

CAN THE U MAKE KERNZA THE WHEAT OF THE FUTURE?

Minnesota agronomists and food scientists are working to develop this perennial grass into a tasty, profitable crop.

By Jaime DeLage >> jdelage@pioneerpress.com

A taste of what could be the next green revolution sits crisp as a cookie in front of Tonya Schoenfuss.

The University of Minnesota food scientist picks it up, appreciates its textured topside and then takes a thoughtful bite.

"I get some kind of green, grassy notes," she says. "I get, like, a molasses flavor, almost like brown sugar."

She says she also tastes a bit of honey, although there is no honey in her sugar cookie, or brown sugar, either.

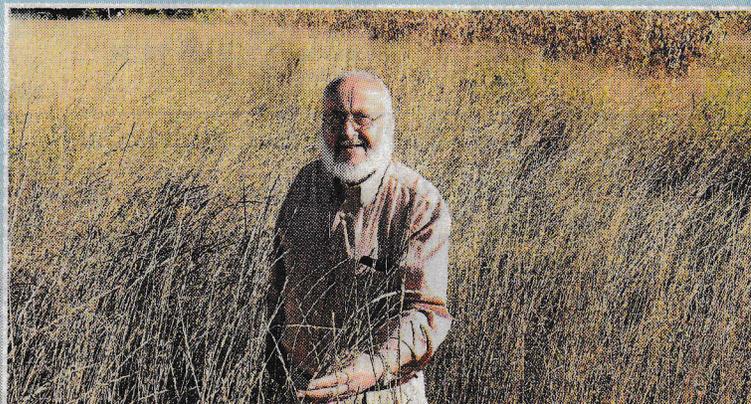
There is a sort of grass, however. These cookies were made of flour milled from intermediate wheatgrass, also known by its trade name of Kernza, a new crop being developed by the University of Minnesota's agronomy department in St. Paul.

The cookies don't taste quite like regular sugar cookies, and the grain they're made from doesn't grow quite like regular wheat. Intermediate wheatgrass is a perennial, much like the grass growing in your neighborhood. You plant it once, and it comes back year after year, harvest after harvest, and that could be the advantage that puts it on cookie plates and bread racks around the world one day.

"That's been the 'holy grail' talk for years," said northern Minnesota farmer Richard Magnusson. "If you had a perennial wheat you didn't have to plant every year, you'd get rid of the tillage expense, the potential for erosion in annual crops."

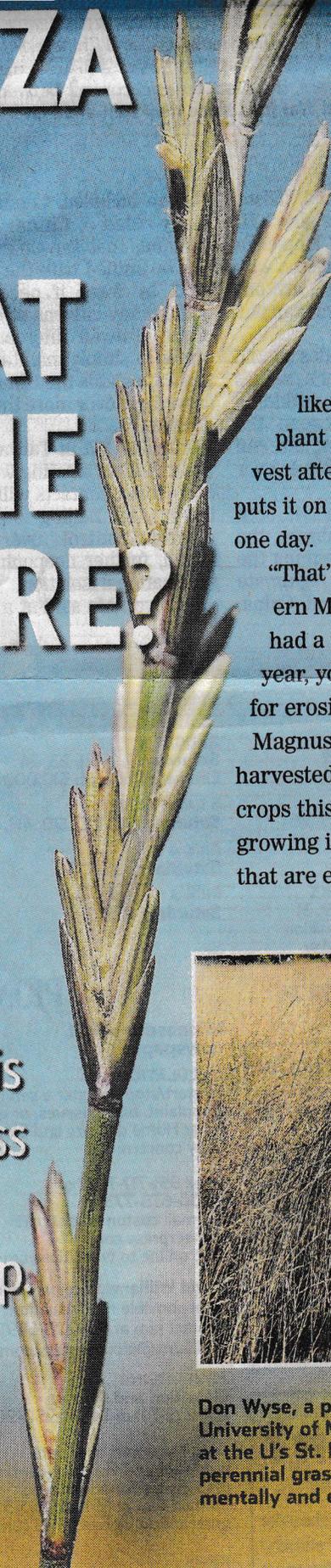
Magnusson is one of three Roseau County farmers who harvested the country's first commercially grown Kernza crops this fall, using seed developed by the U. They're growing it for Patagonia Provisions and other companies that are experimenting with the grain.

KERNZA, 4A >



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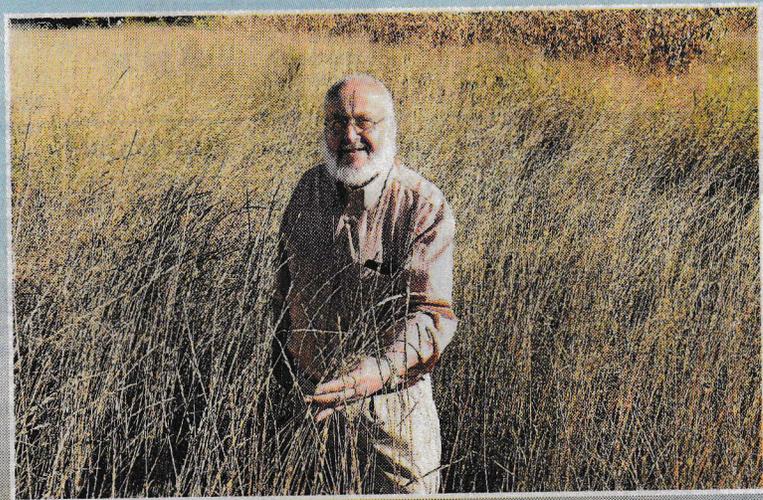
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PIONEER PRESS PHOTOS: SCOTT TAKUSHI

Don Wyse, a professor of agronomy and plant genetics at the University of Minnesota, shows off a field of Kernza in a test plot at the U's St. Paul campus. Wyse's program has helped develop the perennial grass that one day could outperform wheat both environmentally and economically.

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> Kernza

Magnusson said his first Kernza crop, which was planted last fall in a field that didn't dry out in time for an annual crop, survived a harsh winter without any signs of damage and went on to produce its targeted yield this fall.

Northern Minnesota has notoriously short growing seasons, so farmers such as Magnusson are understandably interested in a perennial crop that can endure tough winters and thrive in marginal fields.

"In general, perennials have an advantage in the landscape," Magnusson said. "On the prairie, most of the plants are perennials."

Perennials are the first plants turning green in the spring, while farmers wait for the soil to dry out and warm up enough to plant their annuals. In the summer, perennial roots dig deeper into the earth to reach water and nutrients that annuals can't touch. After harvest, perennials go right back to work turning autumn sun, rain and CO2 into biomass. The farmer can graze it or cut it for hay before winter sets in.

And during the winter and early spring, perennials reduce wind erosion and flooding by holding down their bit of earth.

THE NEXT GENERATION OF CROPS

So why isn't everybody growing perennials?

Because there aren't that many perennial crops available to grow on a scale that rivals wheat, corn and soybeans.

But the U is working on that. The agronomy department in St. Paul has launched the For-

only be highly productive, but ones that produce ecosystem services."

"Ecosystem services" is what U agronomists call the added environmental benefits of perennial crops. Because they live year-round on the landscape, they improve water quality, reduce erosion and provide habitat for waterfowl and pheasants.

The initiative also is developing perennial flax, sunflowers and hazelnuts for northern farmers.

One of the most-promising perennial crops is wheatgrass. Intermediate wheatgrass, like its cousin wheat, is a native of the Fertile Crescent in the Middle East and has been grown in North America for decades. But until now, it has been grown only as forage for livestock.

The Rodale Institute in Pennsylvania looked at 100 different perennial grasses and identified intermediate wheatgrass, with its relatively big seeds and reputation for hardiness, as the best bet to turn into a food crop.

The Land Institute in Kansas took over from there and has been leading the charge to convert wheatgrass into a food crop. It is the one that trademarked the name Kernza.

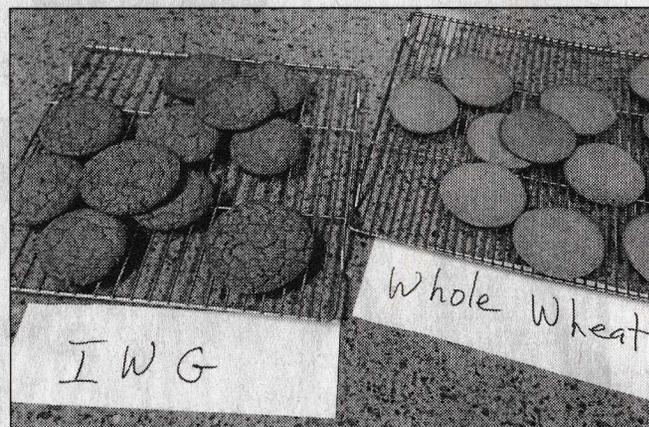
But the Land Institute needed help from the University of Minnesota to improve the breed, figure out the best ways to plant and harvest it, and zero in on the smartest end uses.

That's no small task. In domesticating a wild grass, U agronomists are attempting to do in a few years what early farmers did over lifetimes. At the same time, they're trying to make the sort of productivity gains that previous generations of agronomists spent



PIONEER PRESS PHOTOS: JAIME DELAGE

"I get, like, a molasses flavor, almost like brown sugar," says food scientist Tonya Schoenfuss, tasting a sugar cookie made with Kernza flour instead of wheat flour last month at the University of Minnesota St. Paul campus. Schoenfuss said there's no reason a company couldn't market Kernza now next to whole wheat or specialty grain products. "I'd buy it. I like it better than whole wheat," she says.



Batches of sugar cookies made with Kernza flour, left, and whole wheat flour, right, sit on racks in the U food lab last month.

seeds that hold on until har- just in our first breeding cycle

TRY IT

Kernza will be back on the Birchwood Cafe breakfast menu for about a month starting Thursday. Two items will be offered: aronia berry Kernza pancakes, and beans and rice with Kernza flour tortillas. The cafe is at 3311 E. 25th St. in Minneapolis and serves breakfast from 7 to 11 a.m. weekdays and 8 a.m. to 2 p.m. weekends

potential new food crop that has the potential to be large scale but that gives back to the soil and gives back to the land," she said. "It has a good story."

Singleton's kitchen was one of the first to experiment with Kernza from the U. She said she's talked with New York bakers who have tried Kernza from different parts of the country and they say it has a slightly different flavor depending on where it's grown, much the way wine reflects its terroir.

Singleton said the Minnesota-grown Kernza imparts an earthy flavor.

"If it's in our savory waffle, it adds a chewiness and a texture and a real subtle background nuttiness," she said.

Someday, breeders might have a Kernza product that serves as a perfect substitute for wheat. But Schoenfuss at the U's food lab said there's no reason a company couldn't market it now next to whole wheat or specialty grain products.

"Somebody tomorrow could pull the trigger and just start putting it in something," Schoenfuss said, allowing that they actually would have to

son said. "No tillage, and you reduce pesticide input to almost zero. Farmers in northern Minnesota that were never organic farmers before are growing it organically."

Wyse said it also is likely that Kernza products will command a higher price at the grocery store because they can be marketed as environmentally friendly. Fields of intermediate wheatgrass, especially when planted near streams, will help reduce flooding and keep sediment and nitrogen fertilizer from running into rivers, lakes and the Gulf of Mexico.

"It isn't just a pollutant issue. It's money," Wyse said. "We lose a quarter-million pounds of nitrate-nitrogen every year.

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But the U is working on that. The agronomy department in St. Paul has launched the Forever Green Agriculture Initiative to develop a series of new perennial crops for Midwestern farmers.

The department is the same one that helped develop hybrid corn and other crops that made the Green Revolution of the 1960s and '70s possible — the revolution that earned U alumnus Norman Borlaug the Nobel Prize for his contribution to productivity advances in agriculture worldwide.

"Here we sit, 50, 60 years later, thinking about the next generation of crops," said Don Wyse, the longtime agronomy professor who leads the Forever Green initiative. "But in this case, we're thinking about a series of crops that will not

its cousin wheat, is a native of the Fertile Crescent in the Middle East and has been grown in North America for decades. But until now, it has been grown only as forage for livestock.

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That's no small task. In domesticating a wild grass, U agronomists are attempting to do in a few years what early farmers did over lifetimes. At the same time, they're trying to make the sort of productivity gains that previous generations of agronomists spent decades to achieve.

But they have advantages that early farmers and agronomists didn't have.

They're starting with a grass that's been well studied. Perennial wheatgrass already has been crossed into annual wheat to improve disease resistance, for instance.

And today's agronomists are able to peer into a plant's genetics in a way that wasn't feasible just a few years ago.

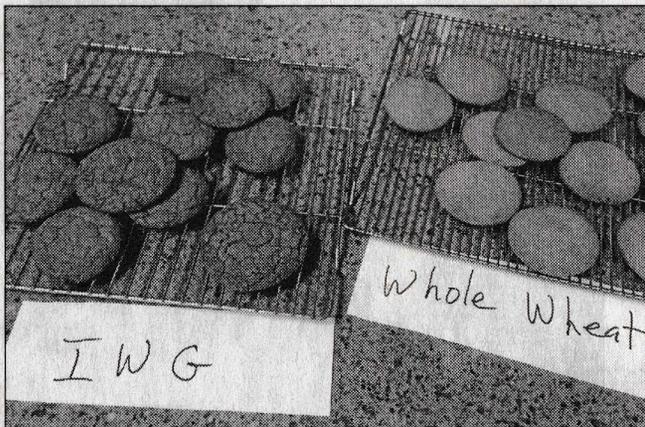
"Remember the big deal about sequencing the human genome?" Wyse said. "Now, we can do the same thing on every plant."

The team's breeders can match DNA fingerprints to plants that have bigger seeds,



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seeds that hold on until harvest time and hulls that come off the seed most easily.

"It's actually cheaper now to get that complete DNA profile on a plant than it is to evaluate it in the field," said Jim Anderson, an agronomy professor and the team's lead plant breeder. "It's about 10 bucks per plant."

They still grow test plots to verify that the traits they want actually are present, but the ability to better predict traits means they are miles ahead of where they would have been without the new technology.

"We're probably in the neighborhood of one-third to one-half what spring wheat would yield on the same land," Anderson said. "But remember, we're

just in our first breeding cycle here. This is like 1905 for spring wheat."

Wyse said he thinks wheatgrass someday could produce bigger crops than wheat simply because it spends so much more of the year collecting sunlight, nutrients and water.

SAVING MONEY

Wheatgrass doesn't have to outperform wheat in the field to outperform it on the bottom line, Wyse said. It should be more efficient to grow because one planting will produce several years of harvests — plus haying or grazing — before it needs reseeding.

"And the farmer's going to have fewer input costs," Ander-

son said. "No tillage, and you reduce pesticide input to almost zero. Farmers in northern Minnesota that were never organic farmers before are growing it organically."

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"It isn't just a pollutant issue. It's money," Wyse said. "We lose a quarter-million pounds of nitrate-nitrogen every year. That's \$125 million. That is a Vikings stadium every decade. And not only that, but it's enough to put on a roof that would open and close."

While the U's agronomists work on improving wheatgrass yields and its food scientists learn more about baking with it, some restaurants and bakeries already are using it — when they can get it from university test plots.

Birchwood Cafe in Minneapolis has had Kernza pancakes and waffles on its menu on and off for the past two years. Owner Tracy Singleton said her customers are eager to try it when they learn more about it.

"They like learning about a

potential new food crop that has the potential to be large scale but that gives back to the soil and gives back to the land," she said. "It has a good story."

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Magnusson, the farmer in Roseau County, said he thinks plenty of farmers would be glad to have another crop to grow if food companies were ready to buy it.

He already knows Kernza can pass one tough test. He ground some up in a blender recently and made pancakes for his kids.

"They thought it was OK," he said. "They ate their normal amount of pancakes, put it that way."

Jaime DeLage can be reached at 651-228-5450. Follow him at twitter.com/JaimeDeLage.