

DROUGHT TIP

Avocados and Water

Avocados are the most salt and drought sensitive of our fruit tree crops. They are shallow rooted with most of their roots in the top foot of soil and are not able to exploit large volumes of soil and therefore are not able to fully use stored rainfall. On the other hand, avocados depend highly on rainfall to leach accumulated salts. In years with low rainfall, even well-irrigated orchards show salt damage. If salt or drought stress occurs during flowering, there can be extensive leaf drop due to the competition between flowers and leaves. In order to reduce leaf damage and retain leaves, irrigation in excess of crop water requirements is required to leach salts out of the root zone. The more salts in the water and the less rainfall, the greater the amount of leaching required.

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Figure 1. Leaf blight is a disease that occurs when poor-quality irrigation water is used. quality.

Figure 2. Salt damage from poor-quality water and poor irrigation habits.



Drought stress often predisposes avocados to diseases such as black streak, bacterial canker, and stem, leaf, or fruit blights. Leaf blight (fig. 1) is often confused with salt or tip burn (fig. 2), but it is a fungal disease that forms an irregular dead pattern on leaves and leads to defoliation. Blight is associated with lack of water, while burn is due to poor-quality water and poor irrigation. Leaf blight often shows up after Santa Ana conditions, when growers get behind on their irrigation and the root zone

suddenly dries out. The stress induced by salt burn is similar to the stress caused by drought and poor salt management and can lead to blight. A high incidence of this disease can occur under prolonged drought conditions. In both salt burn and leaf blight, defoliation leads to sunburned trees and fruit, which can cause severe economic losses. The only way to prevent these conditions is to keep up with the irrigation schedule.

Irrigation Management

To get your water to go further, the irrigation system must be tuned to get the best distribution uniformity (DU). Many avocado irrigation systems were installed 40 years ago, and old age can lead to problems such as clogging, broken emitters and leaks, poor pressure, and mixed sizes or types of emitters that apply different amounts of water. With poor DU, some trees get too much water and others do not get enough. Even fairly new irrigation systems can have poor DU, especially after harvest. Poor water pressure on steep slopes is probably the main problem for many orchards. A DU of 80% means that 10% of the emitters are putting out more than the average and 10% are putting out less. To compensate for underirrigated trees, irrigators run the system 10% longer. As a result, 20% of the trees receive more water than they need. A call to the local Resource Conservation District office can get a free DU evaluation and recommendations that are usually reasonable to follow.

In addition to improving DU, it is important to know when to irrigate and how much water to apply. When to apply can be evaluated by the hand, or feel, method (see the USDA Natural Resources Conservation Service publication *Estimating Soil Moisture by Feel and Appearance*, <https://nutrientmanagement.tamu.edu/content/tools/estimatingsoilmoisture.pdf>), which is fast and cheap. It can also be done with tensiometers or more expensive electronic sensors. But these tools tell you only when to irrigate, not how much to apply. One way to estimate how much to apply is to turn the system on (once you have made sure that

the DU is good) and over the period of the irrigation insert a piece of rebar into the soil to determine the depth of infiltration. The rod will go down as far as the soil is moist and stop when it hits dry soil. When the water has infiltrated about 2 feet, you will know how long to run the system to get an appropriate amount of water. Two feet is the depth of infiltration needed to ensure that adequate leaching is applied to remove accumulated salts from the root zone to prevent salt burn and leaf blight. A typical loam usually takes about 150 gallons per tree to fill the soil moisture profile to 2 feet. Another way to get an approximation of the amount to apply is to use the irrigation calculator at the Avocadosource.com website, <http://www.avocadosource.com/tools/IrrigationCalculator.asp>.

Managing the Tree Canopy

Significantly pruning trees can reduce the amount of water the trees transpire. Trees that are about 15 feet tall can be pruned by half and will use half the water. Massive 30-foot trees would need to have a major pruning to significantly reduce water use. In extreme drought conditions and for the long-term welfare of the orchard, large trees should be stumped (fig. 3) or scaffolded (fig. 4) and painted white to prevent sunburn. Scaffolding usually produces fruit much sooner than stumping. By retaining a significant part of the trunk and branches the tree does not exert as much energy to regrow and retains buds that have been under apical dominance for less time. When new shoots appear they should be headed back to force lateral branches, which is where the flowers will form. For more information on scaffolding, see “Stump and Topwork: A Technique for Rejuvenating Avocado Trees” by R. Hofshi, M. Tapia, et.al. (California Avocado Society Yearbook 93:51–71, 2010).

All the prunings should be chipped and left in the field. This will help conserve water and also help control *Phytophthora* root rot. Trees affected by root rot or crown rot should not be pruned until they have been brought to health using a phosphorous acid formulation. Pruning a sick tree redirects the



Figure 3. These avocados were stumped due to lack of irrigation water.



Figure 4. Scaffolded avocado, which should produce fruit sooner than a stumped avocado.

tree's energy from fighting off disease to growing new leaves, making the tree less able to fight off disease. Or, if the orchard has areas that are diseased (with sunblotch, root rot, crown rot, etc.), windblown, in shallow soil, or experience recurrent frost, consider removing the trees completely to save water. White kaolin clay applied to leaves has been shown to reduce leaf temperature and water loss. Kaolin clay should be used under the direction of the packing house, since once clay is applied to fruit it is very difficult to remove.

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