



Sediment

ORGANIC MATTER

Soils with poor levels of organic matter tend to have low biological activity, low water and nutrient retention capability and are exposed to slaking and erosion potential.

Organic matter is the fraction of the soil made up of decomposed living organisms, including plant and animal remains, cells and tissue, plant roots and soil microbes. The end result of the decomposition process is 'humus'. Humus is the stable part of soil organic matter. The humus compounds withstand rapid breakdown in undisturbed soils, particularly soils high in clay content. However, they will rapidly decompose under aggressive and regular cultivation because of increased exposure to soil micro-organisms.

Increasing organic matter has a number of beneficial effects on soil properties.

Physical properties:

- Reduces the soil bulk density while increasing soil porosity and aeration.
- Increases the amount of plant-available water stored in the soil and helps reduce evaporative water losses.
- Improves the stability of soil aggregates, making soil less prone to compaction, surface crusting and erosion.

Biological properties:

- Increases quantity, activity and diversity of soil micro-organisms that need carbon as an energy source. Much of the recycling of carbon and nutrients is done by these micro-organisms.

Chemical properties:

- Improves nutrient storage and release.
- Increases Cation Exchange Capacity.
- Increases soil pH buffering.
- Increases sorption/deactivation of contaminants such as heavy metals.

Techniques to build organic matter

Rotate crops:

- The level of organic matter is affected by the quantity and quality of the plants grown. The quantity of plant residue can be changed by:
 - growing crops of different biomass
 - improving the nutrition and disease status of following crops through a beneficial rotation
 - growing crops with different rooting patterns that alter soil structure.
- The quality of crop residues can be improved by growing plants that are easy for microbes to decompose. Plants with high nitrogen levels are easier to break down than woody plants with high lignin levels.

Information in this fact sheet has been obtained from the following resource and is gratefully acknowledged. Soil biology basics, Graeme Schwenke and Abigail Jenkins, State of New South Wales, Department of Primary Industries.

Disclaimer: This information is provided as a reference tool only. Please seek professional advice.

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Grow green manure crops:

- Green manure crops are crops that are ploughed in (or sprayed out) rather than harvested.
- Organic matter gains tend to be short-term, as leafy crops are easily decomposed.

Apply animal manures/recycled organic waste:

- Organic amendments such as animal manures (e.g. food wastes and composts) are usually added to supply plant nutrients as opposed to supplying organic matter. Applying manures in excess of plant requirements increases the potential for serious environmental damage from run-off or leaching.
- Recycled organics provide more carbon in the soil than manures or crop residues.

Retain crop residues:

- Retaining crop residues produced onsite by crops is more cost effective than bringing in materials.

Reduce tillage and erosion:

- Carbon added to soil will remain for nearly twice as long under zero tillage compared to intensive tillage.
- Undisturbed crop residues on the soil surface enables rainwater to infiltrate rather than run-off reducing erosion potential.
- Incorporating crop residues increases microbial decomposition.
- Cultivation breaks up soil aggregates exposing the organic matter in the aggregates to decomposition by microbes.
- Tillage releases CO₂ that has naturally built up in the soil.

