AN INTEGRATED SOIL MANAGEMENT APPROACH TO IMPROVING WATER PENETRATION, ROOT GROWTH, QUALITY AND YIELD OF PRUNES

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The purpose of this experiment is (1) to loosen subsurface soil compaction that interferes with water penetration and root growth, (2) to improve and stabilize the structure at the soil surface so that it does not seal and thereby limit water penetration, and (3) to control the pattern of vehicle traffic so that part of the orchard floor remains permanently uncompacted.

The two test orchards, one in Yuba County and one in Tulare County, were subjected to the following measurements in 1980:

1) Soil moisture from 0 to 5 feet.
2) Penetrometer resistance in subsoiled vs unsubsoiled plots, and wheel tracks vs untrafficked areas.
3) Bulk density in surface and subsoil, as affected by subsoiling and wheel traffic.
4) Fruit green weight, dry weight and dryaway.

Soil moisture in 1979 in the Yuba County orchard averaged 13% greater in the 5 foot soil profile in subsoiled plots over unsubsoiled plots. In 1980 the subsoiled plots had only 5% greater moisture than unsubsoiled plots. This lends support to the conclusion that the 1979 difference in soil moisture was mostly due to lack of roots to extract water from the subsoiled plots rather than greater infiltration there. Tulare County plots showed even less moisture differences between subsoiled and unsubsoiled plots than did Yuba County plots. Surface treatments also showed no differences in soil profile moisture.

With no differences in soil moisture, it is not surprising that no differences in green or dry weight of prunes resulted.

Although penetrometer resistance was lower in subsoiled plots, particularly in untrafficked portions, than in unsubsoiled plots, bulk densities were just as high in untrafficked subsoiled plots as in similar unsubsoiled plots. Apparently the Yuba County soil, after subsoiling, settles back into a matrix with no more porosity than it had before subsoiling. The fact that it has less strength than before does not seem to hold any significance in terms of root growth and water movement.

We feel that we have learned all we can from the present experiment but we would like to continue work with a number of prune soils to try to characterize their behavior and develop diagnostic criteria for determining the causes of slow water infiltration.

We would like to be able to say whether or not a soil can be materially helped by certain soil modification and management treatments. Continuing work, if approved, will include collection and laboratory characterization of soils from all prune growing areas, in conjunction with field tests of infiltration rate, soil profile moisture status, bulk density, and penetrometer resistance.