POSTHARVEST

Lenticel Breakdown in Apples

From Orchard to Storage

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Lenticels are small lens-shaped natural openings in the cuticle and peel of apples. These allow for gas exchange and transpiration. Lenticel breakdown is a physiological disorder, which is characterized by dark or blackened lenticels, or small superficial brown spots circling the lenticels (Figure 1).

Susceptibility to lenticel breakdown is often determined in the orchard, while symptoms usually develop after harvest and during storage (Figure 2). Lenticels begin to dry out and micro-cracks form, leading to sunken lesions and easy entry for pathogens. Lenticel breakdown typically develops due to climate and environmental conditions, spray damage and pathology.

***Figure 1.** Lenticel breakdown in 'Gala' apple after storage.*

Rapid temperature changes during the growing season can damage lenticels. Temperatures above 25˚C can also stress trees and cause apples to mature too quickly, resulting in reduced fruit quality, microcracks, and lenticel breakdown. Any rapid changes in weather that result in rapid fruit growth can increase risk.

Direct exposure to sunlight can also be stressful, as it weakens the lenticels and increases susceptibility to injury and breakdown. This is why lenticel breakdown often develops on the sunny side of apples, rather than the shaded side.

Unbalanced water retention in apples resulting from variations in water supply, like irregular irrigation or sudden heavy rainfalls, can cause internal pressure and subsequent microcracks. Calm winds and high humidity can also allow water to build up on apples because of poor evaporation due to lack of air movement.

Spraying in hot and sunny, humid weather with slow drying conditions can cause additional stress to the lenticels.

Adequate calcium levels are essential for stabilizing cell walls, which directly affects the integrity of apple tissue and lenticels. Mineral imbalances, such as high potassium and magnesium to calcium ratios ((K+Mg):Ca) and high nitrogen to calcium ratios (N:Ca), can also increase susceptibility to damage. Larger apples tend to be more prone to lenticel breakdown, while excessive pruning leads to moisture content variation and unbalanced minerals.

Chemicals used in dump tanks and packing lines, as well as soaps and detergents can increase the risk of lenticel damage. High phosphorus loads have been found to be associated with high incidence of lenticel breakdown. A large temperature difference between cold fruit and warmer water on the packing line will also exacerbate the problem.

Some apple cultivars are genetically more susceptible to lenticel breakdown, such as 'Gala', 'Honeycrisp', 'Ambrosia', and 'Golden Delicious'. Apples with high sensitivity to environmental factors, thin delicate skin, or large lenticels are inherently more prone to developing the disorder.

Advanced apple maturity at harvest results in higher susceptibility to lenticel breakdown.

Cell walls to tend lose structural integrity with age, leaving the skin and lenticels more vulnerable to microcracks and pathogens. Delaying harvest while waiting for color allows apples to continue ripening, which results in increased risk of lenticel breakdown. Similarly, delayed cooling and prolonged storage allows for continued fruit ripening and increased susceptibility.

Overall, adhering to good pre- and postharvest practices can help reduce the risk of lenticel breakdown. Harvest apples at optimum maturity, shorten storage duration for high-risk fruit, and minimize large temperature swings. Maintain consistent temperature and humidity levels in storage to reduce moisture-related stress, which can worsen lenticel breakdown. Ensure enough ventilation to keep the apples cold throughout the room and prevent hot spots. Controlled atmosphere and low oxygen levels will help reduce development of lenticel breakdown during storage.

Figure 2. *Lenticel breakdown in 'Honeycrisp' apple after storage.*