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Winter weeds add organic matter to soil in orchards

Judith M Tisdall
La Trobe University, Australia

Fruit trees need soft stable soil (with plenty of organic matter) in the tree-line to enable feeder roots to grow and take up water and nutrients in summer. Why does a plant bother to produce roots? The plant uses energy, carbon, nutrients and water to produce the roots. Why? The plant needs roots for uptake and storage of nutrients and water, anchorage and production of hormones and phytoelexins (defense against pathogens). Organic matter (OM) helps to supply most of these needs and ranges from living plants and animals (>0.25 mm diameter), to highly decomposed humic materials (<2 μm diameter). OM provides: (1) Nutrients to plants, (2) Nutrients, carbon and energy to the many organisms in soil, (3) Buffers soil against rapid changes in chemistry, (4) Acts as slow-release fertilizer and (5) Improves soil structure. The rhizosphere (near the root surface) supports a large population of organisms; all part of OM. Winter weeds are an easy way of adding OM to soil in the tree-line. Living roots of weeds continually exude simple organic materials, then die and are replaced by new roots. The grower should allow weeds to grow in the traffic-line in winter but kill them with herbicide in summer, so they will not compete with the tree roots for nutrients, water and space. The grower should slash dead weeds in the traffic-line and throw them onto the tree-line as mulch. Soil animals gradually mix the organic mulch with the soil and avoid tillage. The mulch also decreases evaporation from the surface and protects the soil from heavy rain and lethal high temperatures in summer. This enables feeder tree roots to grow in soft stable soil and the trees to produce high yields.

Biography

Judith M Tisdall has experience in basic and applied research in soils. She was awarded JK Taylor Medal for excellence in research and communication (2012). Her 52 papers have been cited 3487 times in the scientific literature (HI=18). She was the first to recognize the mycorrhizal effect on soil aggregation. She led a project on soil management for crops in Indonesia that enabled farmers to double their incomes. She contributed to new soil management for fruit trees on Tatura Trellis. She is an Editor-in-Chief of *Soil & Tillage Research* and is a Member of Editorial Board of *Agronomy*.

J.Tisdall@latrobe.edu.au

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