

## Growing Avocados in a Megadrought

**A** new study published in the journal *Nature Climate Change*, led by University of California Los Angeles faculty member Dr. Park Williams, determined the Western United States megadrought — a drought lasting two decades or longer — that has been ongoing since 2000 is the region's driest period since A.D. 800! Furthermore, they concluded the current drought could continue until 2030. Their data were generated by reading tree rings from more than 1,500 trees across the Western U.S. along with recent meteorological data.

Their analysis also highlights the impacts that climate change is having on the Western U.S. — more intense heatwaves, higher temperatures, greater climate variability (think water-rich 2011, snow-laden 2019 and record warm 2021), and most of all dryness.

Managing avocados under these conditions is difficult and many growers are having to make hard decisions about their groves. While there is no ideal way to grow avocados under drought condi-

tions, there are steps growers can take to make sure that every drop of water they have is used efficiently and effectively.

### Irrigation

There is arguably no more important thing to do during a drought than to service and maintain your irrigation system and its components. Your goal should be for every drop of water that enters your irrigation system — whether from a well or district water — to reach a tree by promptly fixing leaks and improving your system's uniformity. To help you in this task, most water management districts offer free water audits that will tell you about your system's efficiency and where best to make improvements specific to your situation.

There are a number of little things you can do to help improve your irrigation system's efficiency and save water. These include capping sprinklers to dead or diseased trees. If your grove has a mix of mature and young trees, change out the sprinkler heads near the

young trees to lower-flow rate heads so you are not overwatering the young trees. Consider investing in pressure compensating emitters or sprinklers. Pressure compensating emitters maintain a constant flow rate over a range of pressures as is common between the top of a slope and bottom of a slope.

You also can save water by optimizing your irrigation management through scheduling and soil moisture monitoring. To properly schedule your irrigation you should utilize an irrigation scheduling calculator tool, such as the avocado-specific one that can be found on [AvocadoSource.com](http://AvocadoSource.com). This calculator has many features, such as allowing the user to adjust their system's distribution uniformity (DU) in order to see how much water can be saved by improving the system's DU.

In addition to knowing how much water to apply to your trees, you need to decide when and how often to apply this water. This is where soil moisture monitoring comes into play. Soil moisture levels have several phases,

from saturated to the permanent wilting point. In between these phases is what is known as “plant available water.” This is the small fraction of water held in a soil that is easily available to the plant. Your goal in scheduling irrigation is to maintain plant available water levels with minimal to no periods in the saturated or permanent wilting phases. To do this, you need to monitor the soil in your grove since the plant available water content is influenced by the unique soil characteristics of your grove. For details on how to efficiently and effectively irrigate avocados see “Irrigation Management in California Avocado Groves” in the Spring 2019 issue of *From the Grove*.

## Mulching

Mulching is the application of material to the soil surface without incorporating it into the soil. In their na-

tive rainforest environment, avocados are naturally mulched by leaves and other plant debris that accumulate on the forest floor. In cultivated avocado groves it is often necessary to supplement fallen leaves with other organic mulches, particularly when the grove is young. Ideally for avocados, mulches should be coarse material such as avocado trimmings, composted greenwaste or wood chips. Mulch should be spread evenly, 3 to 5 inches thick beneath the tree, but kept several inches away from the trunk.

Mulch helps to conserve water in several ways. Mulch reduces water loss due to evaporation by shading and insulating the soil surface. Mulch also helps to reduce water runoff, soil compaction and soil erosion. The combined effect is a reduction in rapid soil moisture fluctuations that help minimize plant stress. In addition, mulching helps to reduce

weed growth; weeds steal water from trees and increase overall grove water use.

In addition to these physical effects on soil moisture, mulching improves root growth. Avocado roots require a lot of oxygen and flourish in the soil-mulch interface zone. More root growth means more water and nutrient uptake that leads to improved tree health and yields.

When considering mulch sources for your avocado grove, local is best. If you have trimmings and branches from within your grove, consider chipping and using these as mulch. If you need to bring mulch in from outside your grove, it should be sourced from as near to your grove as possible to reduce the risk of introducing invasive pests. If you must bring in mulch from an unknown location, it should be composted or otherwise treated (heat, chemical fumigation) to ensure that it is pest free. Also be aware that mulches can be a source of weed seeds, particularly greenwaste. Sourcing mulch locally and knowing the source is always the best practice.

## Stumping or Removing Trees

Reducing the number of trees requiring water in your grove, either by stumping or completely removing trees, is one option for dealing with drought. Stumping involves cutting the tree down to 4 to 5 feet in height, leaving about 2-foot-long stubs of the main scaffold limbs. The stumps should be immediately whitewashed with a diluted (50:50) water-based paint to protect against sunburn. Tree sealant should NOT be used on the cut surfaces; tree sealant will slow the tree’s natural healing process and keep the cut surface moist, which can actually increase the chance for disease and rot to set in. It is best to stump as early in the year as possible, generally after the trees have been harvested.

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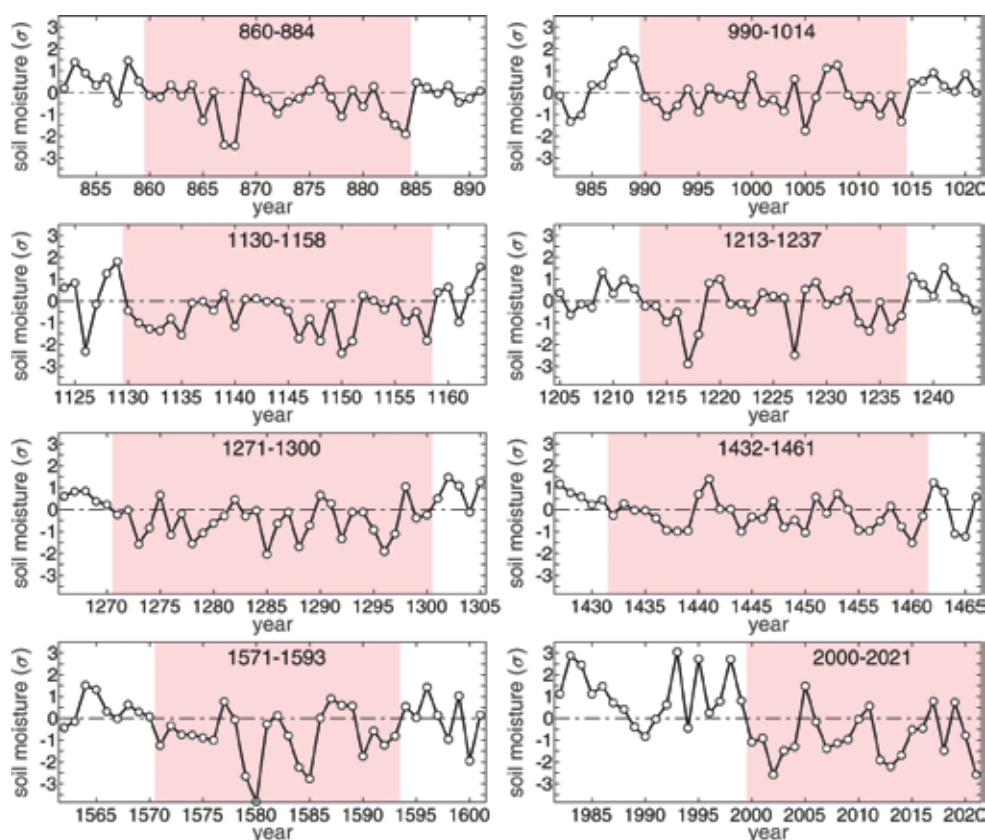
When stumping, consider stumping an entire irrigation block. This will make managing irrigation much easier because the entire block can be shut off rather than having to cap individual sprinklers. Irrigation can be shut off to stumped trees until they start to grow new foliage, usually after one to several months. When the trees start to regrow, it is important to keep the soil moist, but not overwatered. Use of soil moisture sensors is critical during this period. A stumped block will require less water for several years following stumping as the canopy of the trees regrows. Stumped trees generally will be out of production for two years following stumping, producing a crop in the third year.

Deciding which trees to stump or completely remove from your grove isn't always easy. Stumping is generally a good option if the trees are in good health, but are simply too tall and their production has begun to drop off. Completely removing a block is a better option if the trees are diseased, in poor health, or are in a problematic area that is too difficult to manage. Removing and replacing trees will obviously reduce water use for several years as the young trees grow; however, production will be lost for a longer period compared to stumping.

Another potential option that some growers may consider is topworking. Topworking trees starts similarly to

stumping, but instead of allowing the original tree to regrow, new scion wood is grafted onto the stump. This may be a useful strategy if you wish to reduce the number of pollinizer trees in your grove or if you still have blocks of green skin varieties.

There is no ideal way to conserve water when growing avocados — they are thirsty trees. However, by combining several different tactics — improving irrigation efficiency, mulching, reducing the size of very tall trees or eliminating diseased trees — each grower can make incremental improvements to their grove that will help our industry survive until the rains return. 🍷



Summer soil moisture anomalies, expressed as standard deviations from the 800–2021 mean ( $\sigma$ ), during the longest eight extended drought events during the 800–2021 study period. The pink background bounds the years of each extended drought event. The horizontal dotted black line represents the 800–2021 mean. For the first seven droughts shown, soil moisture anomalies come from the study's tree-ring reconstruction. For the final drought (2000–2021), anomalies come from the observation-based record. Image from: Williams, A.P. et al. Rapid intensification of the emerging southwestern North American megadrought in 2020–2021. *Nat. Clim. Chang.* (2022). <https://doi.org/10.1038/s41558-022-01290-z>