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Organic Matter in Soil Aids Structure, Nutrient Exchange and Fertility

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The effects of organic matter in a soil are to improve or maintain a structure favorable for plant roots, add to or maintain nutrient capacity and add to or maintain fertility.

Fertility is kind of a catch all term that describes how well a plant grows and produces. It is really a summary of the right physical, biological and chemical properties of a soil that provides good plant growth.

In the decomposition of organic matter, fungi and bacteria produce by-products and end products that associate with mineral particles in such a way as to give the soil a desirable structure. Such a structure allows water, air and roots to penetrate the soil more readily than when organic matter is deficient.

When the decomposition of organic matter is nearly complete, a black material called humus is formed. Humus decomposes slowly, and in order to keep a desirable amount of humus in the soil it needs to be replenished regularly.

Under natural or cultivated conditions in which crop residues add organic matter to a soil, additional organic matter may not be necessary to maintain desirable amounts of humus. Furthermore, because the amount of humus in a soil is largely regulated by climate, attempts to increase humus by adding more organic matter may not succeed.

Avocados which self-mulch, and lemons with their pruning in the alleys, will contribute to soil organic matter because earthworms and other soil inhabitants will move organic matter from the surface into the body of the soil. In trials where we have supplied additional mulch that has been imported from city yard waste recycling programs, we have seen an enormous increase in soil insect and earthworm activity.

When humus increases in the soil, the ability to retain nutrients increases. This is called the exchange capacity of the soil, and as it increases the ability to guard against leaching of nutrients increase, as well as other mineral constituents which influence the soil's physical and chemical properties. The other soil constituent having a high exchange capacity is clay. In virtually every trial we have done on organic matter incorporation or application to the soil surface, the most dramatic effects have always been on coarse-textured sandy soils, although clay soils show improved effects, as well.

Plant or animal organic matter contains the mineral constituents needed to form new plants or increase plant growth. As the matter decomposes, the mineral constituents become simple chemicals. These simple chemicals are the same as the plant nutrients occurring in the soil or added to the soil from a bag of fertilizer. As long as they remain a part of the organic matter, they cannot be taken from the soil by plants. The rapid, but incomplete decomposition that occurs soon after organic matter is added to a soil,

releases much of the plant nutrients. The rest are released later as humus is slowly decomposed. Time has a similar effect on soil physical properties, the beneficial properties gradually declining with time.

Currently adding organic matter to orchards is a relatively expensive operation, not just in purchase, but also application. Growing a cover crop might be the optimum way, if the demonstrated effect of additional organic matter pays off. We are currently looking at several techniques and their relative costs to assess organic matter additions as mulches.