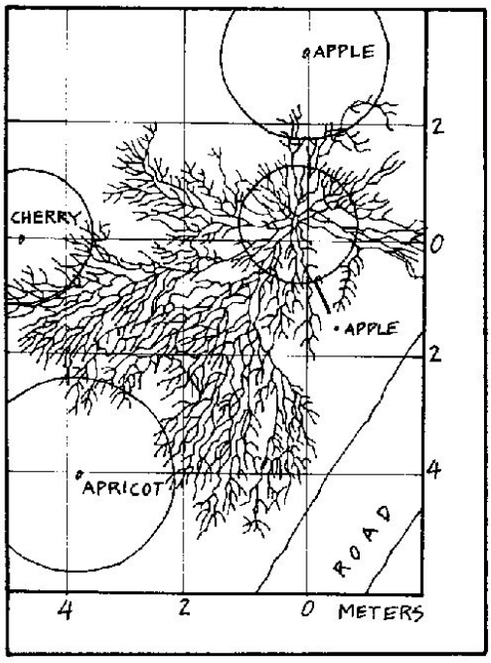

Figure #38: This apple tree's roots extend far beyond the circle representing the canopy of the tree and avoid the compacted soil of the roadway. (Scale is in meters.)

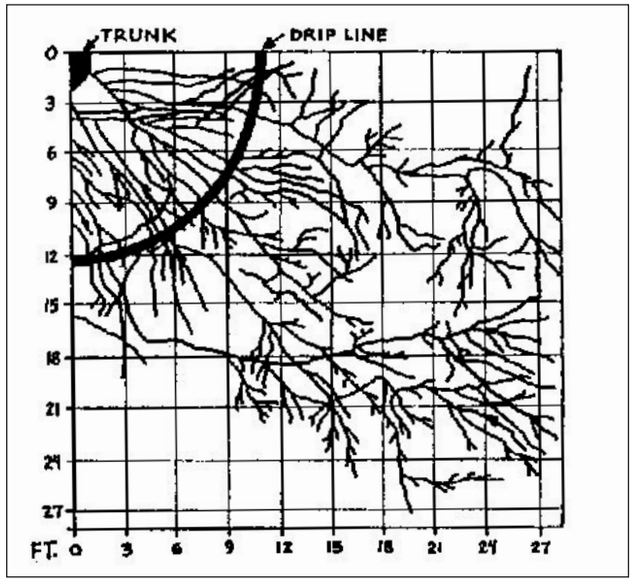

Figure #39: This shows how far a 45-year-old apple tree's roots spread beyond the dripline, represented by the the arc in the upper left side of the illustration. (The scale is shown in square feet.)

Some tree roots tend to avoid each other. In Figure #38 the circular lines represent the canopy of the trees. Here we see that the apple tree's root system tends to grow away or head downwards as it approaches that of another apple tree. (A puzzling observation since apple trees seem to thrive in orchards.) The roots also naturally avoid compacted soil as found on the nearby road. Figure #39 also shows the ratio of the root to the canopy for a 45-year-old apple tree.

Kolesnikov's conclusion is that fruit-tree roots grow one-and-one-half to two and even three times the width of the foliage above them. More amazingly, he states that this ratio is maintained throughout the life of the tree, *regardless of the rootstock, species, and soil* (my emphasis added). This is clearly seen in the apple trees depicted in Figures #39 and #40. As Figure #41 shows, each type of fruit tree maintains a slightly different ratio of root mass to canopy.

The relationship of the width of a tree's root-mass to the amount of moisture it should receive is critical. As I've written in previous chapters, applying water near the trunk is wasteful in any climate. In a climate that routinely experiences short droughts of a month or so up to six months (as in parts of the Southwest), drip irrigation is the most efficient way to distribute water to an entire root system.

The climate, however, need not be arid for trees to benefit from drip irrigation. In a study of established pecan trees in humid Georgia, trees with added drip irrigation showed a 51% increase in yields.