

SOIL MOISTURE CONDITIONS IN AVOCADO GROVES

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The control of soil moisture conditions in the culture of avocado trees is more important than in many other crops. In addition to maintaining adequate soil moisture for good tree growth, other factors must be considered. Where the root rot fungus is present in soil, high soil moisture tends to increase the rate and severity of the tree injury by this fungus. On the other hand, where soil salinity is a factor, dry soil conditions will produce more serious leaf burn.

Soil moisture tensiometers are being used experimentally to help evaluate soil moisture conditions. In cooperation with Mr. J. J. Coony, Farm Advisor in San Diego County, avocado growers were contacted who were willing to have tensiometers installed in their groves and who were also willing to take the daily readings necessary to give a reasonably continuous record of the changes in soil moisture conditions.

Figure 1 gives the soil moisture tension records obtained by two growers. Mr. W. E. Averrett's grove in La Mesa, is a mature grove on adequately deep, well drained soil. The two instruments installed at the same depth but at different locations show a good correlation. The trees on Mr. Lyman Thompson's grove near Vista are not as large, but they are growing on a soil that is only 17 inches deep. Below that depth the undercomposed granite restricts drainage.

The contrast between soil moisture conditions in a deep soil and in a shallow soil is at once evident. The deep soil shows a rather gradual increase in tension following a sharp drop which occurs at the time of an irrigation or rain, while in the shallow soil, except during the winter months, soil moisture conditions change rapidly from very wet conditions to very dry. The dashed lines in Figure 1 indicate some uncertainty in the records since at times the tension was higher than could be indicated by the tensiometers. Mr. Averrett was unable to take the readings through the summer of 1949, but the small amount of servicing required by these tensiometers was evidence that they were operating most of the time under the normal irrigation practice for this grove.

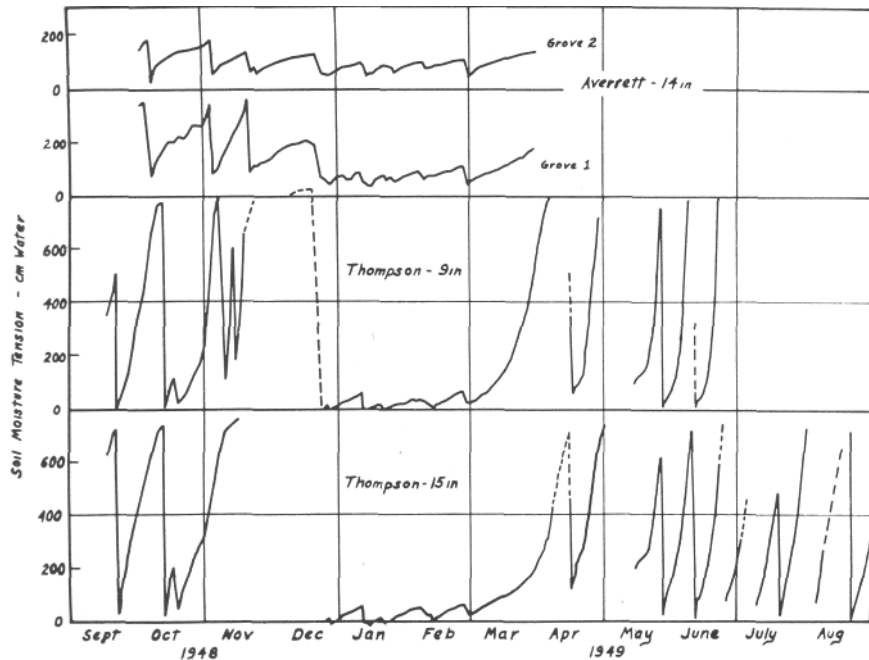


Figure 1. Soil moisture tension records obtained in avocado groves. Mr. Averrett's grove in La Mesa has adequately deep, well drained soil. Mr. Thompson's grove near Vista has shallow soil with restricted drainage.

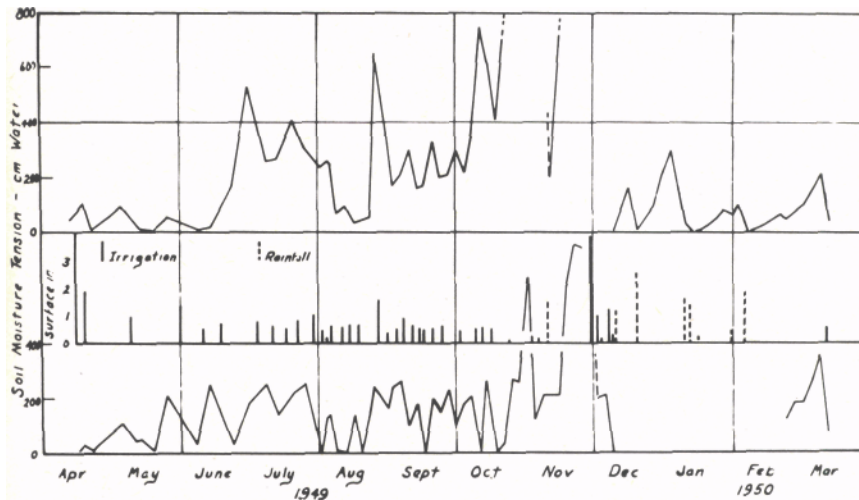


Figure 2. Soil moisture tension records where the irrigation was automatically controlled by a tensiometer. The lower curve was obtained from readings on the control unit. The upper curve was obtained from readings of a separate instrument placed at a different location.

Another important difference in the readings obtained at these two groves occurred during the winter months when the rainfall was supplying the moisture. When the soil was 30 inches deep and well drained the tension values did not at any time fall to zero on the scale, but where there was restricted drainage zero readings occurred at several times during the winter even though the rainfall for the season was below average. The

zero on the tensiometer scale is adjusted so that when a reading of zero is obtained in the field, then water is free to run into the bottom of a hole if it were dug to the depth at which the tensiometer is placed.

Another use for tensiometers is being tried on an experimental basis at the U.C.L.A. campus. Where tensiometers are found to be useful in indicating soil moisture conditions, it is quite possible that they can be adapted to control the valves of a permanent sprinkler system so that irrigation can be accomplished automatically. Equipment of this type is under development by a commercial concern. Figure 2 shows the tension records obtained while such automatic equipment was in operation. The lower curve in the figure was obtained from readings taken on the tensiometer which controlled the sprinkler system. The upper curve gives readings from a second instrument at another location on the same line of sprinklers. The control instrument was placed at a 12-inch depth about 3 feet from the nearest tree. The instrument was adjusted to turn on at about 400 cm. of water, and to turn off when the soil had been wetted to a depth of 12 inches. The number of irrigations and the amounts of water applied are indicated in the figure. The trees in the grove are only 5 years old, but they are planted on 10 foot spacings. The soil is relatively shallow. This grove was made available for experimental work through the cooperation of Professor M. R. Huberty and other U.C.L.A. staff members, and was supported in part by funds supplied by the Avocado Industry.