Hydrocooling shows promise for reducing strawberry weight loss, bruising

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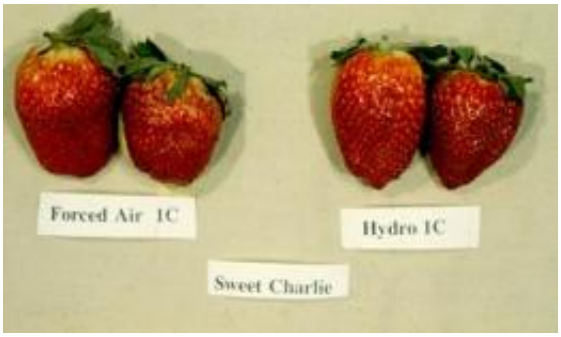

Hydrocooled strawberries (right) were more resistant to applied pressure than those that were forced-air cooled following storage at 34 degrees F. Credit: Photo by M.D. Ferreira

Strawberries are very fragile and highly susceptible to mechanical injury during commercial production. Growers interested in ways to increase profits and reduce product loss are seeking improved handling and temperature management techniques. Collaborative research from scientists from the Brazilian Agricultural Research Corporation -- Embrapa and the University of Florida contains several findings that show promise to significantly improve commercial strawberry handling.

Because of their fragile nature, strawberries must be harvested when they are ripe to minimize bruising, a critical concern leading to product and revenue losses for growers. Bruising is caused by impact, compression, and vibration forces. Impact bruising results from a sudden

sharp force—for example when a fruit falls onto another fruit or onto a hard surface, or when an object strikes the fruit. Compression bruising occurs when tissue is subjected to a constant force such as during hand-harvest (finger pressure), or when the fruit is on the bottom layer of a container.

To replicate commercial handling conditions, the research team used forced-air or hydrocooling with three strawberry cultivars ('Chandler', 'Oso Grande', and 'Sweet Charlie') to reach pulp temperatures of 1 or 30ºC, then subjected the fruit to compression and impact forces. The fruit was subsequently evaluated for bruising; each berry was sliced through the center of the impact area and was considered to be bruised if damaged tissue was visible below the impact area.

Strawberries with a pulp temperature of 24°C exhibited sensitivity to compression but greater resistance to impacts. As pulp temperature decreased, fruit were less susceptible to compression, as shown by up to 60% reduction in bruise volume. In contrast, strawberries at 1°C pulp temperature had more severe impact bruising, with up to 93% larger bruise volume than at 24°C, depending on the cultivar.

Strawberries also showed different susceptibility to impact bruises depending on the cooling method. Impacted fruit that were forced-air cooled had larger bruise volumes than those that were hydrocooled. The impact bruise volume for strawberries forced-air cooled to 1°C was 29% larger than for fruit hydrocooled to 20°C, 84% higher than those forced-air cooled to 20°C, and 164% higher than those hydrocooled to 1°C.

The results proved that strawberries had different responses to compression and impact forces based on pulp temperature. Fruit at low temperature were more resistant to compression, while fruit at higher temperatures were more resistant to impact. This finding translates to practical recommendations for commercial strawberry growers,

suggesting that fruit bruising caused by compression may be minimized by harvesting and transporting early in the day when pulp temperatures are lowest.

According to the report, "there is potential for strawberries to be graded and packed on a packing line; however, impact bruising at transfer points must be minimized. In this scenario, the strawberries could be harvested into field lugs (two or three layers deep of fruit) and transported to the packing house. It would be more advantageous to use hydrocooling than forced-air cooling because hydrocooling cools fruit at a much faster rate."

The authors added that because incidence and severity of impact and compression bruises are temperature-dependent, strawberry growers should consider pulp temperature for harvest scheduling and for potential grading on a packing line. "Hydrocooling shows to rapidly cool strawberry fruit while reducing weight loss and bruising sensitivity," they concluded.

More information: The complete study and abstract are available on the ASHS HortScience electronic journal web site: hortsci.ashspublications.org/c … t/abstract/44/7/1953

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