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Managing soil application of quality recycled organic materials

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Why should we be concerned about carbon in soils?

- Soils are a significant part of the global carbon budget with more than 60% of the terrestrial carbon
- In much of Western Europe we have seen a decline in soil carbon over the last 100 years.
- Soils are able to sequester carbon effectively
- By recycling organic wastes to soils we are adding to the soil carbon pool and also reducing CO₂ production from the manufacture of fertilisers and movement of wastes to landfill, etc..

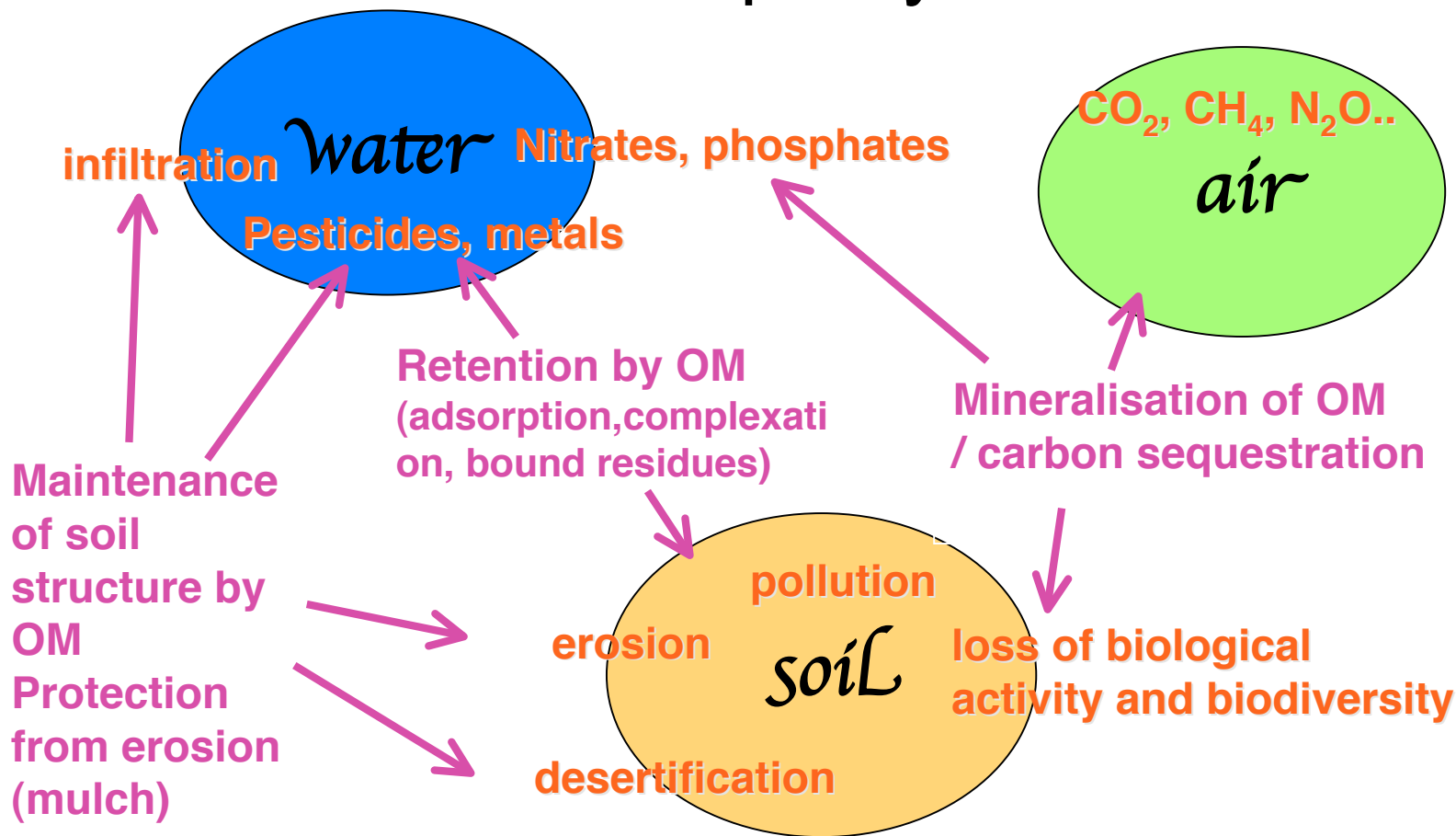
Benefits of organic matter in soils

- Soil Organic Matter (Carbon) is a small part of the soil in terms of mass (often well below 5%) but it is significant in terms of **soil function**
- Soil organic matter has a significant contribution to overall nutrient pools and cycling in soils.
- Soil organic matter has a major effect on soil physical properties such as aggregate stability, water infiltration, etc.
- Soil organic matter supports the micro-organisms in the soil. These organisms control many of the soil properties and processes – soil biodiversity

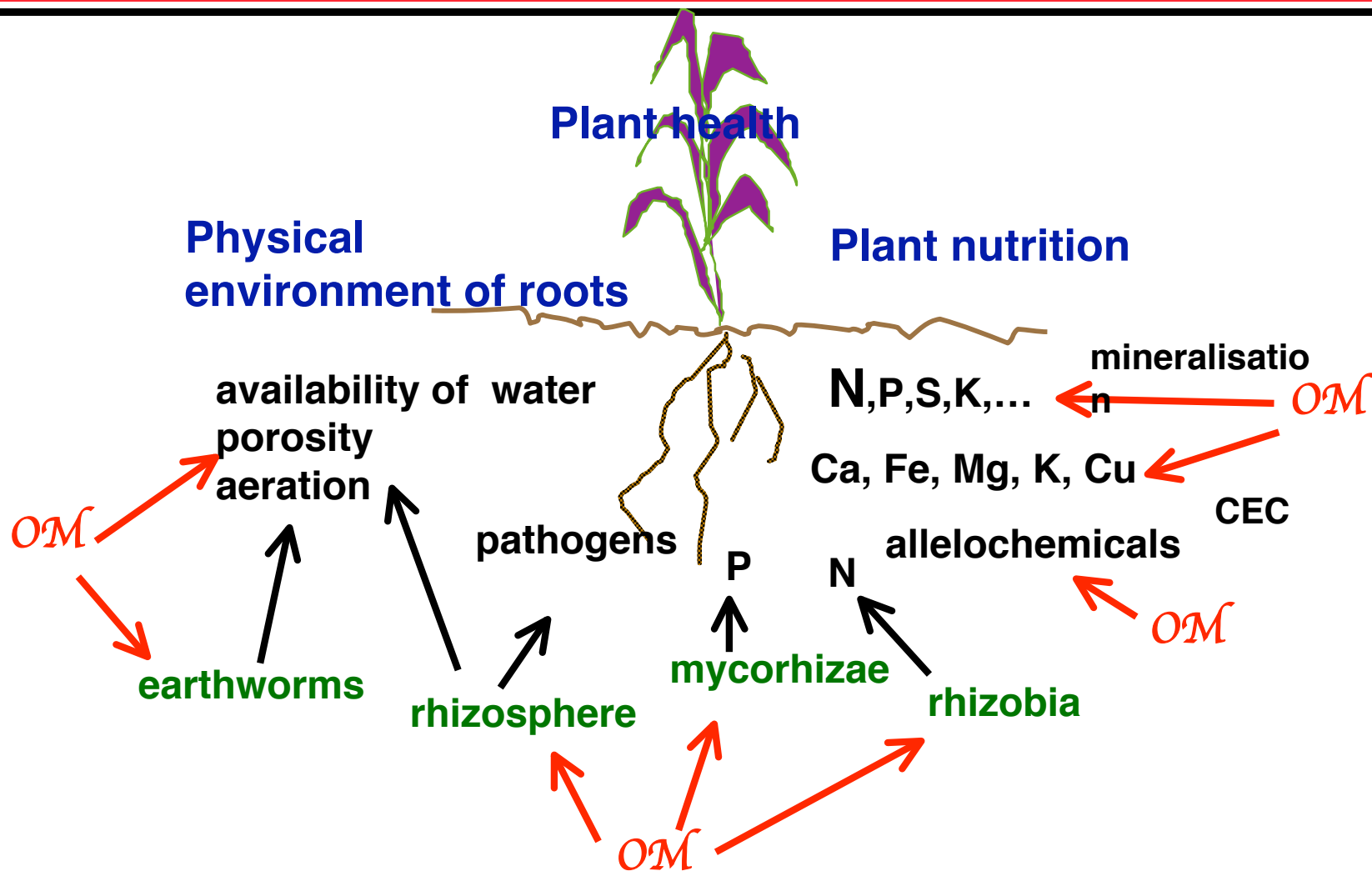


Environmental functions of soil and SOM

Maintenance and quality of resources



Sustaining food and biomass production –role of SOM



Annual food consumption and waste – UK as an example

Annually in the UK we consume about 22 million tonnes of food.

Of this we waste about 7 million tonnes, of which a little over 4 million is readily avoidable and could have been eaten if managed better.

Of the rest about 1.3 million tonnes is unavoidable with our current life style (e.g. tea bags, meat carcasses, vegetable peelings)

Waste in the UK fruit and vegetable supply chain

Stage in the Life Cycle	Mass wasted (million tonnes)
Agricultural production	0.2 (this is very difficult to estimate)
Food processing	0.16
Retail	0.17
Food Service	0.96
Domestic	2.5
Total Fruit and Vegetable Waste	3.99
Waste as a % of supply	25%



Examples of food waste (UK)

- 359, 000 tonnes potatoes (about half of these are untouched)
- 328, 000 tonnes of bread
- 190, 000 tonnes Apples (the vast majority of these are thrown away untouched)
- 161, 000 tonnes of Meat and Fish

About half of what is disposed of is fresh, raw and uncooked.

UK Food waste in general

- In the region of 16-18 million tonnes of food waste per year
 - ~ 6.7 million tonnes per year from households
 - ~ 4.1 million tonnes per year during industrial processing
 - ~ 4.6 million tonnes per year in food service and supermarkets
 - ~ 1 – 3 million tonnes in agricultural and miscellaneous commercial activities

This works out at a cost of £610 per household (family with children) per year.

Characteristics of food waste

- High moisture content – this may give rise to special requirements when the waste is treated, requiring the addition of a bulkier carbon source such as green waste or wood chip.
- High fermentability treatment may require odour control
- Nutrient status is good.

What should we do with the food waste?

Management of organic waste materials is a rapidly developing field:-

Composting – the traditional route for many organic waste materials. Needs good management to achieve sanitation of materials.

Anaerobic Digestion – An increasingly popular approach to organic waste management.

Composting

In vessel composting is probably the most widely used method of dealing with organic wastes because it ensures there is accurate temperature and moisture control and monitoring

It is safe and effective and relatively low cost and produces a product that may be used as a **soil conditioner** or **biofertiliser** (although many composts have a relatively low nutrient status) and the coarser fractions as **mulch**.

In the UK the quality and suitability of composts are evaluated relative to **PAS 100** and the **Compost Quality Protocol**.

Heat is produced in the process is there a possibility of capturing this heat?



Anaerobic Digestion

The **win-win** option!

With AD we can generate energy **and** produce a digestate as a biofertiliser or soil conditioner.

AD involves the breakdown of biodegradable material by micro-organisms in the absence of oxygen.

The outputs are:

Biogas – a mixture of methane and carbon dioxide – a fuel

Digestate – nutrient rich residue – solid or liquor



Anaerobic Digestion

1 tonne of food waste will allow generation of 300 kWh of electricity based on 37% efficiency.

AND

The digestate from this process either directly or after composting (possibly with other more bulky organic wastes) has potential as a **biofertiliser** and **soil conditioner**.

In the UK **PAS 110** and a **AD Quality Protocol** allows evaluation and provide confidence when the material is applied to land.



Thank you