

SOME FACTORS AFFECTING THE ACCUMULATION OF CHLORIDES IN AVOCADO SOILS

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Apparently the avocado tree has an affinity for chlorides. The injurious effect of chloride is evident in the avocado tree by the dying back of leaves from the tips, referred to as "tip-burn." The undesirable effect of chloride injury is to reduce the functional area of the leaf surface resulting in early dropping of much of the foliage and thereby lessening the fruiting potential of the tree.

Unfortunately, chloride injury does not become evident until there is sufficient buildup in the leaf to cause the death of cells in the leaf tip. The accumulation of chlorides in the leaves may take several months before tip-burn is apparent.

As practically all irrigation water used for avocado orchards has some chloride concentration, it becomes a necessity for the grower to know the chloride content of the water used for the best results with his trees. There are several agricultural chemists in Southern California who will make this determination at a nominal cost. In general, irrigation water with more than 150 ppm (parts per million) of chlorides will cause varying degrees of tip-burn on avocados.

The accumulation of chloride salts in the soil over a period of months will cause a condition wherein the soil moisture available to the avocado roots is such that chloride injury becomes evident in the leaves. As the soil moisture content is reduced by evaporation and removal through plant roots, some of the chloride salts remain in the soil and with succeeding irrigations the chloride content builds up to an excess for the avocado. Under the present weather cycle of dry years the accumulation of chloride salts in normally well drained soil may carry over from year to year and cause tip-burn even where the chloride content of the water is much less than 150 ppm.

On the other hand, with favorable conditions salts may be leached below the root zone so that no tip-burn is evident with the use of water having higher than 150 ppm of chlorides.

Under the present usual methods of sprinkler irrigation in avocado orchards, with constantly rising costs of irrigation water and with increasing use of tensiometers, there is a tendency to conserve water and an attempt to keep only the surface foot of soil with optimum moisture content at all times throughout the year. Unless the operator has a knowledge of the chloride content of the water used he may unwittingly build up the chloride salt content in the surface soil even while maintaining an apparent satisfactory soil moisture condition.

There are several methods whereby the accumulation of chlorides in the rooting zone

may be controlled. Where there is good drainage well below the rooting area, periodic heavy irrigations to cause leaching will minimize the accumulation of salts in the root zone.

With poorly drained subsurface soils, drainage must be provided by ditching or by tile drains to carry off the excess water at times of the leaching irrigations, or from heavy rains.

In soils which have somewhat restricted subsurface drainage, a method has been successfully used for several years of concentrating the irrigation under the drip of the trees, leaving a dry area between the tree rows. When setting out a new orchard the trees may be "hedge rowed" and a low border thrown up on each side of the tree row. The bordered area is widened as the trees increase in size, with all leaves and mulch material kept within the borders, leaving the area between the tree rows clean of weeds and organic matter. All fertilizer is spread within the bordered area. Irrigation is accomplished with "lawn type" sprinklers on either side of and in line with the trees in the tree row. Frequent moderately heavy irrigations are given to thoroughly wet the soil in the bordered area; the excess water and salts seeping laterally into the dry inter-row areas. This method is also effectively used where subsurface drainage is poor, by the use of tile in the center of the dry inter-tree rows to carry off an occasional heavy leaching irrigation and/or the excess soil water from heavy rainfall.

Although it may be difficult to get quick results from the leaching of chloride salts from an established grove, given a season or more with improved irrigation and drainage practices, many groves can be returned to economic production where past practices have permitted an excessive buildup of injurious salts in the rooting zone.

In starting a new grove of avocados the owner should take into consideration the chloride content of the water to be used, the nature of the subsoil, and the type of soil in the surface foot or two where most of the roots will be concentrated. He should plan his irrigation system and irrigating program so as to prevent an excess accumulation of chloride salts in the rooting zone.