

SOILS, WHERE FOOD BEGINS



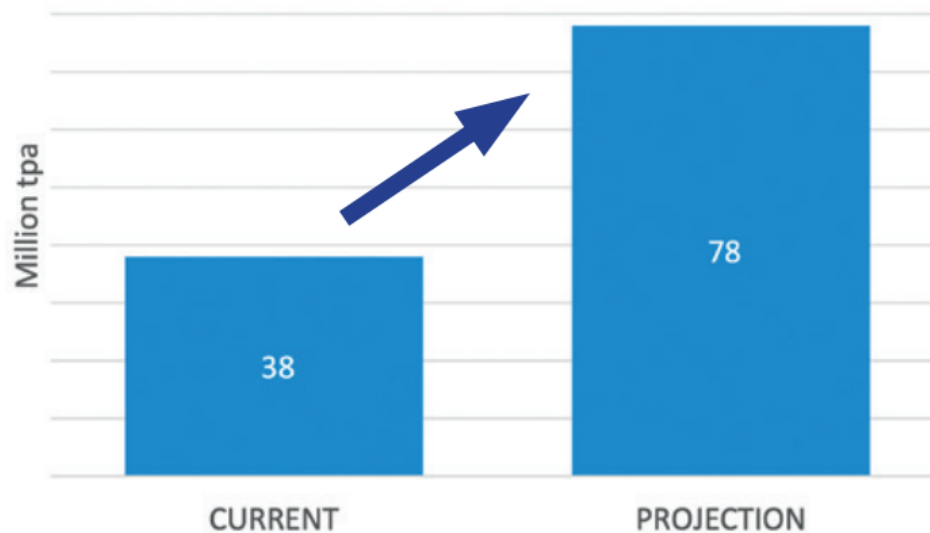
Unlocking the potential of recycled organic waste for soil health

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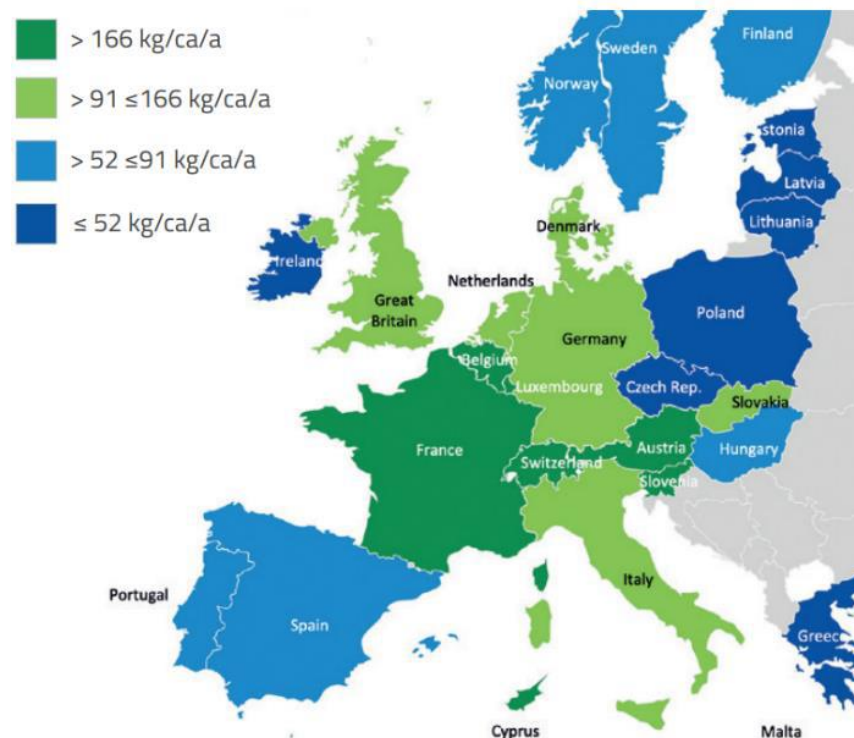
Recycling bio-waste: status and potential

PROJECTIONS TO REACH THE EU's 65% MSW RECYCLING
TARGET INCREASE IN SEPARATELY COLLECTED
& TREATED BIO-WASTE (EU27)



Recycling bio-waste: status and potential

BIO-WASTE COLLECTED PER CAPITA IN SELECTED COUNTRIES
GROUPED INTO QUARTILES
(kg/capita/annum)



Sources: ECN & EEA data. Excludes derived estimates

Recycling bio-waste into high quality soil improvers

FROM WASTE TO PRODUCT



25 % Quality Compost

produced in the EU 27, CH, NO; UK
was certified to the ECN-QAS

=

5.3 Million tpa out of 21,7 Millon tpa



KBVÖ Austria



BGK Germany



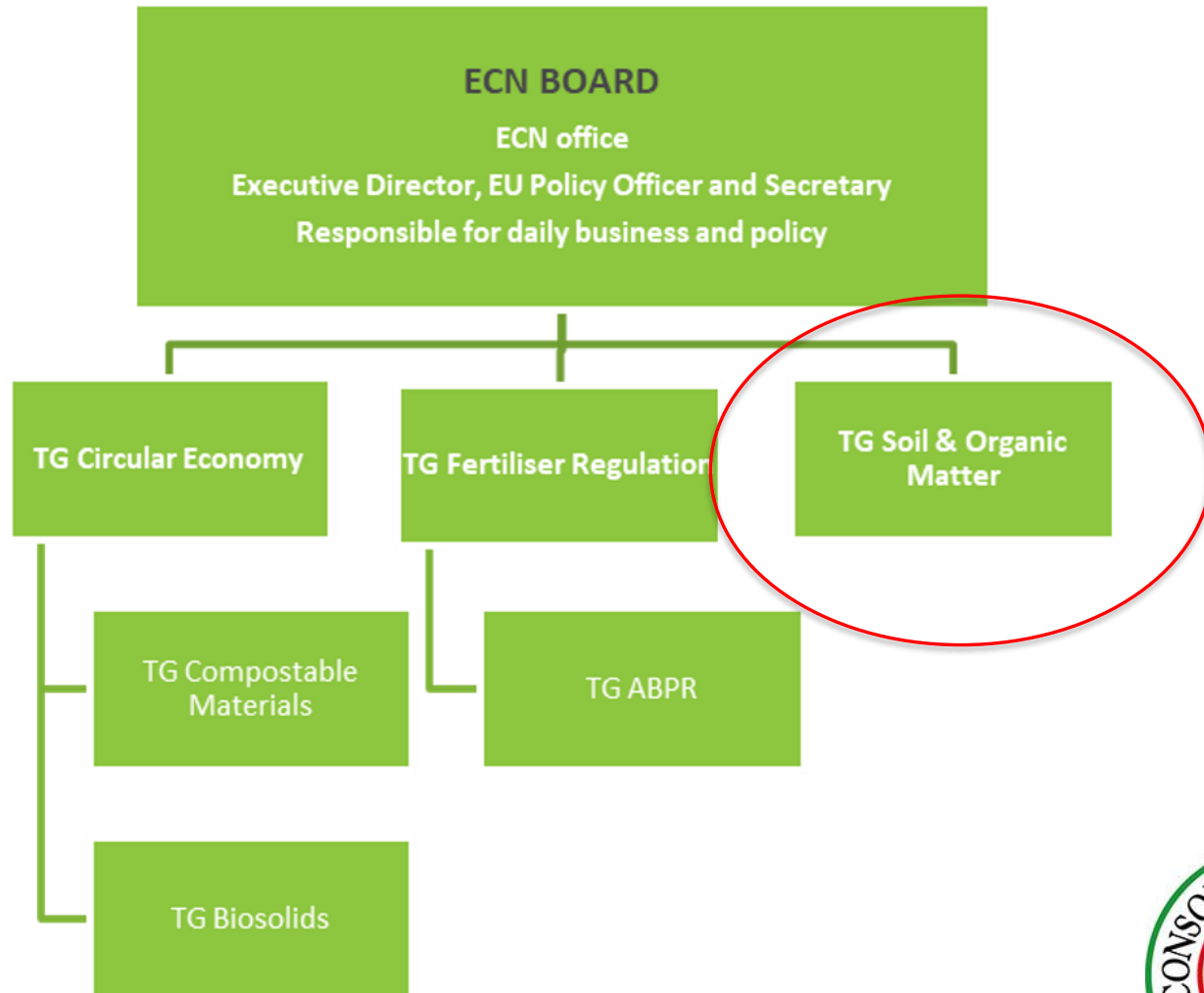
VLACO Belgium



CIC Italy



The commitment of ECN to soil and organic matter



The TG Soil & Organic Matter

The task group focuses on the benefits of compost and digestate from bio-waste.

With the work of the TG the following goals should be achieved:

- raise awareness of the importance of soil organic matter
- strengthen the organic cycle
- demonstrating the benefits of Soil organic matter



TG SOM recent publications



Position Paper on Soil Organic Matter

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 Europe¹. 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 Collection, Treatment & Markets Across Europe. <https://www.compostnetwork.info/download/ecn-status-report-2019/>



ECN INFO PAPER

Survey on national/local plans allocating resources for soil management practices that include the utilisation of compost

Introduction

In order to point out the key aspects of national or local policies put in place so far to stimulate the adoption of good land management practices aimed at preserving soil health and fertility, that include the reintegration of organic matter by means of compost, we have collected and analysed some of the most significant incentivising schemes adopted in some Member States, here shortly summarised.

The following case studies were considered:

- Local humus build-up CarboCert (Germany, GE1)
- RETERRA - CarboSoil (Germany, GE2)
- Healthy Soils for Healthy Food (Austria, AU1)
- Humusprojekt (Ökoregion Kaindorf, Austria, AU2)
- Utilisation of organic fertilisers in place of mineral fertilisation (Italy, Region Piedmont, IT)
- French Carbon Standard CARBON AGRI (France, FR)

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ECN Position Paper

Date: 23/06/2022

ECN Position Paper on the Role of Organic Waste derived Soil Improvers and Organic Fertilizers within Carbon Farming Initiative

The EC Communication on Sustainable Carbon Cycles published on 15th December 2021¹ focuses also on carbon farming as a business model incentivising practices on ecosystems in order to increase carbon sequestration. The EU Commission announced in its 2022 Work Program a proposal for the certification of carbon removals with the view of scaling up the development of sustainable carbon removals and creating a new business model for land managers and companies, in line with the European Green Deal and European Climate Law objectives. The **carbon farming initiative**² (CFI) refers to the carbon pools and GHGs streams management at farm level, aiming to mitigate climate change. This can involve the management of land, livestock, all the carbon pools in soils (materials and vegetation), besides the streams of carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). In this frame, the EU recently published a **technical guidance handbook**³ which is intended to support the development of result-based payment schemes for CFIs in the EU.

The handbook gathers the possible carbon farming schemes under few main topics, amongst which the one called "Maintaining and enhancing SOC in mineral soils", to be achieved by the adoption of management practices that benefit the Soil Organic Carbon (SOC), including cover cropping, improved crop rotations, agroforestry, preventing conversion to arable land and conversion to grassland.

When reading the eligibility criteria of CFI, it is quite surprising the explicit exclusion of the application of organic fertilizers (OFs), with the motivation (see "annexes - case-studies") that the "Application of organic fertilizers result in translocation of carbon from one part of the system to another"; the family of OFs include the organic waste derived organic soil improvers such as compost and solid digestate, possible nutrients and carbon sources for crops and agricultural soils. ECN wishes to clarify the role OFs can play within a carbon farming initiative, wishing that the organic fertilization of soil and plants

¹ COM(2021) 800 final - Communication from the Commission to the European Parliament and the Council - Sustainable Carbon Cycles

² https://ec.europa.eu/clima/eu-action/forests-and-agriculture/sustainable-carbon-cycles/carbon-farming_en

³ COWI, Ecologic Institute and IEEP (2021) Technical Guidance Handbook - setting up and implementing result-based carbon farming mechanisms in the EU Report to the European Commission, DG Climate Action, under Contract No. CLIMA/C.3/ETU/2018/007. COWI, Kongens Lyngby

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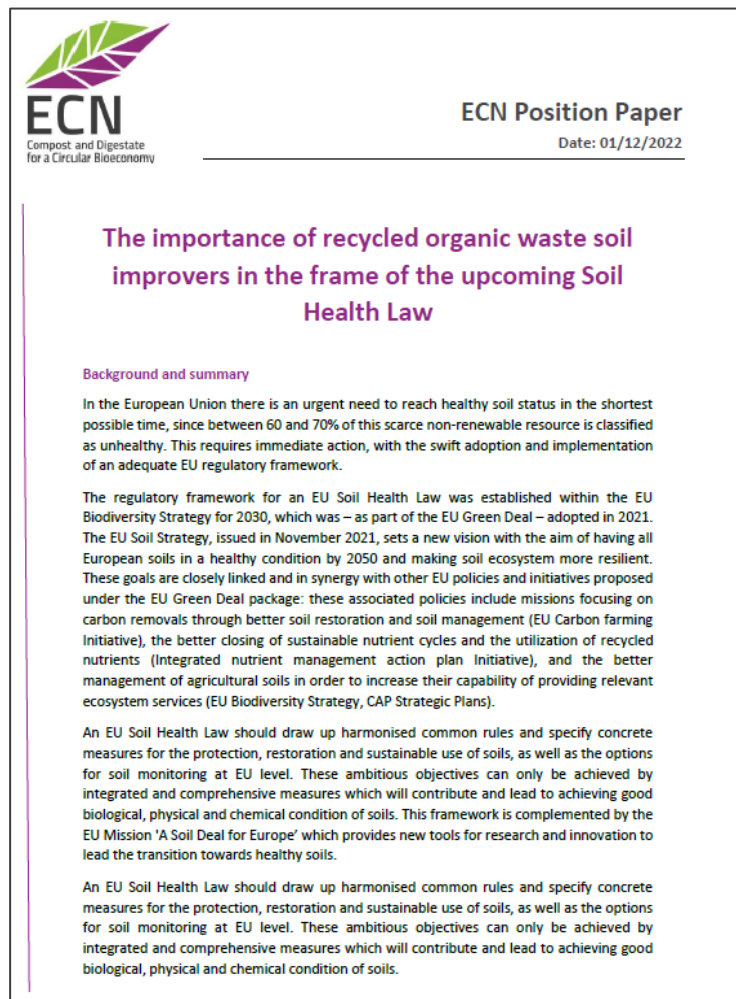
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The latest position paper

- Evaluation of the results of several long-time field trials
- Additional information about the features of organic waste soil improvers



Long-term trials of compost application

- **11** studies selected among those provided by TG members for their representativity (4 from scientific literature and 7 from ECN partner contribution).
- All studies were run on **full-scale open-field** trials
- All trials were at least **2** years long, and many more than **5** years.
- All products under a QAS, or compliant to national legislation!



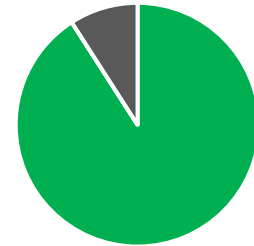
Long-term trials of compost application

- We started giving attention to the soil indicators suggested by the “**soil monitoring report**” applicable to compost (SOC, nutrients, acidification, HM contamination, biodiversity, erosion, compaction).
- Crop yield is not a soil quality indicator, although it can indirectly attest soil health.

Long-term trials of compost application

Soil Organic Carbon (SOC)

Very consistent indicator, 10 out of 11 papers report a positive effect, compared to untreated or chemical fertilization, and one did not investigate SOC.



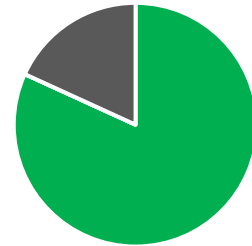
Highlights:

In some cases, the stocking of SOC lasted for three years after the last compost application.

Long-term trials of compost application

Soil nutrient status

Consistent indicator as well, 9 out of 11 papers report a positive effect, compared to untreated or chemical fertilization, and 2 did not investigate this indicator.



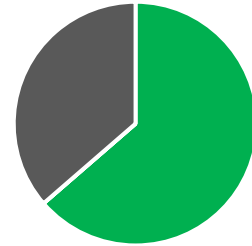
Highlights:

Interesting effect on the increase of the available P fraction. Increased amount of available N at the end of the winter

Long-term trials of compost application

Soil compaction

7 out of 11 papers report a positive effect, which means higher porosity or a reduced soil bulk density, 4 papers did not investigate the topic.



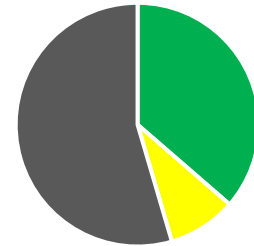
Highlights:

Some papers reported an increased water retention capacity of the soil.

Long-term trials of compost application

Soil acidification

4 out of 11 papers report a positive effect, which means a small increase in pH, 1 reported no statistic significance and 5 did not investigate the topic.



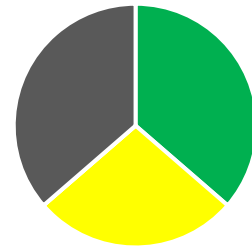
Highlights:

The effect is quite small, though is more relevant in acidic soils, which confirm a positive liming-like effect.

Long-term trials of compost application

Soil biodiversity

4 out of 11 papers report a positive effect, which means a higher microbial biomass or soil respiration rate, 3 reported no difference and 4 did not investigate the topic.



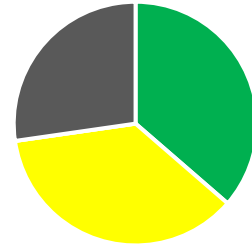
Highlights:

One study reported an increased soil potential ammonium oxidation and nitrogen mineralization, suggesting more nitrogen availability to plants.

Long-term trials of compost application

Crop yield

4 out of 11 papers report a positive effect on crops, 4 reported no statistic significance, 3 papers did not investigate the topic.



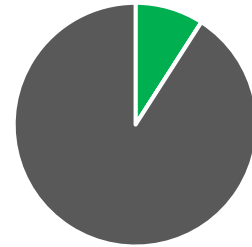
Highlights:

In some cases products were of higher quality compared with chemical fertilization: less incidence of diseases.

Long-term trials of compost application

Organic pollution in soil

Only one study investigated the presence and accumulation of organic pollutants, and observed no difference compared to untreated soil.



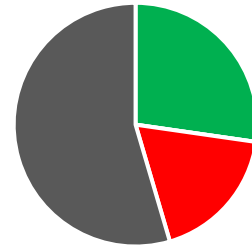
Highlights:

PAHs, dioxins and furans, and phthalates were investigated.

Long-term trials of compost application

Soil Heavy Metals (HM) accumulation

3 out of 11 papers report no effect (which we considered as “positive”), 2 reported a small accumulation of Zn, and 6 did not investigate the topic.



Highlights:

A small Zn accumulation is observable only in high compost dosage for some years.

Conclusions (1)

- Besides closing the loop of organic waste management, the application of organic waste soil improvers to soils is connected to the improvement of many functions that are related to soil fertility and soil health addressed by the upcoming regulation: carbon sequestration, nutrient cycling, soil biodiversity, water resources preservation.
- these benefits are associated to several features that characterize these products, the main ones being their organic matter content and the pool of long term available nutrient elements

Conclusions (2)

- An overall benefit in soil degradation prevention must be considered also, since the application of organic soil improvers plays a role in preventing soil compaction and desertification
- Several long-term field scale trials performed in several European countries and assessed through the main soil health indicators have clearly shown those benefits

Conclusions (3)

- ECN once more highlights that high quality organic waste soil improvers should be acknowledged as important elements to consider in upcoming Soil Health Law, promoting compost and digestates use within a sustainable farming system, meaning that:

the application of compost or digestate should follow good agricultural practices

in light of the encouraging good agricultural practices, appropriate training to farmers on the long-term benefits of soil health, the practical ways of assessing its quality, the specificities of compost and solid digestate and their correct utilization



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