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Stone Fruit: Avoiding Cherry Fruit Cracking Is A Balancing Act

By **Gregory Lang** |
May 2, 2014

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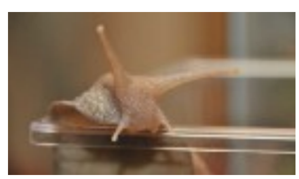

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Water is certainly critical to growing large sweet cherries, but too much of a good thing results in fruit cracking. In recent years, scientists have been studying the various steps involved in how cherry fruit crack, and have realized that cracking can result from prolonged exposure to water in the root zone as well as rainwater on the fruit (or even postharvest from water on the packing line).

Let's first consider the classic scenario of too much rainwater on the fruit. The first encounter of a raindrop with fruit is likely on the top of the fruit. From here, the water droplets will either flow to the lowest point on the top of the fruit — the fruit "bowl" where the stem is attached to the fruit — or the lowest point on the bottom of the fruit, the tip (see figure). Droplets pool in the bowl around the stem, and thus even after the rain event is over, there is prolonged contact with, and uptake into, the fruit flesh in this region.

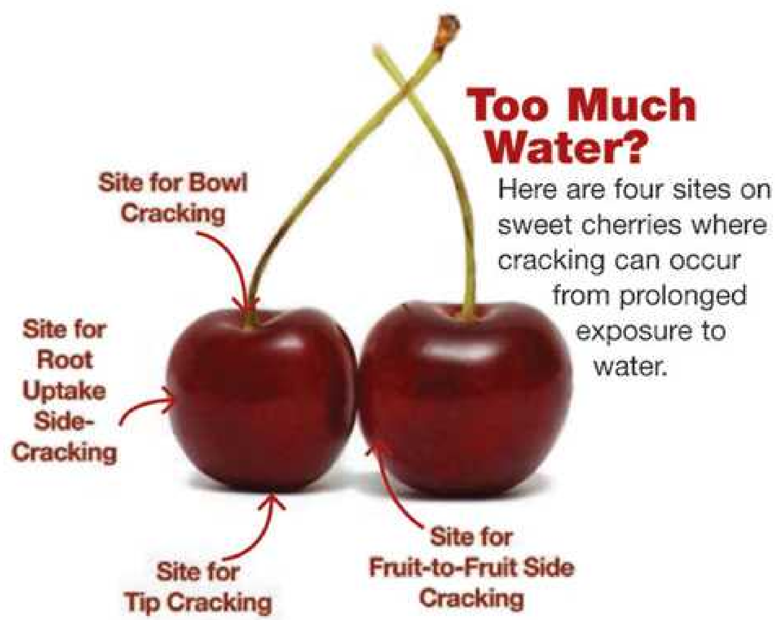
Dr. Lars Sekse (Plant Bioforsk, Norway) and Professor Mortiz Knoche (Leibniz University, Germany) showed that as cherries begin the final period of rapid fruit growth, the cuticle becomes thinner and microcracks appear. Contact with water aggravates microcrack formation. With prolonged contact, too much surface water is absorbed, the flesh swells in this localized area, and bowl or shoulder cracks result.

Similarly, droplets running off the fruit collect at the tip until there is enough water to drip off (see figure). Thus, again there is prolonged contact, which can result in tip cracks. This is also the part of the fruit where the flower style was attached until fruit set, leaving a small scar that generally is not as elastic as the fruit cuticle. Varieties with prominent stylar scars tend to be more prone to such tip cracks than varieties with small scars.

A third potential area of the fruit skin that may incur prolonged contact with rainwater is where two or more fruit in a cluster are touching (see figure), creating a surface tension that prolongs water contact with the surfaces of both fruits. This can result in cracks where the fruit touch, along the fruit sides or lower shoulders.

Clearly, duration of rain contact with any of these fruit surfaces is directly related to how much water is absorbed into the local areas of fruit flesh, resulting in cracking when the flesh swells more than the fruit skin can stretch. Thus, reducing this duration, as by blowing water off of fruit with helicopters or airblast sprayers, can be done following rain events. Eliminating rain contact with the fruit with orchard tent covers or high tunnels can prevent this type of fruit cracking entirely.

Fruit Need Not Be Wet To Crack

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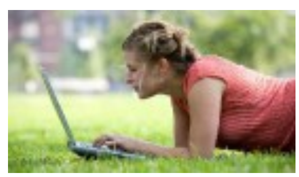
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For uncovered orchards, the uptake of water through the fruit cuticle can be slowed by the application of water-repelling (hydrophobic) fruit coatings — for example, Parka or RainGard. These generally need to be applied more than once to assure the coating remains intact during rapid Stage III fruit growth. Similarly, the application of an osmotic salt, such as calcium chloride, will reduce the osmotic differential between the pure rainwater on the fruit skin and the fruit flesh, which slows uptake. These also need to be reapplied, possibly even during prolonged rain events, since they are water soluble and can wash off.

The more recently characterized cracking scenario is that of too much water (from rain or irrigation) in the soil. In our high tunnel and retractable-roof cherry-covering-system studies at Michigan State University, we have maintained absolutely dry fruit, yet still found cracking can occur when rainwater flowing off the tunnel covers drained onto the soil and saturated the root zone. As we tested high-frequency/low-duration trickle irrigation scheduling, we also caused cracking from excessive root zone saturation, particularly during climatic periods of low evapotranspiration. Soon after we observed these phenomena, Dr. Penny Measham (University of Tasmania) reported that this root-driven water uptake into the fruit is the primary cause of side-cracks (see figure).

Water taken up by the roots is transpired mainly through the leaves, but if the evapotranspiration rate is low, more water is drawn into the fruit. This explains why some hydrophobic fruit coatings may exacerbate fruit cracking in certain situations, if the coatings reduce leaf transpiration and the rootzone becomes saturated. Likewise, orchard covers that raise humidity within the canopy, reducing transpiration, can exacerbate fruit cracking if soil moisture is excessive.

Therefore, methods to improve rootzone drainage, such as modifying surface drainage (planting on berms or raised beds) or installing subsurface drainage tiles, can be helpful for reducing rain-cracking potential, in addition to the use of orchard covers or fruit coatings. Scheduling irrigation to only meet evaporative demand is preferred. This is easier to accomplish in high density cherry orchards with micro-irrigation systems and with smaller trees having smaller root systems, than with large trees that have correspondingly large root zones.

TOPICS: Afg-May2014, Cherry Cracking, Greg Lang, Michigan State University

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