

PROTECTING FRESH FRUIT SHELF LIFE & QUALITY

Fruits and vegetables are essential components of a healthy diet and can decrease risk of chronic disease. Despite the widespread availability of fresh fruit, many Americans eat less than the recommended five servings per day. One of the biggest deterrents to consumption is poor quality. Storage, shipping, and handling can lead to bruising, browning, rot, and deterioration of texture and flavor, making the fruit unappealing to consumers and causing major losses for the industry.

Researchers at land-grant universities are working with government partners in the U.S. and Canada to address these concerns and find effective ways to protect fresh fruit shelf life and quality.

Through consumer surveys and evaluations of fruit characteristics, researchers pinpointed domestic and international consumer concerns and tailored breeding programs to produce fruits with desirable qualities. Ensuring consumer satisfaction is a major part of increasing fresh fruit consumption and maintaining industry success.

Other scientists examined how fruit genetics, physiology, and growing conditions affect susceptibility to decay and disorders after harvest. These insights will help guide breeding programs and crop management practices that protect fruit quality.

Researchers also tested new tools and methods for protecting fruit quality during storage. Findings have helped the industry decide whether to invest in certain technologies. In particular, non-chemical ways to protect fruit quality have provided options for organic growers and export markets with chemical use restrictions and for small-scale farmers who may not be able to afford chemical treatments. Improving storage durability and extending shelf life in these ways enables growers to sell high quality fruit when and where prices are best. The ability to transport fresh fruit long distances without damaging quality also allows more consumers access to a wider variety of fruits.

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RESEARCH HIGHLIGHTS

- With **University of Florida** research, mango shippers now know internal discoloration can be prevented by avoiding exposure to cold temperatures after harvest.
- The chemical compound 1-MCP delays ripening in mango, but interacts negatively with quarantine hot water treatments.
- Applying oxalic acid to mango fruit after harvest reduces incidence and severity of chilling injury symptoms.

- **North Carolina State University** identified watermelon germplasm that is sensitive to hollow heart, illuminating ways to minimize this disorder.

- **University of Hawaii** researchers investigated how crown and slip removal affects final fruit size, acidity, and flesh translucency.

- **University of Florida** researchers found that increased nitrogen produces firmer fruit that can better withstand impacts during shipping and handling.
- **Florida** growers and handlers are using recommendations to manage temperature and maintain peach quality after harvest.

- Adding calcium salts in hydrocooling water and using certain packaging films can improve the shipping quality of sweet cherries.
- Using **University of California** recommendations, **Pacific Northwest** growers are able to ship cherries to long-distance export markets by boat instead of by air, reducing costs.

- After adopting a recommended storage strategy, a major local pear packer in the **Pacific Northwest** documented a nearly \$2,000,000 annual increase in market value and an almost \$800,000 reduction in repacking costs for a single pear variety. Buyer confidence in fruit quality also increased.
- Growers in the **Mid-Atlantic** who followed **University of Maryland** recommendations for preventing internal breakdown reduced losses from 100% in 2015 to none in 2016.
- The **California** pear industry is now combining ethoxyquin, 1-MCP, ethylene, and controlled atmosphere storage to reduce scald.
- Researchers identified films that protect pears during long-term cold storage and long-distance sea shipment.

- **North Carolina State University** researchers educated growers about best storage conditions and optimal shelf life for grapes.

- Researchers in **California, Maine, Maryland, Minnesota, New York, and Canada** tested new technologies that determine whether apples are at the right maturity for harvest and storage.
- Growers are using recommended treatments and conditioning protocols to store Honeycrisp apple crops worth tens of millions of dollars.
- **Cornell University** studies showed that dynamic controlled atmosphere storage has the greatest effect on delaying stem end flesh browning in Gala apples.
- **Michigan State University** researchers showed that a single application of MCP at harvest is nearly as effective as 2 and 3 doses.

- **University of Florida** studies found that cooling to 18°C within 90 minutes of harvest permits blueberries to be held overnight and packed the next day with minimal damage.
- **University of Florida** developed recommendations on the use of 1-MCP to delay ripening in avocados.

