The tasty, diminutive mandarin

By **JEANNETTE WARNERT**

DOMINANT GROWER: Paramount Citrus, with partner Sun Pacific, is the largest clementine mandarin grower in the U.S.

IN the UC Riverside citrus breeding laboratory of plant geneticist Mikeal Roose, scientists spend 75% of their time on mandarins, aiming to develop new varieties with rich sweet flavor, bright color, few or no seeds, easy peeling and a maturity date that will extend the fruit's season beyond winter.

Many mandarins on the market today are sweet and easily peeled, and they split into even segments without squirting juice. A serving has just 42 calories but provides 50% of the U.S. recommended dietary allowance of Vitamin C.

Acreage trends

Acres planted to mandarins are on the rise. In 2005, 24,038 acres were planted in California, with 11,834 of those nonbearing. In other words, nearly half of all mandarins were newly planted at that time. In 2008, 31,392 acres were planted, with 5,707 acres nonbearing.

During the same period, there was a nearly 5,000-acre reduction in the area planted to Valencia oranges, dipping from 49,163 in 2005 to 44,471 in 2008.

Key Points

- In 2008, 31,392 acres were planted to mandarins in California.
- Unlike oranges, mandarins can be crossed for good traits.
- Mandarins are commonly known as tangerines in the U.S.

The director of the University of California Lindcove Research and Extension Center, Beth Grafton-Cardwell, attributes the drop in Valencia acres to greater availability of both imported navel oranges in the summer and newer late-maturing navel varieties. Traditionally, California navels — which are favored for their lack of seeds and thick, easy-to-remove rind — reached maturity in the wintertime. Now navels imported from Australia and late-season California navels are meeting the demand for oranges during the Northern Hemisphere's summer, when Valencia oranges from California typically come on the market.

Mandarins are on the market from November to June. The mandarin looks like an orange, but in fact, it preceded the orange.

Orange history

The orange is a hybrid of ancient origin, Roose says.

"Nobody has ever been able to breed oranges," Roose explains. "If you cross two oranges, all the hybrid trees produce fruit that are very unlike oranges. Because oranges are hybrids between two ancestral species, the characteristics derived from each of these ancestors produce novel combinations in the offspring of oranges."

The origin of oranges as hybrids involving pummelos and mandarins was proposed long ago and has been confirmed by DNA evidence in several labs.

"The chloroplast genome in oranges, inherited from a female, came from pummelo. We can also find other genes in oranges that match pummelos and lots of others that match mandarins," Roose says. "But we still don't know which pieces of the orange genome came from mandarins and which from pummelos. That's what we're trying to figure out."

The most common way to propagate true-to-type edible varieties of oranges, lemons and limes is to graft cuttings called budwood onto rootstock trees. In effect, they are propagated by cloning.

Mandarin history

The mandarin's history is different. Mandarins are thought to have originated in Southeast Asia. They can be bred, offering scientists the ability to cross varieties that have good characteristics to produce fruit that is recognizable as mandarins. Recently released varieties include Gold Nugget and Yosemite Gold mandarin hybrids.

At one time, mandarins were shipped to the U.S. from the Moroccan port city of Tangier, explains Tracy Kahn, UC Riverside botanist.

"They were given the nickname tangerines, and the name stuck," Kahn says. "In the U.S. we use the terms mandarin and tangerine interchangeably. However, mandarin is the botanical term that's used throughout the world."

Warnert writes for UC Ag and Natural Resources.

Paramount is citrus leader

PARAMOUNT Citrus owns, cultivates and harvests more than 40,000 acres of fresh citrus: clementine mandarins, navel and Valencia oranges, lemons, and other citrus. Paramount is the largest integrated grower, shipper and packer of fresh citrus in the U.S. Key hallmarks include:

- More than 10 million cartons of fresh citrus from Paramount's own groves are shipped annually throughout North America and the Pacific Rim, processed from Paramount Citrus' facilities in the San Joaquin Valley and Mexico. In 2000, the company acquired Dole Food Co.'s fresh citrus division to expand clementine acreage. With partner Sun Pacific, it is now the largest clementine grower in the U.S. More acquisitions are likely.
- Strategic acquisitions such as UniMark and its Mexican affiliate, Grupo Industrial Santa Engracia S.A. De C.V., in 2008 significantly increased lemon acreage.
- Investments into research to match consumer taste profiles and unique growing practices include pulling several thousand acres and replanting new varieties to match consumer preferences.