

A few days before the National Weather Service issued excessive heat warnings for much of California last week, the California Avocado Society conducted a webinar on mitigating heat in avocado groves.

After suffering extensive fruit and tree damage during heat waves in 2016, 2018 and 2020, Farm ACW in Fallbrook decided to invest in an overhead sprinkler cooling system to protect its avocado orchard, according to an article by the [California Farm Bureau Federation](#).

Because the orchard is on hilly terrain that makes access difficult, farm managers decided to use impact sprinklers that send water far into the orchard from their perches atop posts on the sides of the roads.

"It's large water drops, and we get a nice stream, which helps reach the 100-foot radius of the sprinklers," said Ryan Halby, manager of Farm ACW. "It's impractical to install sprinklers in the groves on the hills, so we use larger sprinklers on the road."

Halby was among the growers, University of California researchers and orchard cooling industry specialists who discussed ways to protect avocados from excessive heat during the webinar.

Heat damage has become an issue of concern to many of the state's avocado growers, and evaporative cooling with overhead sprinklers is the most widely used method of lowering the temperature of the canopy and fruit.

"We have helped five avocado growers in the Fallbrook area in Southern California to install fruit cooling systems," said John Rowley, rotator product manager for Nelson Irrigation, which is based in Walla Walla, Washington. "The primary reason to cool avocados is to prevent fruit drop."

Estimating at least 70% of the 300,000 acres of apples in the Northwest use cooling to protect crops, Rowley said the goal is to "pull heat out of the plant."

"The best way to do that is to evaporate water on the surfaces of the fruit and the leaves," he said. "This is the most efficient use of water to cool."

Water, the most available tool for cooling orchard canopies and fruit, is a precious commodity in avocado production areas, and farmers and researchers are still working to fine-tune their understanding of the point at which the crop must be protected.

"We need to develop predictive models to know when the temperature will be too high for

the orchards," said Giulia Marino, UC Davis tree physiologist. "Most studies are based on the temperature of the air, not the leaves or wood, but we want to know how much the tree organs heat up. Since microclimate is affected by the foliage, we can impact it by practices like pruning and irrigation."

Because the leaves can be cooled through transpiration, she said, it is important to make sure trees are well-irrigated before a heatwave.

"The earlier the better," Marino said. "If it is hot, the stomata stay open to cool—but this uses a lot of water. Heat and drought stress are interconnected. Photosynthesis goes down, and respiration goes up under heat. If we have lower photosynthesis and water loss, there is a loss of plant growth. You will end up with less vegetative growth, and smaller and discolored fruit."

Irrigation can protect the leaves during heat spells, but because it cannot directly prevent damage to the fruit, other management steps are also needed.

"The leaves can be anywhere from 9 degrees Fahrenheit hotter to cooler than the air," Marino said. "Unlike leaves, bark and fruit can be much warmer than the air. Fruits and trunks can't transpire; your fruits are going to be 27 degrees hotter than the air, more or less."