

AVOCADOS AND THE COYOTE FIRE

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Avocado trees burn rather easily and when many of them are grown in close proximity to southern California's fire susceptible brushlands, the combination can be rather disastrous. Such was the case during the last week of September in 1964 near Santa Barbara when the Coyote Fire burned 20 avocado orchards.

This report will summarize the avocado damage and present those conclusions that can be made a year afterward. Final evaluation of regrowth, rebuilding, and the success of avocado replants will have to be reported later.

The Coyote Fire started on September 22 in the foothills in the northwestern portion of Montecito. This is an area of homes and scattered small avocado orchards. The fire spread behind Santa Barbara, westward to San Marcos Pass, and then northward into the Santa Ynez River watershed and the Los Padres National Forest. Total burned area was 67,000 acres.

The U.S. Forest Service reported 188 structures burnt with a value of \$2.6 million; many were very expensive residences. Fire suppression costs totaled \$2.5 million and damage to the watershed has been estimated to be \$15.7 million.

Damage to the over 10,000 avocado trees that were in the path of the fire ranged from outright burning to slight singeing of the lower leaves. Some of the trees were still carrying the mature, unharvested 1964 crop. Most of the trees were also carrying a heavy set of fruit for the 1965 season.

Estimates of damage to avocados totaled over one quarter of a million dollars. The value of the fruit lost to the grower was about \$140,000. Tree damage was valued at about \$100,000. Burnt deer fences, plastic irrigation systems, field boxes, ladders and other supplies and equipment ran at least \$10,000.

One consolation benefit of the fire was that many potential orchard sites had the brush cleared rather effectively.

Observations of these damaged orchards have led us to the following conclusions and suggestions.

Injury to the avocado trees varied with the intensity of the heat. This in turn depended on the fuel supply in the immediate area. A thick mat of dropped avocado leaves, particularly with twigs, broken branches and low limbs, often served to cause the death of the trees. Similarly exposed trees without undertree buildup of fuel usually recovered.

Another heat source that badly damaged the avocado trees around the edges of the groves was a heavy growth of brush, trees and other vegetation. Again, this is a matter

of fuel. In areas where grass was growing or where the brush had been removed, relatively mild injury resulted. Prunings piled in draws within or around the groves were particularly damaging.

None of the orchards was sprinkler irrigated during the fire due to lack of water pressure or to the speed with which the fire moved. One orchard was overhead sprinkler irrigated for several hours until just before the time the fire hit. These trees were much less severely damaged; the leaves and fruit were lost but nearly all of the trees came back. The adjoining orchard without water had many trees killed.

The most critical part of the tree is the trunk. The bark from just above the ground to about two feet high can become so hot as to kill into the cambium, the layer between the bark and wood. When the cambium is killed, the tree is girdled and will die. Many trees, observed with undamaged leaves and fruit in the tops, nevertheless, died several months later because the trunk had been killed.

Orchards with plastic under-tree sprinkler risers had these pipes bent or otherwise damaged. Plastic hoses or pipe on the soil surface where water was not applied were complete losses. The use of steel pipe and risers above ground resulted in no loss to the irrigation system.

PREVENTIVE MEASURES

These preventive measures can be suggested for groves in areas of high fire hazard:

1. Remove all combustible material from around the trunks of the trees for a distance of two to three feet.
2. Prune off low-lying limbs, those that are low enough to accumulate more than the normal inch or so of leaf mulch.
3. Remove from the orchard all broken limbs, deadwood and other combustible debris.
4. Clear brush, trees and other heavy vegetation away from edge of orchard for a distance of at least 50 feet.
5. Do not pile brush or other combustible material in draws or canyons, or around the edges of groves.
6. Apply sprinkler water for as long a period in advance of the fire as possible so as to have everything wet down. Water during the fire would obviously be desirable but often is lacking because of lack of pressure or speed of the movement of the fire.
7. Use steel pipe and rises for above ground sprinkler systems.

Every fire is different, so experiences vary. In fact, each of the 20 orchards in the Coyote Fire is showing different rates of recovery. But in general, the following suggestions can be made for handling the orchard after a fire:

1. It is nearly impossible to determine the extent of damage to the wood of the tree immediately after the fire. It may take several months to be able to observe whether the bark is killed all the way to the cambium or not. Thus, we recommend against pruning until new growth appears to indicate where the wood is alive. Allow the dead

burned leaves to hang on the tree to provide some sunburn protection. Denuded trees should be whitewashed on the south side of the limbs.

2. Irrigation practices should be based on frequent observation of soil moisture. A tree without leaves does not use much water. Over-irrigation increases the hazard of root rot, chlorosis and other water-induced difficulties. Since fire damage can vary from tree to tree, the water applications should be adjusted to the individual tree's needs. Use the proportion of functioning leaves as a guide, but it's best to check soil moisture frequently.
3. To save expenses, fertilizer and pest control can be postponed for a year or so.
4. Since the burned areas may be seeded by air and many weed seeds survive fires, a sprinkler irrigation will start the ground cover growing to minimize erosion the following winter. You may want to ground broadcast annual ryegrass, soft chess, or barley in critical areas before irrigating.

Fire and avocados can be a disastrous combination. The problem will probably worsen as southern California groves are pushed further into the foothills by urbanization. More experience is needed in how to minimize damage with the use of fire retardants. Also needed is more information on better ways to rehabilitate damaged trees and how and when to replant killed trees. But we all hope that fire prevention can be stepped up so that others will not have to experience fire damaged avocados.