

Tater Treats

Nutritious Sweetpotato Chips and Fries



SCOTT BAUER (K9419-1)

Geneticist Janice Bohac and technician John Fender compare chips made from USDA sweetpotato breeding lines.

Imagine a sweetpotato that isn't very sweet.

For the last 8 years, ARS geneticist Janice R. Bohac and entomologist D. Michael Jackson of the U.S. Vegetable Laboratory, in Charleston, South Carolina, pathologist John Mueller of Clemson University, and cooperators have used conventional breeding and selection to develop medium-light orange, yellow, or cream-colored sweetpotato breeding lines for new uses.

"They're bland in flavor and lower in sweetness—perfect for making great potato chips or french fries," says Bohac. She has been testing them in the small-scale chip-making kitchen in her laboratory.

"Unlike the sweet, orange-fleshed varieties of the United States, these sweetpotatoes resemble those eaten in the Tropics and favored by many

Americans originating from Asia, Africa, the Caribbean, and South America," Bohac says. "Because they're not as sweet or moist as the traditional American types, they are great candidates for chips and fries."

Bohac's new sweetpotatoes have several attributes that make them an excellent ingredient in snack foods. For one, they are highly nutritious. Chips made from them contain many nutrients—including the orange-pigmented beta-carotene that's the precursor to vitamin A.

"Just one medium-sized orange or dark-yellow sweetpotato provides more than the Recommended Dietary Allowance of vitamin A and high levels of fiber, vitamin C, and folic acid," she says.

In addition, Bohac says her new sweetpotatoes have high dry matter



content—as high as 40 percent. "This means that these chips don't soak up as much oil as other chips or those made from the leading U.S. sweetpotato variety. Thus, they're crispy and have less fat."

"I've had people here try them and say, 'I don't usually like sweetpotatoes, but I like these,'" says Bohac.

The sweetpotato, *Ipomoea batatas*, is a member of the morningglory family. Sweetpotato ranks as the seventh largest food crop in world production. In 1999, they were a \$215-million-plus crop in the United States.

Sweetpotato roots resemble—and are often called—yams, *Dioscorea alata* or *D. rotundata*, but they aren't botanically related to yams. Yams are not grown commercially in the United States. And while yams are dry and starchy and can

make a good chip, they contain little to no beta-carotene or vitamin A, and so are less nutritious.

Another good feature of Bohac's and Jackson's new sweetpotato breeding lines is that they can be grown with fewer pesticides because they are resistant to key sweetpotato pests like root-knot nematodes, Fusarium wilt, and soil insects. And they grow and produce well in the South.

"A lot of the starchy sweetpotato varieties grown in tropical countries don't yield well in the United States because they are not adapted to our climate," says Bohac. "They also deteriorate quickly in storage."

Unlike current commercially grown U.S. varieties, "these new sweetpotatoes are being developed specifically to be grown in the United States for making chips and fries," she says.

Bohac is hoping that sweetpotato chips will catch on here as they have elsewhere. Starchy, bland sweetpotato chips and fries are popular in many parts of the world, including Peru, Japan, China, Bangladesh, Thailand, New Zealand, and Jamaica and other Caribbean countries.

"In the United States, sweetpotato chips have been marketed only on a small scale—primarily because current varieties have a strong sweetpotato flavor," she says. "They also require more processing to remove sugars, reduce browning during frying, and achieve the right texture."

Bohac and her colleagues have named one of the new dry-fleshed sweetpotatoes "White Regal." It's being used as a parent to produce improved dry-fleshed breeding lines with multiple pest resistance.

There are several other dry-fleshed lines in advanced testing that may be superior to current commercial fresh-market cultivars for making chips and fries.



"We need to do more yield testing—as well as cooking tests with sweetpotatoes coming out of several months of storage—to determine which cultivars will be most suitable for processing. This information will determine which breeding lines will ultimately be released," she says.

Bohac is looking for a commercial cooperator so she can produce and test the chips on a larger scale. "If these new

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Entomologist D. Michael Jackson (left) and John Fender examine sweetpotato breeding lines for maintenance of quality during long-term storage.

chips catch on, they could open up new markets for U.S. farmers and new nutritious products for consumers," she says.—By **Hank Becker**, ARS.

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Striking Potato Gold

Want nutritionally packed potatoes? Plant geneticist Kathleen G. Haynes, with ARS' Vegetable Laboratory, and nutritionist Beverly A. Clevidence, head of ARS' Phytonutrients Laboratory, both in Beltsville, Maryland, are developing yellow-fleshed potatoes with increased carotenoid content. Some of their potato lines have more lutein content than commercial potatoes. Lutein is a carotenoid thought to protect against age-related eye problems and blindness.

"U.S. consumers are increasingly interested in yellow-fleshed potatoes because the colored variety tastes better," says Haynes. "Yellow-fleshed potatoes may offer more health benefits with enhanced carotenoid levels. Also, the quality is better."

The newly developed potatoes can be used for baking or making chips. Their flesh ranges from white to very dark yellow to almost orange. Haynes has found that the more intense the yellow, the higher the lutein content.

Clevidence's laboratory is analyzing the carotenoid content in some of the potato lines. "We're still in the early stages," Haynes notes. "We don't have a variety that's ready for commercial release. We're evaluating different lines that could ultimately end up in a new variety." So far, the promising lines contain 3 to 13 times more carotenoid than Yukon Gold, the most widely purchased yellow-fleshed potato in the U.S. marketplace.—By **Tara Weaver-Missick**, ARS.

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