

Mulching Practices in Avocado Orchards

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Avocado production, for the past several decades, has relied primarily on the use of chemical fertilizers to supply the necessary nutrients for optimum production. These man-made fertilizers rapidly replaced animal manures and mulches as the main source of nutrients due to their low cost and ease of application.

Although these materials adequately meet the chemical needs of the plants, little attention was given to the biological and physical phases of the soil. As every avocado grower knows, the feeder root systems of avocado trees are very shallow and tend to localize in the upper portion of the soil profile which is designated by soil scientists as the 'A' horizon and contains the greatest amounts of soil organic matter.

Most of our San Diego County avocado soils are composed primarily of decomposed granite which contains less than 1% organic matter. Avocado trees, however, are subtropical trees and are well adapted to soils containing 10% and higher organic matter.

A healthy root system is evidenced by large cream-colored feeder roots immediately below the leaf mulch layer. Moving further into the soil profile, the soil becomes less organic, and fewer feeder roots are found even six inches below the soil surface.

Trees not receiving adequate irrigation have a thick layer of fallen leaves that are not readily decomposing. The trees have leaves that are limp and tip-burned and fruit that is small and drops prematurely. When the leaf mulch is brushed away, few feeder roots are found beneath the surface, and those roots tend to be darkened and shriveled. No amount of fertilizer, either chemical or organic, will improve this condition until sufficient water is applied.

Fortunately, as an orchard matures, the natural leaf drop eventually breaks down, supplying a constant source of organic material. Although eventually a thick humus layer will form in a healthy orchard, there is evidence that this can be enhanced through the use of a variety of organic products other than traditional animal manures.

Locally [in San Diego County], sanitary districts are looking for ways to use digested sludge which was traditionally deposited in landfill sites. Currently, the Encina sludge plant in north San Diego County produces 27,000 tons of digested sludge per year. Landfill sites now require at least 50% solids in sludge for disposal. As the digested sludge is only 15% solids, other outlets for disposal must be found.

The Fallbrook Sanitation district mixes the sludge with green yard waste and composts thoroughly to destroy human pathogens. It also produces a product which uses special composting worms to break down the material to make a fine, uniform mulch.

Spent mushroom compost has also been used successfully. This material is a combination of straw, manure, gypsum, lime, peat moss, and cottonseed meal. It is thoroughly mixed and broken down during the mushroom growing process.

All these products, which contain manures, have high levels of salts, which can cause premature leaf and fruit drop. Application should be made during the winter months when the trees are in a state of quiescence. This allows excess salts to be flushed from the root zone before the trees are actively growing in the spring.

Although the initial salt levels are high, four to six inches of water is usually sufficient to reduce the salts in the soil extract to an acceptable level. This can be done with irrigation water if no rain occurs. If there is any doubt that the soil has been completely leached, it is advisable to test the soil for excess salts.

In addition to the benefits of adding chemical nutrients, recent research has focused on the use of organic material to help control plant pathogens, such as *Phytophthora*, in replant situations. Preliminary results of research done by John Menge, of the University of California at Riverside, and Gary Bender, San Diego County farm advisor, have been promising. Future replant recommendations may include the use of organic matter to help provide beneficial micro-organisms for increased viability.

Although organic materials may prove to be beneficial to both avocado production and the environment, care should be taken to use these products properly. No fertilizer or mulch will replace consistent and appropriate farm management practices.