An avocado tree canopy completely desiccated by heat from fire combined with high winds and extremely low relative humidity. Note the presence of weeds still around the tree and the lack of trunk damage; this tree will most likely recover, but the existing crop is lost.

Post-Fire Grove Management and Recovery

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Sadly, it seems a version of this article is appearing all too regularly in *From the Grove*. According to the California Office of Environmental Health Hazard Assessment (OEHHA), the annual average area burned by wildfires in California was three times greater in 2020-2023 than it was in the 2010s. And the number of large fires – 10,000 acres or more – has increased in the past two decades. All but two of the 20 largest wildfires in California since 1950 have occurred since 2000; 10 of which occurred in 2020 and 2021.

Given these changes in wildfire numbers and severity, it is increasingly important that growers understand how to manage their groves following wildfire damage. Equally important is grove management prior to a wildfire to help reduce – to the extent possible – the damage that wildfires will cause in the grove, which will be discussed in a future issue of *From the Grove*.

The information presented here is based on the past experiences of many growers, grove managers and UC Farm Advisors. Before making major fire-recovery related grove management decisions, consider consulting a local grove management company, a UC Farm Advisor or Tim Spann, CAC's research program consultant, to gain additional insight into your specific situation.

Fire Damage Symptoms

The damage to avocado trees from fire is based on two primary factors – the speed of the fire and the heat of the

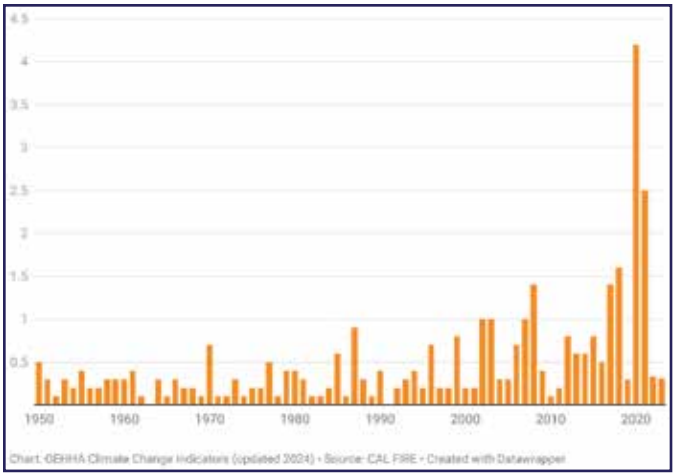
fire. A fast moving, cool fire will be far less destructive than a slow moving, hot fire. When fire burns through a grove it may damage the trees superficially, scorching those parts of the tree facing the fire's heat, or — if heat and wind persist — the entire canopy may desiccate and next season's crop is certainly lost on these trees. If orchards were subject to intense heat, damage to tissues within the trunk and branches may be permanent and trees may never fully recover.

It can take anywhere from weeks to several months to know the full extent of damage to avocado trees following a fire, and it all depends on the damage to the trunk. In a fast-moving fire, the leaves may turn completely brown soon after the fire has swept through. It may look like the grove is devastated, but there is a good chance these trees can recover, just keep a watchful eye.

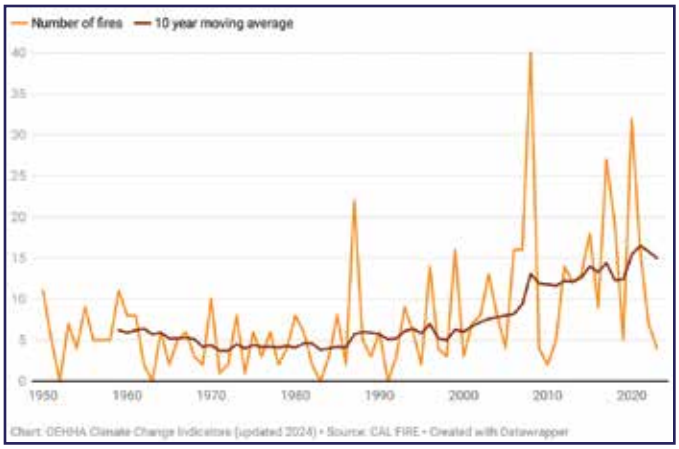
In a slower, hotter fire, damage to the tree trunks can be significant and they are less likely to recover. If the trunk has been blackened and charred, recovery is unlikely. In some cases, the trunk may not be significantly charred, but in the days and weeks following the fire if the tree develops cankers or boils where the sap bubbles to the surface, it is unlikely the tree will recover. If a tree begins to sprout from its base, at ground level, the tree is a goner; the graft union has died, and the tree is trying to resprout from the roots.

In the months following a fire, a recovering tree will sprout out indicating where it is still alive. However, this new growth may suddenly collapse the following year when stressful conditions — high winds or heat — occur.

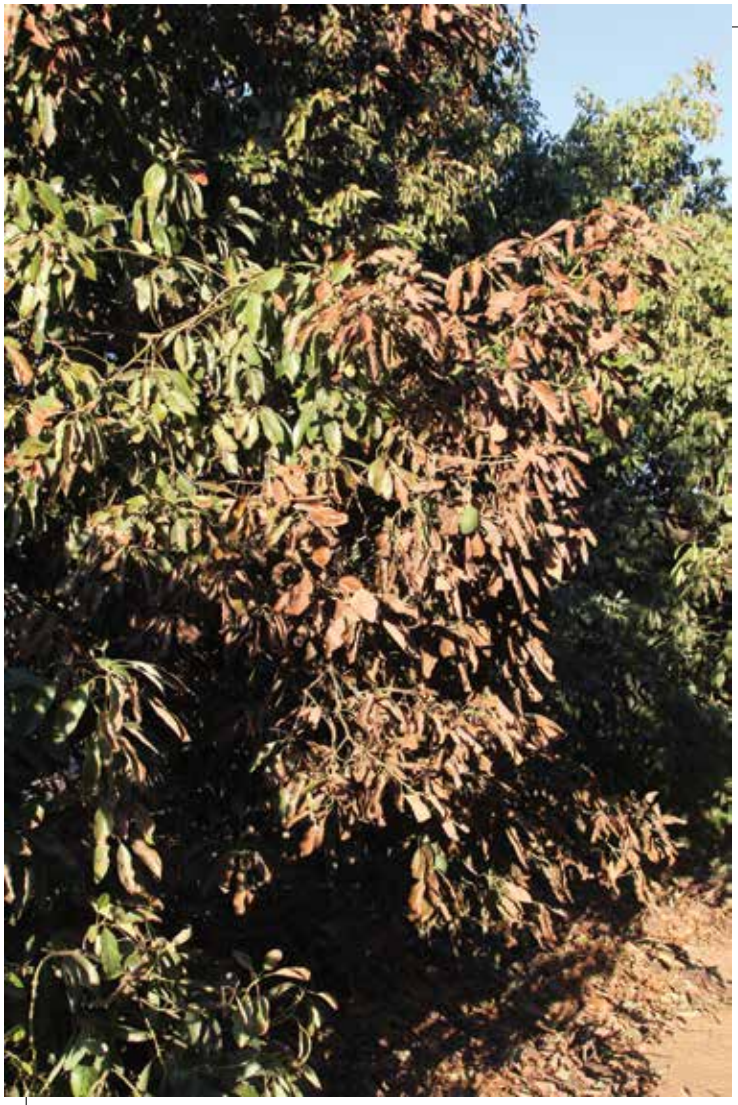
Growers who have lived through past fires generally agree that struggling to resuscitate badly damaged trees is time lost, and in such cases tree replacement may be the best option. Just as with freeze damage, dealing with fire-damaged



This graph shows the number of acres (in millions) burned by wildfires in California each year from 1950-2023.



This graph shows the number of large fires (10,000 aces or more) each year from 1950-2023, with the red line indicating the 10-year rolling average.



The side of an avocado tree canopy facing a fire shows signs of leaf damage.

groves requires patience and discipline. It is best not to rush assessment of tree damage and consider getting a second opinion before making major pruning cuts or replacing trees. With that in mind, it is worthwhile to consider the following points concerning grove fire recovery.

Document, Document, Document

Growers should take copious notes and document everything related to any fire damage and recovery. Growers also must take into consideration the Food Safety Modernization Act (FSMA). Growers affected by the fires should record a "notice of unusual occurrence and corrective action" in their food safety plan. A form for this is available in CAC's Food Safety Manual, which is available online (CaliforniaAvocadoGrowers.com/growing/food-safety/food-safety-manual-resources). In addition, growers should document all costs associated with the fire in their groves. This includes keeping records of things such as labor costs, and receipts for any materials and supplies purchased in association with recovery. These records are necessary for any future insurance claims or potential litigation related to the fires.

Irrigation Is Critical, But Must be Adjusted According to Fire Damage

Replace all damaged sprinklers, risers and other irrigation system components as soon as possible, make sure underground plumbing is operational and test your system. The dry winds and fires will have caused considerable tree stress, so a thorough deep irrigation should be applied as soon as irrigation systems are operational. Remember that fire damaged trees will use less water if leaves are scorched because they will have a reduced functional leaf surface area. If irrigation continues per pre-fire schedules, the ground may become saturated and cause further tree damage during recovery due to root asphyxiation. In consideration of this, it may be worth investing in soil moisture sensors to help ensure that a bad situation is not worsened.

In post-fire irrigation management, growers should be especially cognizant of the fact that fire damage is unlikely to

An avocado tree trunk completely blackened and charred by fire. Note the lack of any weeds or mulch remaining and the complete loss of leaves on some branches, indicating the high heat and intensity of the fire. This tree will not recover.

Sap blisters on the trunk of an avocado tree following a fire. These blisters indicate the sap in the tree boiled during the fire and the tree will not recover. Photo courtesy of Ben Faber.

Be Patient with Pruning

It is important to wait to prune until you can determine the extent of damage to the trees. Cutting away the bark and looking for live cambium may not necessarily be a good measurement of how badly a tree has been damaged because it may be hard for the inexperienced grower to discern differences between living and dead tissues. Wait to see where the new growth flush occurs on damaged trees before making pruning cuts. In hot areas, give the trees a chance to test new growth in warm weather before pruning, because some new growth will inevitably collapse. By waiting to assess damage to your trees, you will know where to make definitive pruning cuts, thus allowing you to salvage as much of the damaged tree as possible and return to production as quickly as possible. If your grove was overcrowded or was too tall to efficiently manage, this may be a good opportunity to modify your management practices by thinning trees and reducing tree height.

Dr. Ben Faber, University of California Cooperative Extension Farm Advisor, contributed to this article and has assembled a wealth of information about fire preparedness and recovery that can be found on the Tropics in Subtropics blog, http://ucanr.edu/blogs/topics/index.cfm.

be uniform across a block. Individual trees or areas within a block may have been damaged differently and will now have distinct irrigation needs. It may be necessary to run a second line in some blocks to accommodate trees with different water requirements, change microsprinkler sizes, or even swap some microsprinklers for drip emitters to accommodate this variation.

Protect Trees from Sun Damage

It is extremely important to whitewash (using a diluted interior white latex paint) all sun-exposed branches and trunks that were previously shaded by leaves. Sunburn on exposed branches, limbs and trunks can cause considerable additional tree damage. You may unnecessarily whitewash some trees that will not survive, but it is better to be cautious and whitewash everything to protect those trees that will recover.