

Inventing the RediRipe® Sticker

A new way to measure maturity in fruit

By Susan McGinley

What a simple concept—slap a sticker on an apple and watch the sticker turn color to tell you when the fruit is ripe. But it took years of testing to develop this idea into a practical device that would really work.

Inventors and partners Robert Klein and Mark Riley explored numerous approaches before they hit on the one that was more accurate, less expensive and far easier to use than other ripeness assessment methods. In 2006, the RediRipe® sticker was launched for limited commercial testing and promptly won the Arizona Governor's Award for innovation. After further testing, the business partners expect the sticker to be commercially available for the 2009 tree fruit harvest season.

The circular, thumbnail-sized sticker has a dot in the middle that turns from white to blue when attached to a fruit that has started producing ethylene, a common maturation indicator naturally released by climacteric fruit. Climacteric fruits display an increased respiration with maturity, which is related to their production of ethylene. Examples include apples, peaches, pears, apricots, avocados and plums. The sticker encases reagents that are specific to ethylene and display a vivid color change with gradations.

"Our sticker is the only one used on individual fruit," Klein says. "It eliminates cumbersome practices like gas chromatography, is more efficient and costs far less than the typical laboratory equipment. Individual stickers are expected to cost less than a penny each."

Growers and experts have learned the telltale signs of fruit maturation through years of experience walking through orchards to note the color, size and shape of the fruit. The RediRipe® sticker gives a direct readout of the fruit's maturity status and so should improve fruit management and greatly reduce fruit loss.



RediRipe® LLC

Ethylene-detecting RediRipe® sticker on an apple in an orchard. Climacteric fruits such as apples, pears, and peaches release ethylene related to fruit maturation. This sticker has turned from white to blue indicating that ethylene production has started and hence the apple is mature.

The search for a more user-friendly way to determine ripeness began several years ago when Klein thought of the sticker idea from the standpoint of a frustrated consumer: he was tired of buying unripe fruit and decided to do something about it.

The Albuquerque, New Mexico, resident—originally trained as a psychologist—wanted to work with a scientist who was conversant with ethylene research and could develop and test sticker prototypes. He eventually met Riley through Ed Eaton, a scientist at New Mexico State University who had graduated from the UA's Department of Agricultural and Biosystems Engineering (ABE), where Riley is currently a professor.

"It was fortuitous and I don't know that I could have found someone better than Mark," Klein says. In 2004, after Riley, as a UA faculty member, obtained the necessary permission from the Arizona Board of Regents, the two formed RediRipe® LLC. Klein is the company CEO, and Riley is CTO. Under Riley's direction and through the critical work of RediRipe® and UA technician Dominic DeCianne, the research and development team at the ABE laboratory in Tucson tried hundreds of approaches, each subtly different.

"We based our methods on a reaction with ethylene that had long been abandoned," Riley says. "Our innovation lies in using these techniques to quantify ethylene and in maintaining the sticker in a delicate balance of being reactive, but not too sensitive that we get false positives."

The device responds to ethylene, a gas that turns on a series of ripening steps in a fruit, leading to softer flesh and an increase in sugar levels.

"No one has done what we're trying to do," Riley says. "If we can determine when ethylene production begins and quantify how

much is coming out, we'll know the maturation or ripeness status of the fruit." It takes approximately a day for the color to develop after a sticker is placed on the fruit. The sticker is accurate and cheap to ship because it is lightweight.

"Dominic has been instrumental in developing the sticker," Riley says. "At first, Bob and I developed this into a project that became the master's research of Navaporn Srinavakul. When Dominic joined the lab, progress took off as he helped Navaporn and also supervised a horde of undergrads working on different aspects of this technology."

Meanwhile, Klein has worked extensively with industry groups, obtaining funding from the USDA and the Washington Tree Fruit Research Commission, a growers group that continues to support and encourage the sticker research. The commission funds small research grants to promote the fruit industry, particularly apples and pears.

"The response has been extraordinarily positive," Klein says. "I gave a presentation in 2002 to ask for funding from the commission. The very first question I got from the growers was, 'Can we have this tomorrow?' I knew then that they would fund us."

Klein and Riley have worked with Ines Hanrahan, a commission project manager, in testing the RediRipe® sticker on different varieties of apples and pears in orchards and packing houses in Washington. The research also assesses how well the sticker fits into orchard routines, and how it can save growers time and money. In Tucson, the UA laboratory team has tested the sticker on backyard fruit and on apples and pears from local groceries.

Other funding and research assistance over the past several years has come from the Sandia National Laboratories/New Mexico Small Business Association program and Technology Ventures Corporation, both in Albuquerque.



RediRipe® LLC

The current version of the sticker is designed for use on apples and pears, but the technology could be adapted for other fruits, possibly impacting avocados, peaches, tomatoes, flowers and some kinds of melons.

"We're improving the sticker to detect the lowest concentration of ethylene that's produced by the fruit," Riley says. The UA holds the patent (pending) for the sticker, while RediRipe® LLC is the exclusive licensee.

Interest in the RediRipe stickers has now expanded to include requests from all over the world, not only from growers, but also from grocers who want to put them on the fruit in their stores. For that purpose, there's potential to combine the RediRipe sticker with the PLU ("Price Look-Up") stickers commonly seen on produce into a single sticker.

Klein and Riley note that the current version of the sticker is designed for use on apples and pears, but the technology could be adapted for other fruits, possibly impacting avocados, peaches, tomatoes, flowers and some kinds of melons. ★

Contact

Mark Riley
(520) 626-9120
riley@ag.arizona.edu

Robert Klein
(505)-247-4665
RKlein@RediRipe.com

(From left:) Robert Klein, CEO of RediRipe® LLC and Mark Riley, CTO and UA professor of agricultural and biosystems engineering, invented the ripeness sticker because no quick or simple method existed for determining maturation of individual fruits on the tree or in the packinghouse.



RediRipe® LLC