

Tangerine Tomatoes Top Reds in Preliminary Lycopene Study

Tangerine tomatoes, named for their attractive orange color, are plump, juicy, and slightly sweeter than everyday red tomatoes. Sold seasonally at some farmers' markets and specialty grocers, these are heirloom fruits, the kind that your grandparents or great-grandparents may have planted in their garden.

Besides their appealing color and pleasing flavor, there's another reason to give these vintage tomatoes a try. A 1-month study led by Agricultural Research Service chemist Betty J. Burri and former ARS biologist Betty K. Ishida, both based in California, has provided new evidence to suggest that, ounce for ounce, tangerine tomatoes might be better sources of lycopene—a powerful antioxidant—than are familiar red tomatoes.

The difference lies in the forms of lycopene that the two tomato types provide. The *trans*-lycopene form makes up most of the lycopene in common red tomatoes. In contrast, most of the lycopene in tangerine tomatoes is *tetra-cis*-lycopene.

The California investigation and one conducted by scientists in Ohio suggest that the tangerine tomato's *tetra-cis*-lycopene is more efficiently absorbed by our bodies than is the *trans*-lycopene of red tomatoes.

For the California study, 21 healthy men and women volunteers were asked not to eat any fresh tomatoes, tomato products, or other foods rich in lycopene (watermelon or pink grapefruit, for example) other than that provided by the researchers. That instruction went into effect at the start of a 1-week "washout" period and stayed in effect throughout the rest of the study period.

In the week after the washout, volunteers ate their usual breakfast, dinner, and snacks (minus lycopene-rich foods), but came to the ARS Western Human Nutrition Research Center in Davis, where Burri is based, to have a special lunch. This meal consisted of kidney bean chili made with either red or tangerine tomato sauce. The chili, about a 2-cup serving, was accompanied by French bread, butter, and a salad of leafy greens with dressing.

Volunteers followed that regimen with another week-long "no lycopene" washout stint before switching over to a final 1-week phase featuring lunches of whichever type of chili—red or tangerine—they had not already eaten earlier in the study.

Blood was analyzed weekly for lycopene levels with a standard laboratory instrument known as a "high-performance liquid chromatograph." The analyses indicated that lycopene levels increased relative to those measured just before each 1-week chili regimen began. Total lycopene levels increased more after the tangerine tomato treatment than after the red tomato treatment.

The team also assessed oxidative damage. Lycopene and other antioxidants can, as the term implies, protect cells and "good fats"—essential fatty acids—against oxidation. Using a procedure known as a "TBARS assay," the scientists determined that oxidative damage decreased with both treatments. But decreases were greater after the tangerine-tomato regimen.

Burri and Ishida, along with former ARS visiting scientist Jung S. Seo and others, published their findings in a 2009 issue of the *International Journal of Food Sciences and Nutrition*.—By **Marcia Wood**, ARS.

This research is part of Human Nutrition, an ARS national program (#107) described at www.nps.ars.usda.gov.

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Tangerine tomatoes might be a better source of lycopene than traditional red tomatoes.