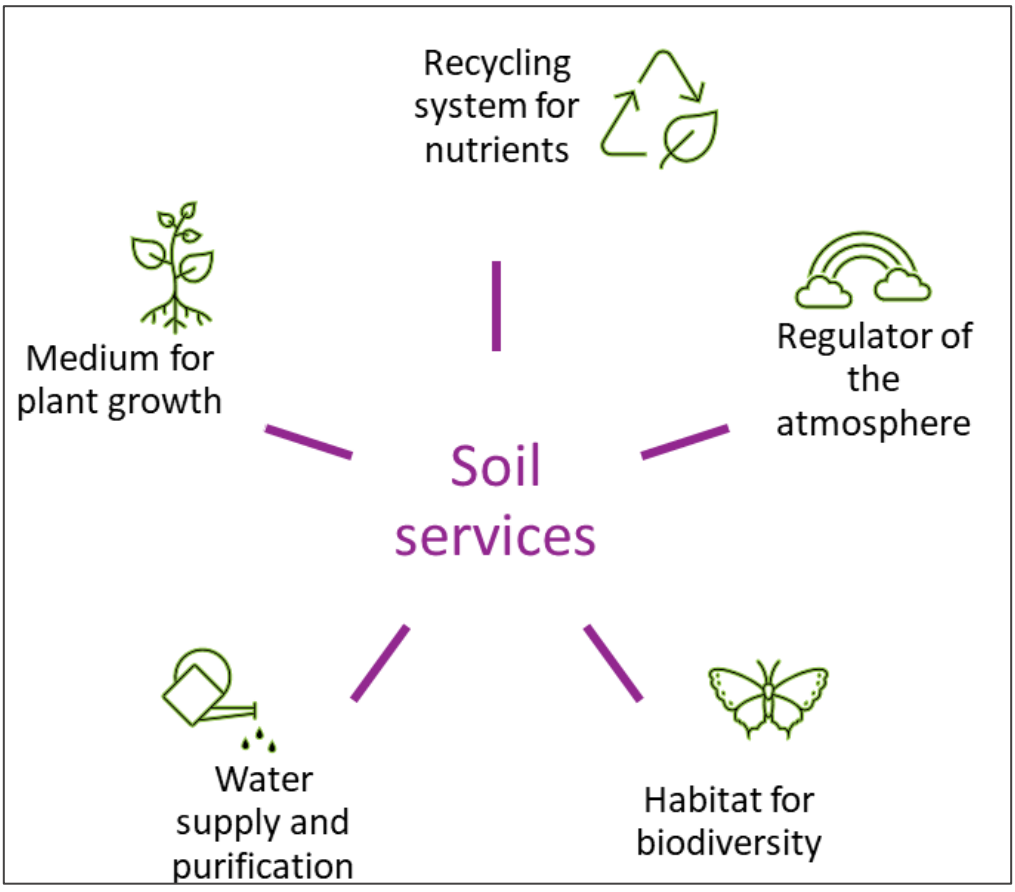
- Maintain, increase, and minimise losses of soil organic matter on all fields and degraded areas
- Benefit from the additional positive effects associated to the use of compost and digestate to soil health and fertility
- Encourage the use of recycled nutrients and their more efficient management through their life cycle.

[1] ECN Status Report 2019: European Bio-waste Management. Overview of Bio-Waste Colllection, Treatment & Markets Across Europe. https://www.compostnetwork.info/download/ecn-status-report-2019/

1 Challenges to soil health

Soil is a mixture of minerals, organic matter, water and air. There are many different types of soil around the world, which are all influenced by the composition of the underlying rocks, the local climate, the types of plants that grow in it and the animals that live in and on it. Soil is therefore a complex ecosystem, and not just an inert substance. It contains many different types of micro-organisms, invertebrates and plants that interact with each other. Thus, soil is a vital, non-renewable resource for ecosystems.

Soil plays an essential role in services such as water purification and infiltration, energy production, nutrient regulation, pest control, recreation and, last but not least, food production. It is also a major global carbon sink, with significant potential to remove climate-changing gases from the atmosphere. However, as ECN has highlighted through its S.O.S. Soil initiative[2], **the ability of soil to deliver ecosystem services**, such as food for the majority of animals on our planet, as a biodiversity pool and as a regulator of gasses, water and nutrients, **is at risk**.



[2] Save Organics in Soil – S.O.S Initiative http://www.saveorganicsinsoil.org

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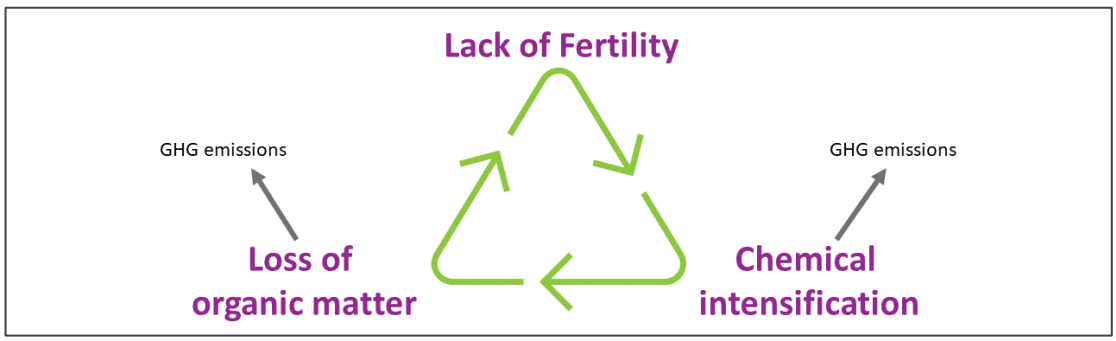
Most of the world's soils are facing significant pressures, either directly as a result of human activity, or indirectly because of climate change. The loss of organic matter caused by erosion is one of the critical threats to soils across the globe. Indeed, soils that are low in organic matter are less productive, retain less water and store less carbon.

The separation between arable and livestock farming, which has contributed to make farmers less aware of the importance of supplying soils with organic matter (once guaranteed by animal manure) resulted in diffuse soil degradation. In this paper we highlight exclusively the importance of returning organic matter to soil to restore its natural fertility and prevent erosion, greenhouse gas emissions and uncontrolled degradation.

Second, the costs for application and incorporation into the land of soil improving compost and digestate is usually perceived as an additional obstacle to its utilization. The loss of soil fertility has thus been masked over the last 40 years through increasing utilization of high performing mineral fertilisers derived from fossil origins. These have helped to maintain crop productivity in the short term, but have led to progressive depletion of soil function and quality in the long term.

Collectively, this has resulted in a general misconception about the quality of organic soil improvers, a lack of knowledge about how to use them, harm to biodiversity and ecosystems, diffuse pollution and soil degradation.



2 Indicators of soil health

Several physical, chemical and biological parameters can be considered to be indicators of soil function involved in habitat provisioning, water and nutrient cycling, and primary productivity.

Physical parameters include bulk density, water holding capacity, aggregate stability and penetration resistance, and biological parameters include nitrogen mineralisation, microbial biomass and activity. Chemical parameters include pH, bioavailable or mobile nutrients, cation-exchange capacity and electrical conductivity.

Whilst these parameters can be assessed through laboratory and in-field testing, a more practical approach to soil health self-diagnosis can be taught to farmers, taking advantage for example of visual soil inspection techniques.

Soil health indicators		
Physical parameters	**Biological parameters**	**Chemical parameters**
a. Bulk density b. Water holding capacity c. Aggregate stability d. Penetration resistance	a. Nitrogen mineralisation b. Microbial biomass and activity	a. pH b. Plant-available or mobile nutrients c. Cation-exchange capacity d. Electrical conductivity

3 Compost: a valuable soil improver

Since its inception, the European Compost Network (ECN) has promoted the importance of **compost** utilisation to benefit soil quality and productivity, increase the efficiency of bio-waste recycling, reduce the environmental impact of bio-waste disposal in landfill, and sequester carbon[3] due to the long-term storage of humus in soils.

Compost (and solid digestate, which is provided with a comparable organic carbon content) is an effective soil improver that replenishes the productive layer of fields with fertile and

[3] Soils act as sources and sinks for greenhouse gases (GHG) such as carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O).

nourishing organic matter following just a few years of continuous applications. Compost and solid digestate also strengthen the physical, chemical and biological properties of soil but farmers struggle to integrate them into their normal practices.

The composting and anaerobic digestion processes take place under controlled conditions and result in microbial decomposition of bio-waste and the transformation of organic substances into compost or digestate. The majority of agronomic experts acknowledge that compost and solid digestate which have undergone proper production processes are biologically stable soil improvers in which the organic component has a high degree of maturation, and which can be safely used for improving the quality, health and fertility of soil.

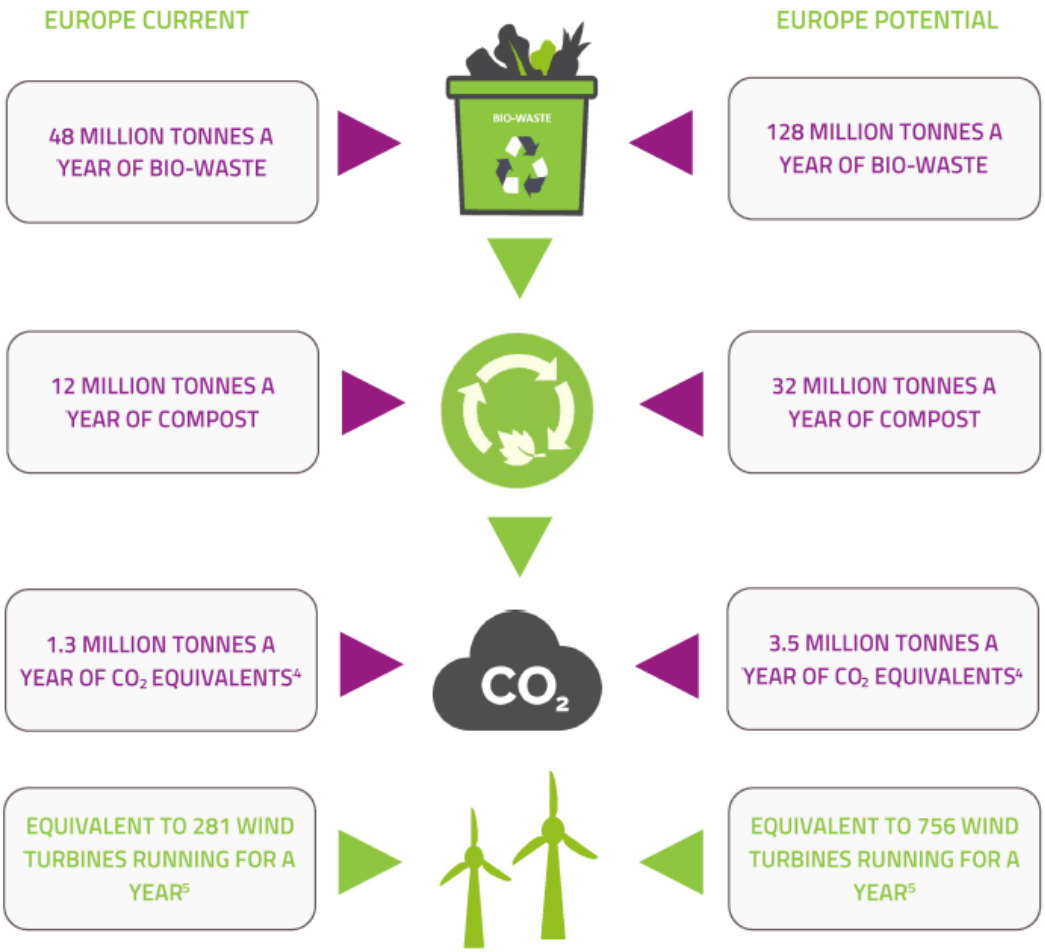


Figure 1 -Soil Carbon Sequestration – European Potential from Bio-Waste
©European Compost Network [4]

[4] https://www.compostnetwork.info/download/soil-structure-carbon-storage/

The main benefits of compost and solid digestate application to land are seen in the medium- to long-term effects.

- Replenish the fertile layer of humus in the soils. When soil is rich in humus,
    - it can store more carbon. With every tonne of compost (fresh mass) applied to soil with sub-optimal levels of organic matter, between 60-150 kg of carbon dioxide equivalents can potentially be sequestered,
    - it has an improved structure for better aeration and increased water holding capacity, which reduces the risk of erosion.
- Improve the health and productivity of agricultural and horticultural soils provided with low levels of organic matter.
- Increase soil aggregate stability and soil pores, thereby reducing compaction.
- Help soil to store water, therefore reducing the need for irrigation.
- Improve the buffering capacity of the soil, and helps it to hold onto the nutrients for longer and it prevents them from being washed into watercourses.
- Increase the number, diversity and activity of soil organisms, including microbes and invertebrates such as earth worms. Soil biota helps plants resist disease and farmers to use fewer pesticides.
- Is a useful source of plant nutrients, including nitrogen, phosphorus and potassium. As nitrogen in compost is bound up with other compounds, it is released slowly over time and helps from a nutrient 'bank' in soil so that the nutrients are present for plant growth over a number of years.
- Have an alkaline pH, which means that it can help to reduce soil acidification.

The richness in organic matter, active microbial flora and, to a lesser extent, macro- and microelements makes compost and solid digestate excellent products suitable for a wide variety of agronomic uses, from horticulture to open field crops.

Compost and digestate can replace mineral fertilisers

Doses and techniques for compost and solid digestate application depend on several factors that include the type of soil, its organic matter and nutrients content, the specific crops grown and climatic conditions.

Moreover, recycling nutrients in compost and digestate and returning them to soil benefits the climate and environment in other important ways:

- Compost and solid digestate reduce the farmers need for traditional mineral fertilisers. The manufacturing process of such products is very energy intensive and leads to significant greenhouse gas emissions – they are estimated to be about 1% of total global emissions.
- Compost and solid digestate reduce the mining of raw materials, such as phosphorus and potassium, and lime. As phosphorus is an EU Critical Raw Material, recycling phosphorus helps conserve this valuable resource within Europe.

4 EU current and upcoming policies: The new European Union approach to soil and the Common Agricultural Policy (CAP)

The European Environment Agency recently concluded that the EU needs to adopt a consistent and coherent policy framework for soil quality to make existing incentives and measures more effective and ultimately achieve the goals of the European Green Deal[5]. The European Commission announced in the Biodiversity Strategy in May 2020 the intention of updating the EU Soil Strategy and build a European framework[6].

The European Commission plans to address soil quality from two different perspectives: **restoration of degraded soil** and **sustainable soil management practices**.

The European Commission proposed **9 CAP objectives** and 38 **result indicators**. Member States will have to pursue the **EU CAP objectives** through specific **interventions** that they will design in their own national **CAP Strategic Plans**.

[5] European Environment Agency, *The European Environment: State and Outlook 2020*, 2019

[6] COM(2020) 380 final EU Biodiversity Strategy for 2030 Bringing nature back into our lives https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1590574123338&uri=CELEX%3A52020DC0380

Figure 2 - The objectives of the new CAP. © European Commission

The new CAP points to an increased subsidiarity and to shift from a compliance to a performance-based policy. It is important to investigate if the instruments chosen to pursue the different goals ensure good coordination of sometimes diverging and fluctuating national policies.

5 ECN calls for substantial circular solutions

ECN recommends that the European Commission acknowledges the important climate and environmental benefits that regular applications of quality compost and digestate[7] to soil generate, and to include in the soil strategy (and therefore in the CAP) a mechanism to encourage Member States to reward the use of quality compost and digestate, reduce the use of mineral fertilisers and close the biological cycle in line with circular economy principles.

This will help Member States to achieve the CAP objectives in the following ways, by:

1. Contributing to climate change mitigation and adaptation, as well as sustainable energy.
2. Fostering sustainable development and the efficient management of natural resources such as water, soil and air.
3. Contributing to the protection of biodiversity, enhancing ecosystem services and preserving habitats and landscapes.

The European Commission announced in the Biodiversity Strategy[8] and the Farm to Fork Strategy[9] that it will encourage Member States to set national targets to reduce nutrient losses and the use of fertilizers by 2030. To this end the European Commission assessed the nutrient load reductions needed for each Member State[10] and will work with them to adopt Integrated Nutrient Management Action Plans[11]. ECN hopes that these plans will reflect the important contribution that quality compost offers to close the biological cycle. The European Commission also announced in the Farm to Fork Strategy that it will adopt a legislative proposal for a framework for sustainable food systems in 2023. ECN recommends that the European Commission set obligations or other instruments reward those selling nutritious organic food grown on quality compost.

[7] Quality compost means a material that has been certified by conformity assessment or quality assurance bodies according to well established and proven standards or parameters provided by specific and applicable national legislation.

[8] COM(2020) 380 final EU Biodiversity Strategy for 2030 Bringing nature back into our lives https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1590574123338&uri=CELEX%3A52020DC0380

[9] COM(2020) 381 final A Farm to Fork Strategy for a fair, healthy and environmentally-friendly food system
https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0381

[10] COM(2020) 846 final
https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0846

[11] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12899-Nutrients-action-plan-for-better-management_en

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Conclusions

- The European Commission should acknowledge the important climate and environmental benefits that regular applications of quality compost and digestate to soil generate. We propose that the Soil Strategy (and therefore the CAP) should include a mechanism to encourage Member States to reward the use of compost and digestate and close the biological cycle in accordance with circular economy principles.
- The application of compost or digestate should follow good agricultural practices, since the main goal of any soil protection policy should be to restore health and fertility. In this respect, the conditions for application (period, doses, farming techniques) should be based on the actual requirements of the specific crops and the benefit to the soil and regional climate. Any practice that only aims at increasing carbon or organic matter levels in soils, disregarding soil use, should be discouraged.
- Member States should agree on monitoring, reporting, and verification rules and procedures that could allow soil health certificates to be issued to farmers and landowners.
- Incentives should include appropriate training to farmers on the long-term benefits of soil health and the practical ways of assessing its quality. Since soil improvers do not work in the same way of mineral fertilisers, farmers need advice to evaluate their compost requirements, when it should be spread, and how they can forecast the expected results. Many farmers will gain from agronomic training and advice from experts. Appropriate training should improve farmers' contribution to innovation, and protection of soil health and ecosystem biodiversity.
- Protecting soil and its fertility requires long term interventions. Any policy protecting and improving soil and biodiversity should forecast long term programs coupled with appropriate rewards and incentive instruments. Penalties should only be introduced if they are meant to set a level playing field between the actors that invest in soil protection activities and the those who do not. The benefits of the regular application of high-quality compost and digestate to soils usually arise and become clear and measurable after five years.

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About the S.O.S – Save Organics in Soil Initiative

This international initiative **S.O.S. SOIL – Save Organics in Soil**, led by the European Compost Network (ECN) and the Italian Composting and Biogas Association (CIC), aims to highlight the importance of soil organic matter to encourage policy makers to develop instruments to move Europe towards implementing sustainable, climate proof soil management practices.

Please sign the manifesto 'Save Organics in Soil' here: https://www.saveorganicsinsoil.org/

About the European Compost Network (ECN)

The **European Compost Network** (ECN) is the leading European membership organisation promoting sustainable recycling practices by composting and anaerobic digestion of organic resources and guarding over the quality and safe use of the recovered organic fertilisers and soil improvers. With 68 members from 27 European Countries ECN represents more than 4500 experts and plant operators with more than 45 million tonnes of biological waste treatment capacity.