



LEFT: Dr. John Bamberg, USDA geneticist and project leader of the genebank. RIGHT: Tim Kaczmierczak, greenhouse technician at the UW-Peninsular Research Station, pours some potato beer.

Breaking News: POTATO BEER!

A HEALTHIER BREW SPROUTING OUT OF RESEARCH STATION

----- Story & photos by Paige Funkhouser -----

Would you drink beer that was “better” for you? If the team of researchers at the U.S. Potato Genebank in Sturgeon Bay is successful, healthier beer could become a reality.

Finding new uses or identifying useful genetic traits for the illustrious potato is one of two main purposes for researchers working at the genebank, which is housed at the University of Wisconsin Peninsular Research Station on Highway 42, just north of Sturgeon Bay. The other purpose? The safekeeping and distribution of 106 species of cultivated and wild potatoes.

“This Potato Genebank is a back-up for improving the potato crop internationally,” said Tim Kaczmierczak, Agricultural Science Research Technician, Vegetable Crops Research Unit, for the U.S. Department of Agriculture. “(Our) purpose is to keep the germplasm alive, healthy, ready to send to scientists and breeders around the world, and research ways to make a better potato.”

Germplasm is the living tissue from which new plants can be grown.

The potato is one of the world’s most nutritious foods, providing 45 percent of our daily Vitamin C needs, more potassium than bananas, and a small serving of French fries has more fiber than a serving of spinach! (Justification for next time...)

Worldwide, human diets rely on four food crops, in the following order: rice, wheat, potatoes and corn. Potatoes, like grains, are made up of sugar molecules that, when fermented with additions such as yeast and hops,

can successfully create beer – nutritious beer. That’s the ultimate goal for Kaczmierczak and Dr. John Bamberg, USDA geneticist and project leader of the genebank.

A BEER OVER BEER

Kaczmierczak is a hobbyist home brewer of beer. The story of potato beer begins where many stories do – over a bottle (or two) of the liquid gold and a challenge to try something new. “Dr. Bamberg knew I had been brewing beer for a few years, and said one day, ‘Why don’t you try making beer with potatoes?’ So I did. And it turned out pretty good,” said Kaczmierczak, as he cracked open an unlabeled brown beer bottle to sample.

Similar in visual cloudiness to New Glarus’ Spotted Cow, Kaczmierczak’s potato beer tastes like ... beer.

“It’s not a lawn-mowing beer,” Kaczmierczak pondered while sampling the beer, “not the kind you easily drink after. Maybe it would be good paired with...French fries!”

The first hurdle of “Can it be done?” accomplished, Kaczmierczak and Bamberg moved on to the science of getting the maximum nutritional benefits out of the potato and into the beer. Bamberg engaged food scientist Nick Smith at the University of Wisconsin-Madison to work on optimizing the brew.

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— Tim Kazmierczak, potato beer brewer

“We would like to have more nutritional outlets for using the potatoes we have in the genebank,” Bamberg said of why he green-lighted further research into the potato beer project. “We are interested in developing potato stocks. We’ve got potatoes specially bred for different uses ... potato chips, French fries. Maybe we could breed optimal potato cultivars for beer making.”

Bamberg and Kazmierczak and the researchers at UW-Madison are working to determine how to impart the nutritional values from potato into beer: Should the nutrient-dense skin be kept on or removed for brewing? Which variety will taste the best? What’s the protein tolerance before the beer tastes off? Can the potato be roasted, as barley often is? How much nutritional value can potato beer retain?

According to Bamberg, there are several potential significant nutritional benefits to brewing with potato rather than grains. The high levels of potassium in potatoes, for example, would be expected to carry through the brewing process intact.

“We have been working with our sister genebank in Lima, the national potato breeding program and non-governmental organizations in Peru for many years,” he explained. “Since Peru is the native home of the potato, the organization we are working with thought it would be intriguing to see how they could deploy potato beer there. Yes, we have done taste testing here and there and have a small grant to pursue it.

“Until the last few years, Peru really hasn’t had much of a craft beer industry,” added Bamberg. “(Co-op researchers) got excited about the potato beer project. There’s an interesting cultural tag to this; it’s something that highlights the Peruvian culture.”

MORE THAN JUST BEER

While they wait for testing results on the potato beer, researchers at the USDA Genebank in Sturgeon Bay continue work on many other projects, such as identifying potato genes that resist turning green under lights. The total estimated crop loss due to greening between field, grocery and in people’s homes is about 15 percent.

“Greening under light is a defect in fresh potatoes,” explained Bam-

berg. “In normal eating potato species, there is not much resistance to greening. But when we screened a wild potato from Argentina in the collection (*Solanum microdontum*), it did not get green at all when kept under lights for four days. Is that a curiosity? No! Those stocks we identified were sent to breeders in Idaho, who have now incorporated the trait into edible potatoes with much less greening.”


The potato stocks housed at the genebank are much more diverse in useful traits than the commonly eaten potatoes. Researchers are working to find those traits and make them available to U.S. breeders who will use them to help both potato farmers and U.S. consumers.

“The historic thinking at the genebank has been ‘What can we do to help the farmers?’” said Bamberg. “Improve disease, pest and stress resistances; increase yield and response to fertilizer? We’re doing research on potatoes’ nutritional traits and other qualities that will directly impact the consumer, such as naturally higher antioxidants, potatoes with higher levels of folate, and even anti-cancer compounds. With the high cost of healthcare, this is an opportunity to use the potato genebank to return a great value to the taxpayers.

“We’re also working on improving specialty market varieties with novel texture, colors and tastes, such as the Colombian orange-fleshed egg-yolk specialty type.”

As a part of the USDA, research done at the genebank belongs to the American taxpayers, which means the genebank does not receive royalties for any research it conducts. If the beer research discovers useful results, the information would be published, and private industry and the public would benefit.

The average American consumes 120 pounds of potatoes annually.

“People eat a lot of potatoes, making them among the most practical of foods to deliver nutritional benefits,” Bamberg said. “If we can create a more nutritious potato, that will have a larger impact on nutrition than, say, the higher-cost and more nutritious blueberry. People consume a lot of beer in this country. Just imagine if we could extend the nutritional advantages of potatoes to beer.” 

PENINSULA HAS PROVEN IDEAL FOR PRESERVING POTATO SEEDS

AN UPRIGHT, three-door, stainless steel freezer pushed into a corner of a research lab at the U.S. Potato Genebank houses the millions of potato seeds harvested by researchers. Seeds are tucked safely into foil packets to keep out moisture, then inside of 3x2-inch manila envelopes that are numbered, labeled and stored vertically, with air space between each. The future of the world’s potato crop chills inside, waiting 20-30 years (average viable lifespan of a potato seed) for another chance to grow.

The U.S. Potato Genebank found a home at the University of Wisconsin Peninsular Agricultural Research Station in Sturgeon Bay in 1948. Potato scientists were organizing to lobby for a centralized program to import, classify, preserve, evaluate and distribute potato germplasm. Wisconsin was pushing for a genebank at the time, and having the genebank removed from the production area of the state was important to eliminate potential disease spread. The “island” of northern Door County provided

an ideal isolated location.

Today, the genebank uses 10 greenhouse compartments in which plants are grown to generate seeds and tubers for distribution to customers, as well as for cooperative and in-house research. During summer, plants are grown in four large screen houses. A seed lab is used to extract, dry and package the seeds. Freezers hold the seed collection and walk-in refrigerated storage holds research tubers.

- Paige Funkhouser