

Quote: . . . shoots need to be well distributed over the tree to enable most fruit to enjoy filtered light rather than excessive amounts of direct sunlight.

## **Sunburn Management**

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What causes sunburn? Sunburn on fruit is caused by an interaction of high fruit temperatures and high light intensity (radiation). A critical air temperature threshold of 30° to 32°C (86° to 90°F) appears to be important. The amount of air circulation around the trees, tree water status and tree management are other important factors that influence sunburn of fruit. Here is some information about sunburn of apples and what you can do to minimize it:

- Exposed fruit on the trees can heat significantly above air temperature, sometimes as much as 12° to 14°C (21.6° to 25.2°F) higher.
- The amount of direct exposure to the sun and the amount of air circulation are the main factors affecting fruit temperatures. Fruit size, wind direction and fruit transpiration are of lesser importance.
- Sunburn is always worse on the north and northwest sides of the trees (south and southwest in the northern hemisphere).
- Annual extension growth of shoots needs to be 20 to 30 cm (8 to 12 inches) and the shoots need to be well distributed over the tree to enable most fruit to enjoy filtered light rather than excessive amounts of direct sunlight.
- Basal dominant varieties like Braeburn, Fuji and Delicious tend to run out toward the tops, leading to severe sunburn in the upper parts of the trees. Training and supporting the young trees can avoid this problem.
- Sunburn is not strictly a heat phenomenon, but is caused by an interaction of heat and exposure to certain wavelengths of light.
- Tree vigor and leaf coverage affect the incidence of sunburn. A lack of shoot growth, low vigor or a heavy crop may result in sunburn.
- Newly exposed fruit unconditioned to direct sunlight sunburns easily.
- Branches bearing fruit should not be allowed to bend over and expose fruit that was previously in the shade.
- Heavily cropped limbs and branches should be propped or tied up to maintain the original limb position. Limb movement and twisting can be responsible for a lot of serious sunburn.
- Careful attention to fruit thinning, especially toward the ends of branches, will prevent branch movement.
- In bi-colored and red varieties, thinning fruit down to ones and twos maximizes color development and can minimize sunburn. What seems above all to make fruit on a tree more vulnerable to sunburn is the crop load or the leaf-to-fruit ratio. When there are more fruit and fewer leaves, there is a lot more fruit exposed to the sun. If the fruit is covered by a few leaves at some part of the afternoon, it will most likely not burn.
- With summer pruning, make sure that you do not overexpose the fruit with too much leaf removal. Watershoots should be removed throughout the growing season to maintain light penetration and allow fruit to condition. Removing watershoots several weeks before harvest exposes previously unconditioned fruit. This does not apply to the very late varieties like Pink Lady.

- Removal of sunburned fruit should be delayed as long as possible to minimize additional damage.
- Fruit burns less if the trees are irrigated regularly. This is due to the maintenance of the tree's water status and some ability of the tree to regulate its temperature by transpirational water loss.
- Varieties like Granny Smith, Mutsu, Fuji, Braeburn and Jonagold tend to burn more than Delicious, Golden Delicious or Gala. It is difficult to rate varieties for their susceptibility to sunburn because it varies so much with tree age, vigor and crop load. Young trees tend to have more sunburned fruit than older trees because the fruit is more exposed.
- After storage, flesh breakdown can often be observed under a sunburned spot.
- The skin which has been exposed to high temperatures is very susceptible to storage scald.
- Fruit can look good going into storage but develop bitter pit or breakdown even in good storage.
- Apples can develop a lot of watercore in hot weather long before the normal time of fruit maturity.
- Shading that reduces light levels by up to 17% has reduced sunburn by up to 75%. On average, shade cloth has reduced orchard temperature by 8°C (14.4°F).

Well-colored, high quality apples are produced on trees that have good light penetration to all parts of the tree canopy throughout the growing season. To get good light penetration, you need to grow good trees first. In countries and regions with hot summers, like Australia and the Goulburn Valley, fruit growers need to build strong and balanced tree frames first. This does not need to take long if the trees are planted closely, supported by a trellis, trained and pruned correctly. With proper thinning, irrigation, nutrition and pest management, such apple orchards can cope with heat waves because they have good leaf coverage to protect them from excessive radiation. By all means experiment with other methods of protecting the fruit from sunburn, but let us not forget the main cultural practices that could and should be applied to enhance red skin color and prevent sunburn of fruit.