Flavor secrets of Hass avocados probed

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ARS and University of California-Riverside researchers are identifying key avocado compounds that contribute to ideal flavor and may serve as "markers" that breeders could use to select new avocado varieties. Credit: California Avocado Commission.

What makes an avocado delicious? U.S. Department of Agriculture (USDA) plant physiologist David M. Obenland and a team led by University of California-Riverside colleague Mary Lu Arpaia are collaborating in a series of studies to answer that question.

Their focus is Hass avocados, the kind that's the most widely sold in the United States, and is known for its smooth, buttery texture and rich, often nutty flavor.

Of course, aroma is part of what is perceived as flavor, and scientists already know that Hass avocados have at least 25 aroma compounds,

known as "aroma volatiles." But for the most part, the precise contribution of each of these aroma volatiles has not been well studied. That's why Obenland and Arpaia are determining the kinds and concentrations of aroma compounds that are essential to the classic Hass avocado flavor.

With further work, these key compounds might serve as "markers" that breeders could use in pinpointing the most promising new kinds of avocados. Growers and packers of the future might be able to use the markers to determine the best times to harvest the fruit, or to develop new tactics that better protect these compounds or their precursors during storage and ripening.

In preliminary studies, the scientists used two well-established analytical procedures—solid phase microextraction and gas chromatography/mass spectrometry—to extract, identify and determine changes in the concentrations of individual aroma volatiles as avocados matured and ripened.

In all, the scientists worked with samples from about 850 domestic and imported avocados, and analyzed more than 4,500 observations from 15 to 20 taste-testers.

The studies, described in an article in *Postharvest Biology and Technology* in 2012, are apparently the first to report the levels of aroma compounds sampled during Hass avocado maturation and ripening, according to Obenland. He works at the Agricultural Research Service (ARS) San Joaquin Valley Agricultural Sciences Center in Parlier, Calif. ARS is USDA's chief intramural scientific research agency.

Among other findings, the scientists confirmed that three chemicals prevalent in the early growth of the fruit (hexanal; (E)-2-hexenal; and 2,4-hexadienal) were probably responsible for a grassy flavor, and that

the "likeability" of the fruit, from the taste testers' point of view, increased as the levels of these compounds decreased in the maturing fruit.

The work differs from most prior avocado flavor studies, which primarily focused on the flavor contribution of the fruit's natural oil.

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