

Quantifying the Long-Term Agronomic and Economic Benefits of Compost

Soil health, nutrient supply, and fertiliser reduction



compost-digestate.eu

Vision

Contributing to a sustainable Europe where organic resources are fully recycled and recovered into valuable compost and digestate products

Advocacy

**Quality
Assurance**

**Knowledge
Sharing**

**Capacity
Building**

**Market &
Innovation**

Olivier Labrie

Project Officer for Agriculture

Representing the **European Compost Network**

Session 9.1: Quantifying sustainability and impacts of solutions for soil management and health

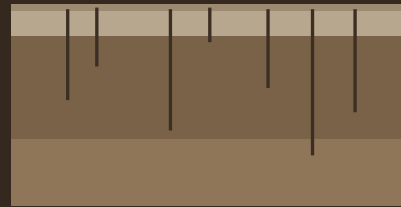
Presented at Soils for Europe Conference · Coimbra, Portugal · September 2026

EU soils are degrading rapidly, and compost can help reverse that trend

62%

of EU soils are in an
unhealthy state

— JRC Soil Health Dashboard



*Degraded soil profile
under continued SOM
loss*



*Restored compost-amended
soil, with SOM build-up*

Long-term compost use rebuilds the soil foundation

1

Organic Matter

Increased in all trials; serving as a reservoir for nutrients and water, and enhancing soil processes, structure, and life.

→ 5-year trial: At <20 t/ha → +35% SOM

2

Organic Carbon

Soil carbon stabilised via compost; contributing structure, niches, and storage.

→ 27-year trial: +42% in 0–20 cm;
+63% in 20–40 cm

3

Biology

Increased microbial biomass and activity; driving nutrient cycling and soil aggregation.

→ 9-year trial: Sandy soils, 20-80 t/ha
→ +10-46% biomass

4

Nutrient Supply

Trials provided reliable supply of nutrients; creating a slow-release “nutrient bank”.

→ 20-year trial: P and K just as readily available as with mineral fertilisation

5

Soil Structure & Water

Increased humic substances; providing greater aggregate stability, improved water holding capacity, reduced erosion.

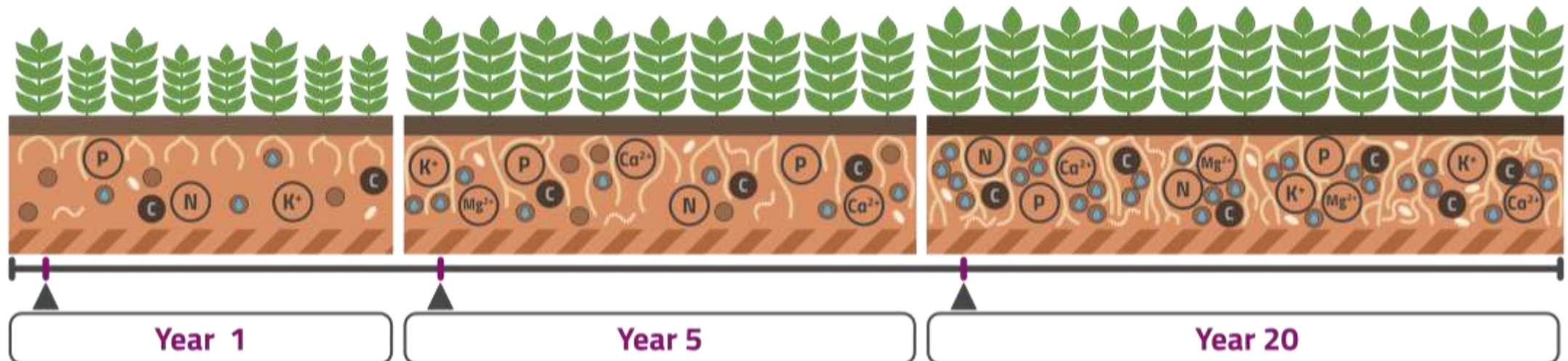
→ 24-year trial: At 15 and 45 t ha⁻¹ yr⁻¹
→ ~ +350% infiltration rate vs. min. fert.

6

Soil Quality

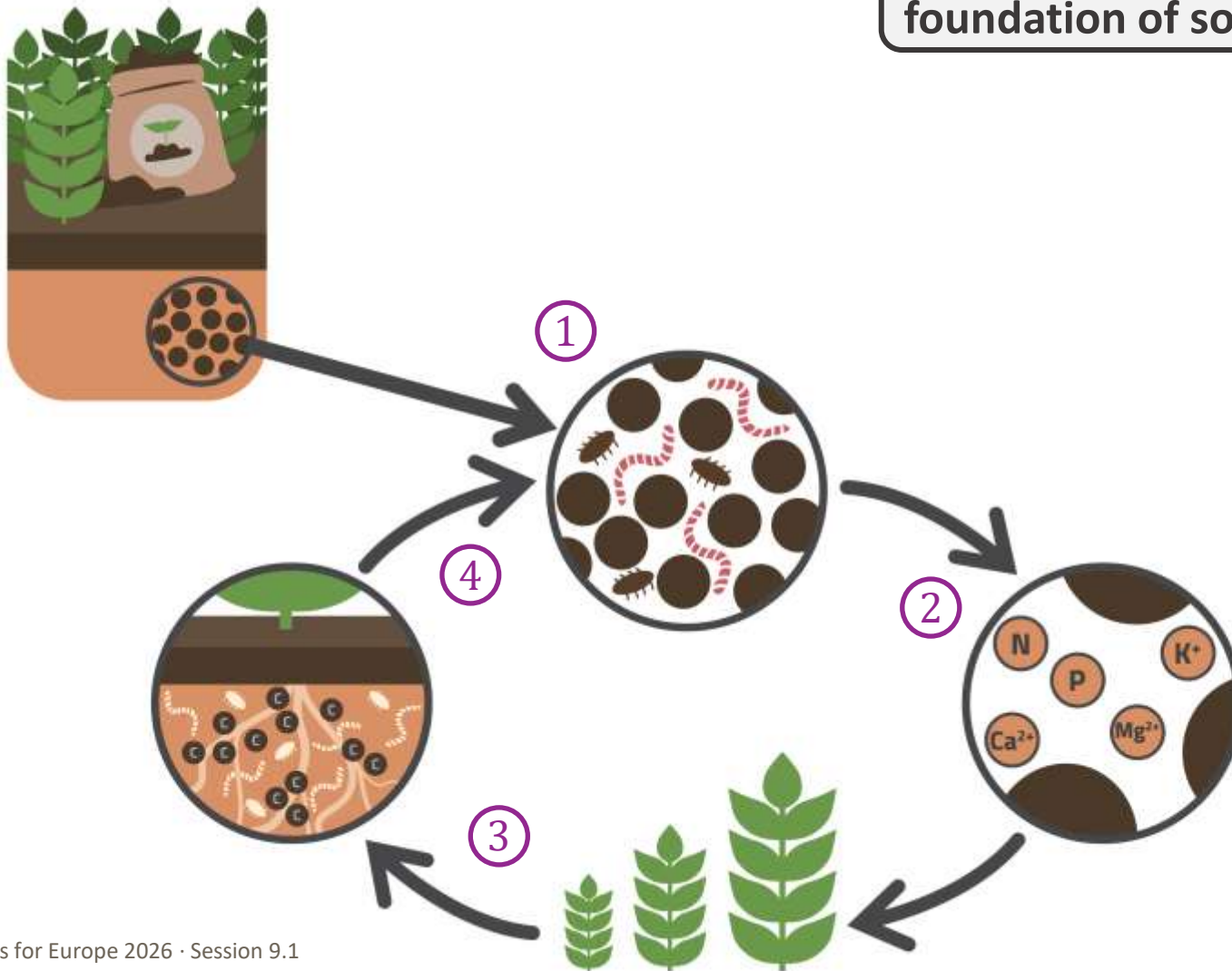
Adsorbed heavy metals and pollutants; maintaining soil quality and function.

→ 20-year trial: No significant differences in soil or wheat heavy metal content



Compost Stimulates A Self-Sustaining Nutrient Cycle

Compost contains 15–32% organic matter, which is the foundation of soil fertility.



7

Crop Yield & Quality

Increased OM, microbial biomass, and activity leads to lasting nutrient availability.

→ 7-year trial: no statistical yield difference b/w compost and mineral plots

Mineral fertiliser replacement potential compounds with years of sustained application

at 20 years of annual application

56% **72%**

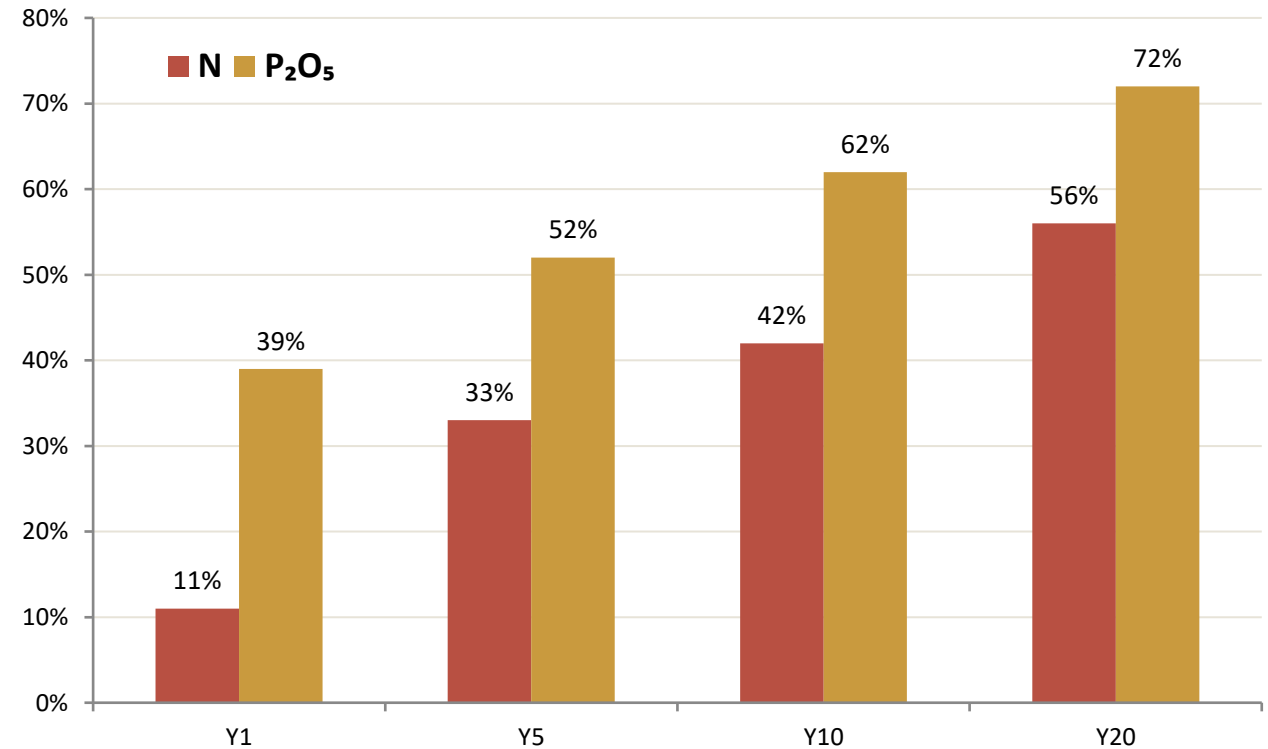
N

P₂O₅

of crop nutrient demand can be supplied by green & bio-waste compost, replacing mineral fertilizer.*

→ Literature on long-term compost trials suggest that the replacement potential can be higher.

Mineral Fertiliser Replacement Potential (%)



Green & bio-waste compost, average of 10 and 15 t FM/ha/year application

**Results from a model developed for 2026 ECN Fact Sheets, which is based on the nutrient composition of ECN members.*

The input savings translate directly into farm-level economic benefit

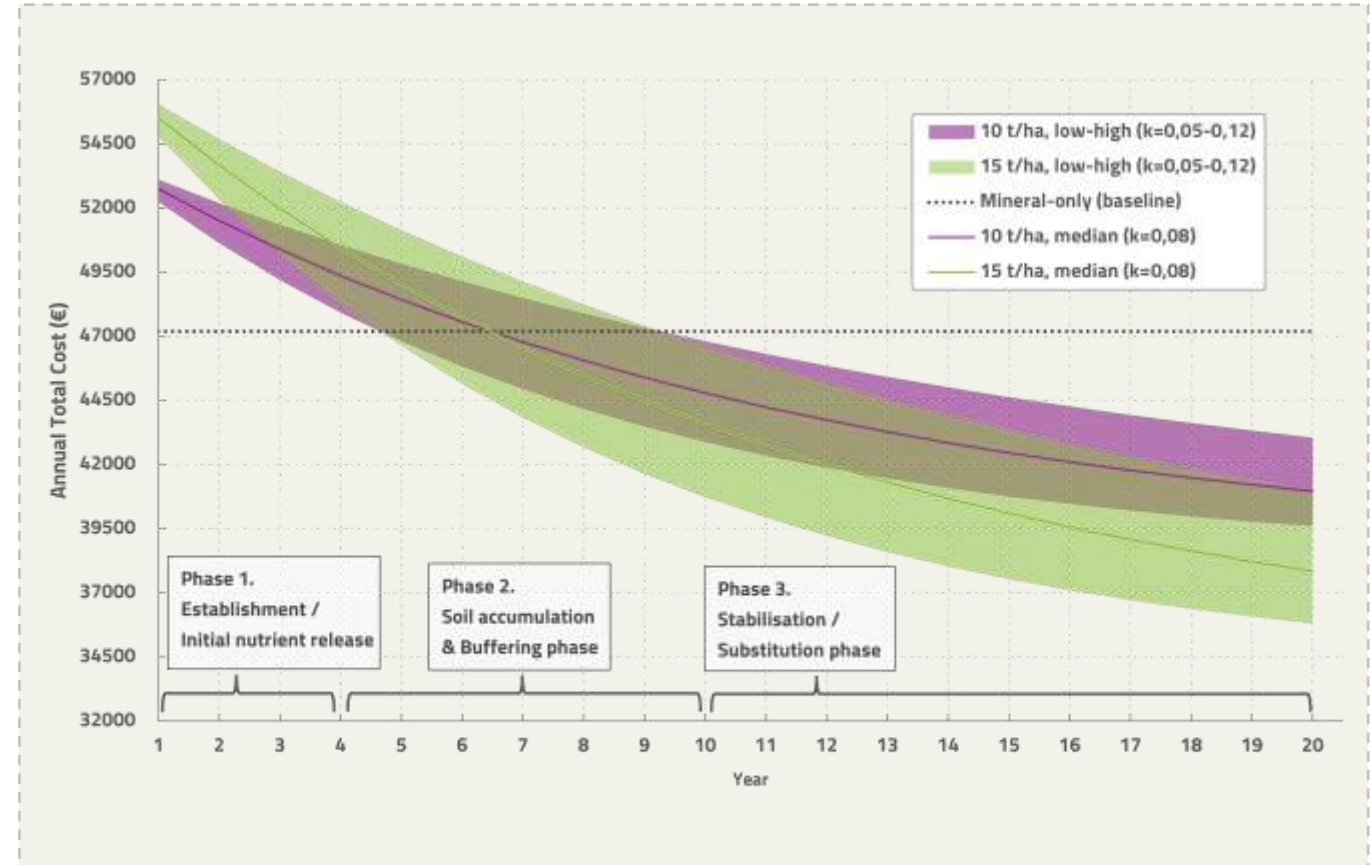
Potential to save:

€ 42 - € 109

per ha per year

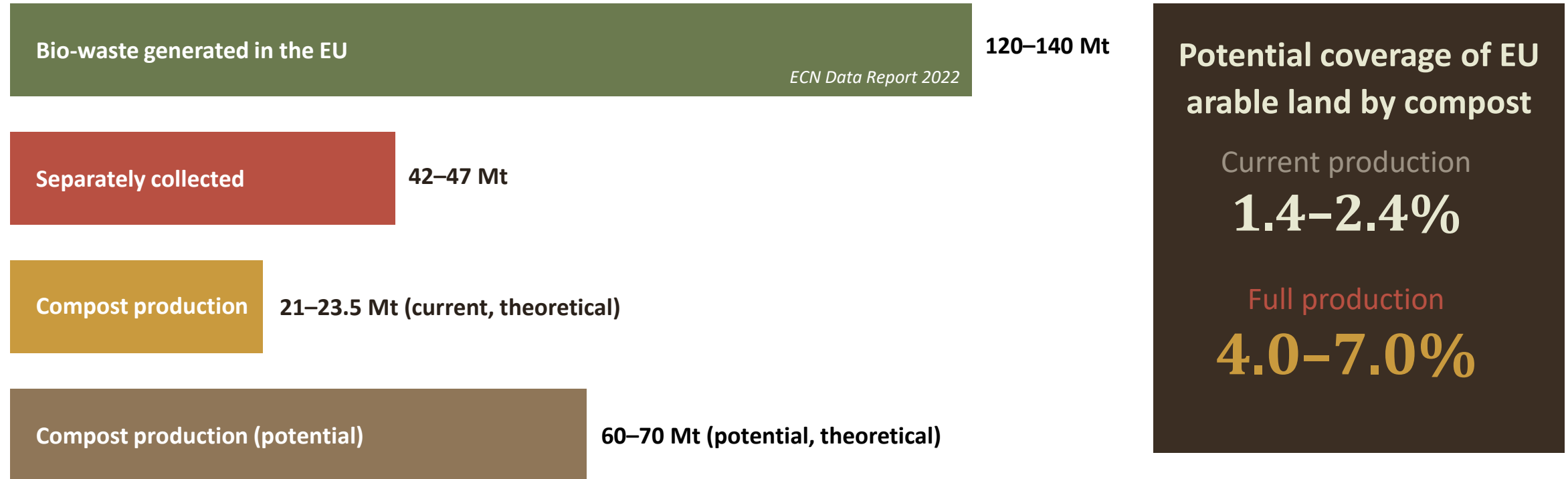
through avoided mineral fertiliser cost;
including net of compost application cost.

→ In other words, by year 20, 9 to 23% in annual fertiliser cost reductions are possible.



**Results from a model developed for 2026 ECN Fact Sheets, which is based on the nutrient composition of ECN members.*

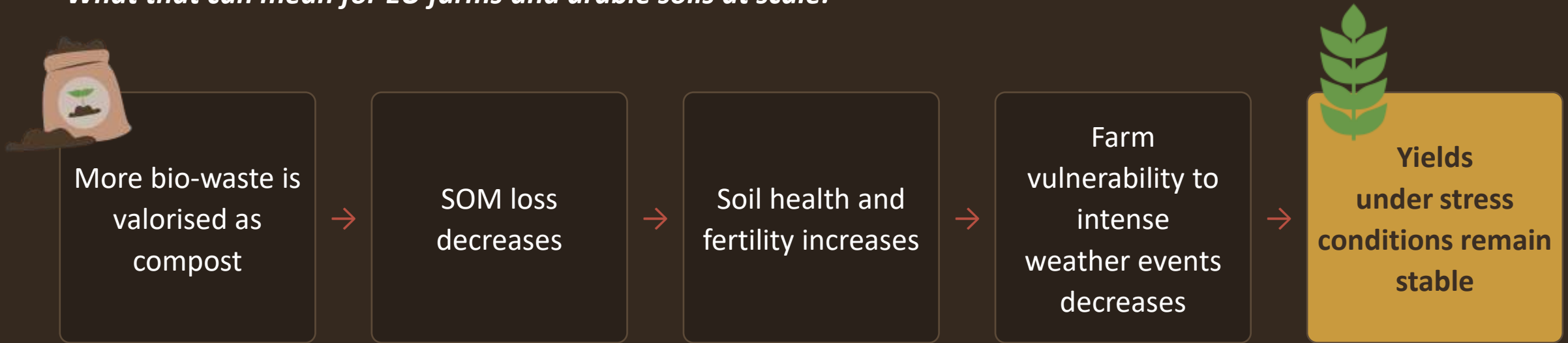
The benefit is very real — but much of the feedstock never becomes compost



EU bio-waste generation, separate collection, and compost production — current vs. potential

By closing that gap, the payoff compounds

What that can mean for EU farms and arable soils at scale:



Long-term compost trials support the case for scaling on-farm use, a vital lever for soil health, nutrient security, and farm resilience under climate change.

Taking this forward: ECN and FertiCcovery

An open invitation for synergies via ECN and FertiCcovery

1 ECN Fact Sheets (QR code)

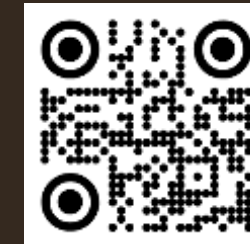
Current long-term compost field trial data for soil health and farm sustainability



compost-digestate.eu

2 FertiCcovery Project

1. Evaluate BATs for recycling fertilisers from secondary materials
2. Promote balanced nitrogen and phosphorus flows for soil health
3. Advise policymakers on alternative fertilising products



ferticcovery.eu

3 Open to collaborations

Looking to connect with projects and stakeholders working on soil health, nutrient recovery, or bio-waste valorisation.

Let's talk after the session!

labrie@compostnetwork.info