THE SUSTAINABLE USE OF COMPOST

FACT SHEET 1:

SOIL STRUCTURE & CARBON STORAGE

ABOUT SOIL

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.

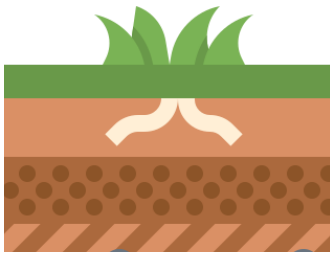
Soil is therefore a complex ecosystem, and not just an inert substance. Soil contains many different types of micro-organisms, invertebrates and plants, and these interact with each other in ways in which scientists are now only beginning to understand.

It is also a very important carbon store, holding around three times as much carbon as the atmosphere. Soil also performs a number of so-called 'ecosystem services', which include storing and filtering water, recycling nutrients and harbouring about a quarter of the world's species.

As soil is also the medium in which most of the world's food is grown, it is vitally important that it is looked after so that humans can continue to grow enough food to feed over seven billion people.

SOIL'S FUNCTIONS

- Food production
- Vegetation (feed, fibre, fuel & medicines)
- Biodiversity (¼ of total)
- Climate change (adaptation & carbon storage)
- Water (filtration & storage)
- Nutrient storage & release



SOIL IS THE SOURCE OF 95% OF OUR FOOD

IT HOLDS ABOUT THREE TIMES AS MUCH CARBON AS THE ATMOSPHERE

THREATS TO SOIL

Most of the world's soils are facing significant pressures, either directly as a result of human activity or indirectly because of climate change. Loss of organic matter caused by erosion is one of the critical threats to soils across the globe. Soils that are low in organic matter:

- **Are less productive** – that is, they grow fewer crops;
- **Retain less water** – this means that they dry out quicker and are not as good at absorbing water; and
- **Store less carbon** – this is because soil organic matter is mostly carbon.

Modern agricultural practices have resulted in significant soil erosion over the last century. Across the EU, about 12 million hectares of agricultural land suffer from severe erosion. This is thought to cost in the region of €1.25 billion annually; equivalent to a loss of crop productivity of around 0.43% every year .[1]

Countries in the south of Europe are most prone to the effects of soil organic matter losses, with Italy, Spain, Portugal, Greece, Cyprus, Bulgaria and Romania being particularly vulnerable.

[1]. Panagos, P., Standardi, G., Borrelli, P., Lugato, E., Montanarella, L. & Bosello, F. (2018) Cost of agricultural productivity loss due to soil erosion in the European Union: From direct cost evaluation approaches to the use of macroeconomic models. Land Degradation & Development 29: 471-484. DOI: 10.1002/ldr.2879

IMPROVING SOILS WITH COMPOST

Soils with low levels of organic matter can be improved by regular applications of quality compost. This has many benefits:

SOIL ORGANIC MATTER - Experiments have shown that a lot of the carbon in compost is stored in soil as organic matter.

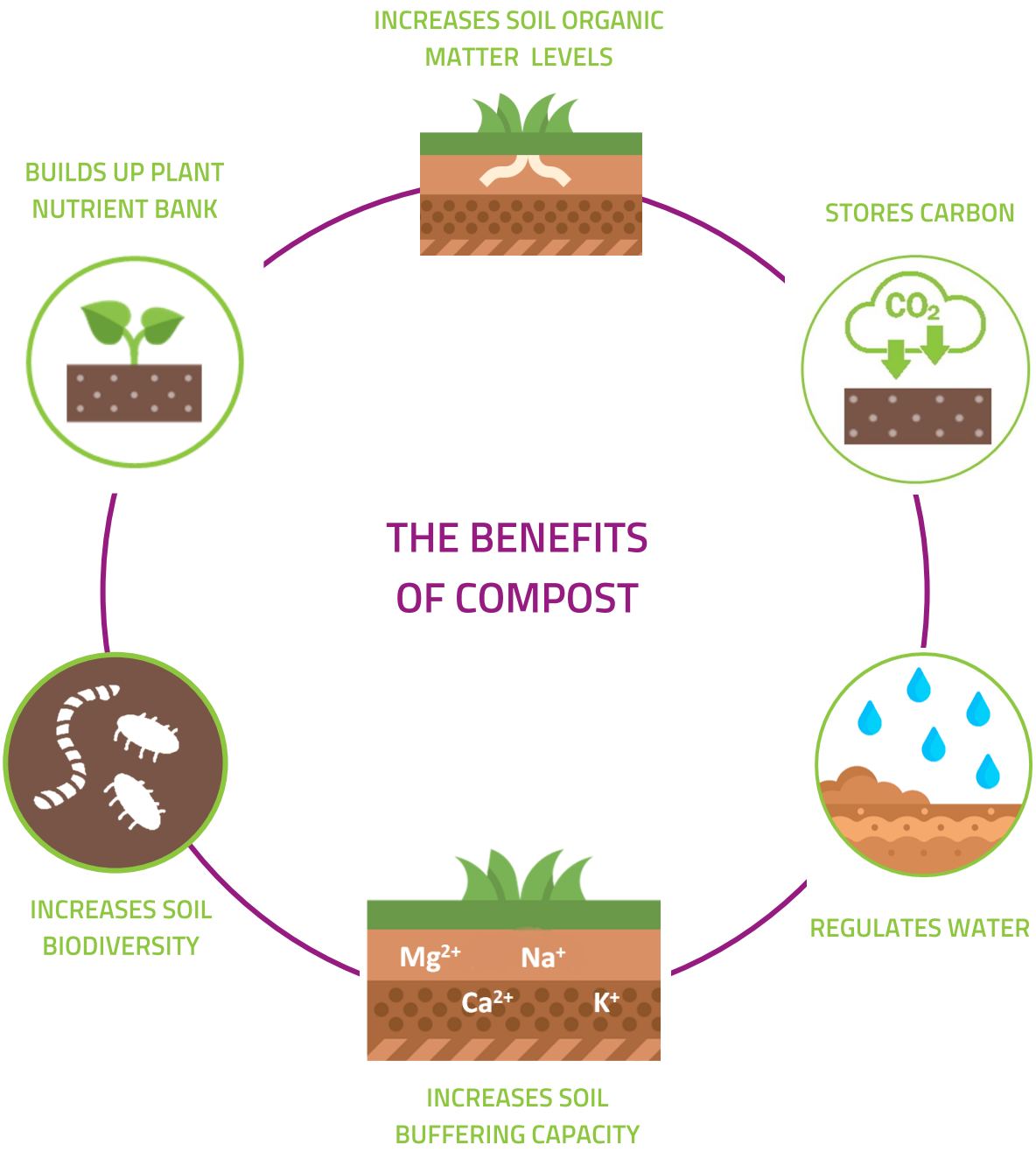
SOIL STRUCTURE – Compost increases soil aggregate stability and soil pores, thereby reducing compaction.

WATER HOLDING CAPACITY – Compost helps soil to store water, therefore reducing the need for irrigation.

SOIL BIOLOGY – Compost increases the number and diversity of invertebrates and micro-organisms in soil. This can help plants resist disease.

SOIL FERTILITY – Compost helps build up a bank of plant nutrients (including nitrogen, phosphorus & potassium).

CATION EXCHANGE CAPACITY – Compost increases the buffering capacity of soil, helping it to hold onto nutrients for longer.



COMPOST STORES CARBON IN THE SOIL

Soils with low levels of organic matter can be improved by regular applications of quality compost. This has many benefits:

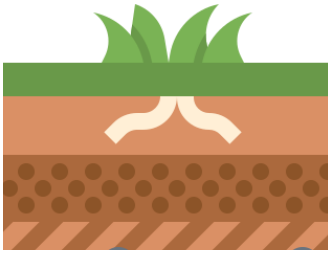
- A fraction of the organic matter in compost is converted into a stable form called 'humus' - this remains in soil for many years.
- Every tonne of soil organic carbon holds the equivalent of about 3.67 tonnes of atmospheric carbon dioxide.
- For every tonne of compost (fresh mass) applied to soil, between 60 - 150 kg of carbon dioxide equivalents can be sequestered (stored)[2].

CARBON DIOXIDE IN THE ATMOSPHERE IS CONVERTED INTO ORGANIC MATTER BY PHOTOSYNTHESIS

BIO-WASTE

BIO-WASTE (LEFT OVER FOOD & GARDEN WASTE) IS CONVERTED INTO COMPOST

COMPOST



1 TONNE OF COMPOST (FRESH MASS) SEQUESTERS
30 KG SOIL ORGANIC CARBON
110 KG CO_2 EQUIVALENTS
(EQUIVALENT TO 11% OF ITS MASS)

SOIL

[2] Calculations based on: Gilbert, J., Ricci-Jürgensen, M. & Ramola , A. (2020) Quantifying the Benefits to Soil of Applying Quality Compost. ISWA, Rotterdam.,

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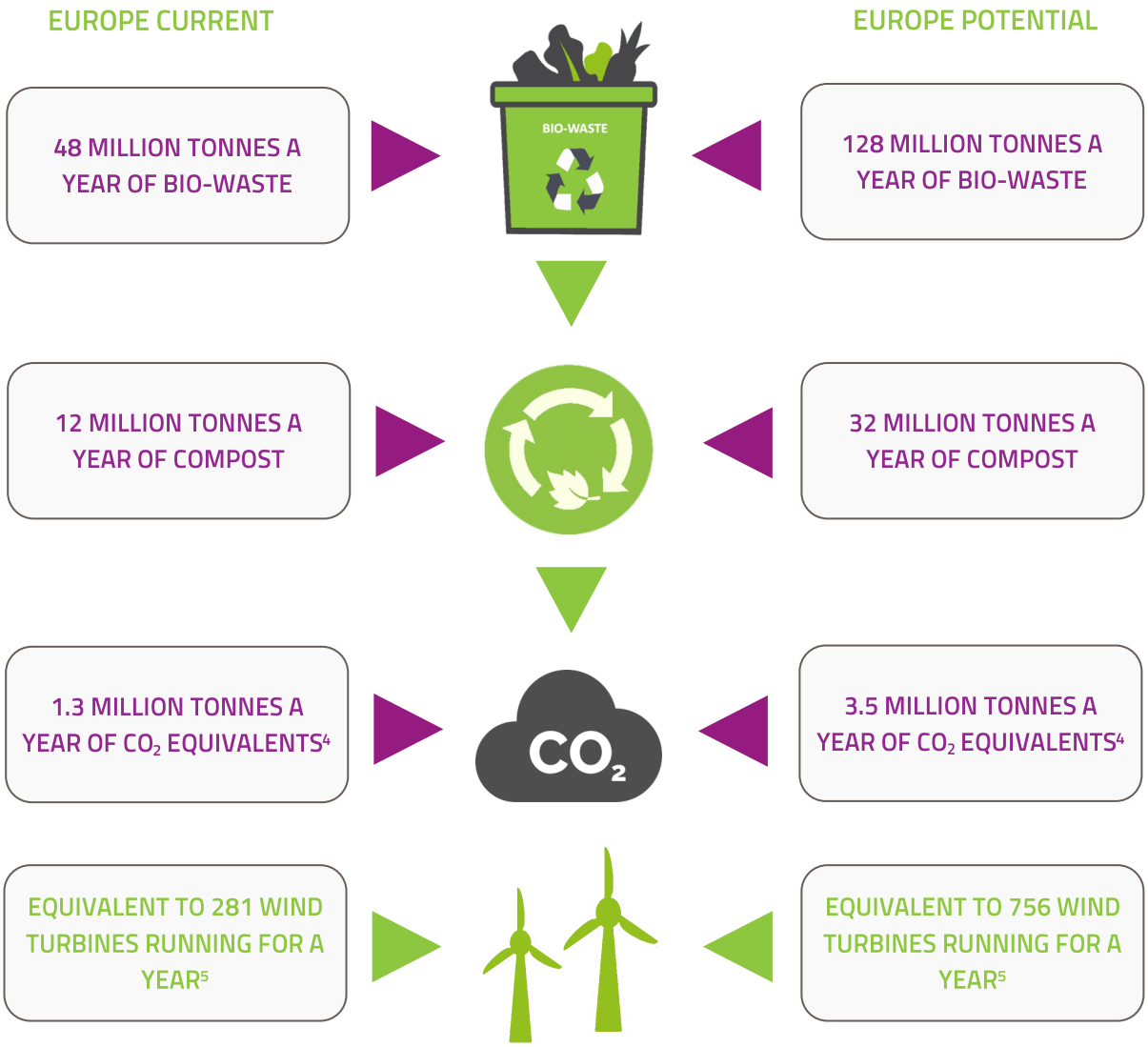
SOIL CARBON SEQUESTRATION — EUROPEAN POTENTIAL FROM BIO-WASTE

Bio-waste is made up of discarded plant and animal residues, and includes garden/park and food waste. Between 118 and 138 million tonnes of bio-waste is generated across the EU every year, but less than 40% of this is currently recycled into useable products.

About 12 million tonnes of compost is produced annually across the EU, but this could be increased to just over 32 million tonnes a year if all collectable bio-waste was treated[3].



[3]. In 2018 approximately 48 million tonnes of bio-waste was treated, resulting in an estimated 12 million tonnes of compost (74% of the total) and 4 million tonnes of anaerobic digestate (26% of the total). This assumes a 33% conversion of bio-waste into compost and digestate. Scaling up, the median value of 118-138 million tonnes of bio-waste was taken, and it was assumed that there would be a pro-rata increase in compost and digestate production (i.e. 74% of the total would be compost and 26% digestate).

[4]. Calculations based on Gilbert *et al.* (2020); see footnote 2. A C-sequestration rate of 50 kg soil organic carbon per tonne of compost (dry matter; or 30 kg on a fresh mass basis) was assumed; however, as soil and climatic conditions differ widely across Europe, this rate will vary between regions and member states.

[5]. www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

About 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/soil improvers.

The European Compost Network is a membership organisation with 65 members from 27 European Countries. Members include all European bio-waste organisations and their operating plants, research, policy making, consultants and authorities. ECN represents more than 4500 experts and plant operators with more than 45 million tonnes of biological waste treatment capacity.

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