

IRRIGATION OF AVOCADOS IN SAN DIEGO COUNTY

C. D. Gustafson

University of California, Farm Advisor in San Diego County.

Avocado growers in San Diego County are faced with a water shortage. The shortage of irrigation water makes it imperative that growers use water wisely and carefully. Irrigation is the most important and the most difficult cultural practice in growing avocados. No general set of rules on how to irrigate an avocado orchard can be given, for each orchard is an individual problem and should be handled as such. There are a few basic principles of soil-water-plant relations which should be considered in developing a sound irrigation program. Soil structure, soil texture, water quality, water penetration, water use by trees and factors of temperature, humidity and wind, which influence transpiration, must be taken into account if a good irrigation plan is to be developed.

Avocado trees are surface rooting plants and much of the root system is in the upper twelve to twenty inches of soil. It is important to maintain a good water supply to these roots at all times. Irrigation practices vary with the type of soil present, since all soils do not have the same capacity to store water. Clay soils retain the most water. Loam soils can hold more than sand soils. Shallow soils and light textured soils need more frequent applications of water than deeper and finer textured soils because they have less storage capacity. In the avocado growing sections of San Diego county, the two types of soils most commonly found are Vista sandy loam and the Fallbrook fine sandy loam. Both of these are characterized by coarse textured topsoil with a porous granite subsoil, affording fair to good drainage. The Fallbrook series contains a little more clay than the Vista soil, and therefore will retain more moisture for a longer period of time.

Water requirements for avocados will vary with the climatic zones within the county. Irrigation water use ranges from two acre feet, or less per acre on the coast, to two and one-half acre feet per acre or more in the inland districts. Therefore, if additional water is not put on to take care of the grass or weed cover present and compensate for evaporation loss, the trees will suffer, since these water use figures are for tree consumption only.

Water is removed from the first foot of soil rapidly after an irrigation due to the activity of the plant roots, evaporation of water from the first four to six inches of soil and the extensive root system of the weed or grass cover.

Bermuda grass and other weeds are keen competitors for soil moisture. Permitting weeds to grow will reduce the amount of water available for the avocado trees. Studies and measurements have been made to determine the use of water under local climatic conditions. It is estimated that two tons of weeds per acre will use fifteen hundred tons of water during the growing season. This is more than 360,000 gallons, or about sixteen

acre inches of water. Field observations have indicated that the Bermuda grass, or other weeds, will use from one-third to one-half the moisture applied to that acre during the growing season. This means that the weeds will take as much, if not more, than the trees. It is therefore necessary that weeds and grass be eliminated. The only material that can be recommended for weed control in avocado orchards for the present is the regular weed oil. The new chemicals that have proven successful in citrus orchards have not had the same results in avocado orchards. It is true that on many hillside orchards the ground cover must be maintained to prevent erosion. It would be less expensive in the long run to eliminate the weeds and put on a mulch to cover the ground during the winter time for erosion control. During the rest of the year, the mulch would help to prevent soil compaction due to irrigation water droplets hitting the soil.

If winter rainfall is short, the first irrigation of the season should be a deep one in order to fill the soil profile with moisture. This insures the soil will be leached of any salts in the root zone. Subsequent irrigation should be applied in such a manner as to refill only that portion of the soil which has been depleted of water. Examination of the soil should be made prior to each irrigation either with a shovel, auger or soil tube. It is important to know how much water is present and at what level it is located. In San Diego county severe tipburn on leaves of avocado trees continues to be a problem. Some avocado growers have improved tree conditions and reduced salt injury by more frequent irrigations. This was accomplished without using more water than had been used in previous seasons. Tipburn is thought to be caused by a number of factors: (1) Accumulation of salts in the soil. (2) Soil differences. (3) Rootstock differences. (4) Varietal differences. (5) Inadequate amounts of water used. (6) Timing of irrigations.

It was noticed where growers used heavier amounts of water, less burn was evident. The amount of water was an important factor. But in some cases salt injury occurred even where seemingly adequate amounts were used. In instances where the soil was uniform and well drained the problem still presented itself in a few trees. Possible explanation for this could have been in the way the water was applied, or the interval between irrigations. It has been noticed in nutrient uptake that some trees function more efficiently than others. It may be that some rootstocks are more prone to take up detrimental salts than others. The Hass variety in many cases showed more tipburn than the Fuerte.

Many San Diego county avocado groves are on a fourteen day, or longer, irrigation schedule. Under this type of program, the upper portion of soil often becomes dry in five to six days. Also, because of the longer interval, more water is applied at each irrigation than is absolutely necessary. Much of this water is being applied to the subsoil that has not, as yet, been dried out. Since moisture should be maintained at all times in the first eighteen inches, the depth of irrigation and the frequent application results in accumulation of salts in the most active root zone. Shortening the irrigation interval to seven days makes it possible to maintain moisture at a fairly high level in the upper zone. This has the desirable effect of meeting the tree requirements for easily available moisture and keeping the salts in the diluted stage which does not affect the trees so seriously. A periodic leaching should be done every five to eight weeks during the irrigation season to eliminate the salts in the upper soil. Before leaching is attempted, growers are urged to check the soil for proper drainage. A water-logged soil invites the

Avocado Root Rot Disease.

The shorter interval irrigation schedule can be recommended for a number of reasons:

1. Surface rooting habit of the avocado tree necessitates moisture replenishment in the upper soil at frequent intervals.
2. The Vista sandy loam soil, characteristic of the soil in which avocado trees are grown, makes it necessary to irrigate frequently because of the low water holding capacity.
3. A heavy weed cover found in almost all orchards requires a supplemental amount of water.

In districts where water supply prospects for the next year are not available, a five point emergency program can be developed. Briefly, it is as follows:

1. Determine as closely as possible at the start of the season how much water may be expected through the year.
2. Select the best producing part of the orchard and give that most of the available water, allocating only enough water to the rest of the orchard for a minimum tree maintenance.
3. Practice weed control.
4. Take advantage of the opportunity to topwork poor varieties to better varieties, thereby reducing water needs of those trees.
5. Remove all trees which have been marked for removal due to disease, poor production, or tree thinning.
6. Irrigate at night wherever possible.