

Lincoln-Pipestone WHPA

Lincoln and Pipestone Counties, MN

Continuous Living Cover (CLC) includes agroforestry; perennial grains, forage, and biomass; and cover crops and winter annuals. CLC keeps living cover on the landscape and roots in the ground year-round, providing both economic and environmental benefits. This series highlights farmers using dynamic CLC strategies and the research behind their practices.



High nitrate levels in aquifers under agricultural land have lead to high treatment costs, well closures, and health risks for rural communities. Kernza® perennial grain provides a way to profitably protect drinking water sources, offering a cropping system that can be planted on Wellhead Protection Areas (WHPA) without contaminating drinking water.

The Lincoln-Pipestone Rural Water System purchased highly vulnerable land in 2016 that sits over an aquifer supplying drinking water to 36 municipalities. The goal: prevent nitrate from row crop fertilizer from reaching the aquifer to avoid the treatment costs and health risks of nitrate contamination. The EPA limit for nitrate in drinking water is 10 ppm, but health risks increase even at 5 ppm.

Options for vulnerable land have been limited for producers: leave it fallow or put it into the Conservation Reserve Program, but lose income, or keep it in production but risk nitrate contamination. Finally, a new crop offers promise for making a profit without threatening drinking water sources.

Kernza® was developed from forage varieties of intermediate wheatgrass by selecting for large seed size, non-shattering, and other traits. The result is a dual-use grain and forage crop that can stay in the ground for three years or more, providing soil and water quality benefits. Data has already been collected showing Kernza's effectiveness in preventing nitrate leaching, and farmers, city planners, and water associations are excited to plant Kernza and be a part of the solution to nitrate contamination.

In the Fall of 2017, 54 acres of Kernza were planted on the Lincoln-Pipestone land.

Benefits and Opportunities

In August 2018, nearly 10,000 pounds of Kernza grain was harvested by local farmers, and the seed was sold to The Land Institute for testing and distribution. In 2019, soil water sampled from the field had close to 0 ppm nitrate - extremely low relative to typical levels under corn and soy, which can be as high as 28 ppm.

Since it can be harvested for three years without re-planting, Kernza cuts down on the need for tillage, and with its dense stands and natural resistance to most wheat diseases, it requires fewer pesticides and herbicides than most annual row crops.



It's still early in the crop's development - breeding work is ongoing, supply chains are being established, and harvesting techniques are being refined with input from multiple stakeholders.

In Summer 2018, lead researcher Dr. Jake Jungers of the University of Minnesota, Lincoln-Pipestone Rural Water General Manager Jason Overby, farmer and LPRW board member Randy Kraus, and Laura DeBeer of the Pipestone County Soil and Water Conservation District met to plan the Kernza harvest, figuring out which type of machinery to use, how to dry the grain, and who could process the seed.

This collaborative effort created technical knowledge that could be shared with other Kernza growers, ensuring that the crop continues to be developed in a way that meets farmer and landowner needs.

Conservation that Pays

What sets Kernza apart from many other conservation strategies is that from the beginning, its development has focused on creating a marketable solution: a crop that reduces nitrate in groundwater while fitting into a farmer's business plans. The University of Minnesota's Forever Green Initiative has been instrumental in not just agronomic research, but supply chain and market development, too.

Those investments are paying off. Connections between farmers and grain processors - with the help of market and supply chain development staff like Forever Green's Connie Carlson and Colin Cureton - have made it possible to sell Kernza to food manufacturers, including Bang Brewing, Patagonia Provisions, Perennial Pantry, General Mills, and more! Demand continues to grow, helping make Kernza an environmentally and economically sustainable solution.

Resources

- [Kernza.org](https://kernza.org) offers resources for growers, handlers, researchers, and consumers
- [The Land Institute](#) and the [Forever Green Initiative](#) are partners in Kernza research and development

Science Supporting the Practices

Nitrate levels in the soil water at the Lincoln-Pipestone site were less than 1 ppm throughout the season. This is well below the safe drinking water limit of 10 ppm, and indicates that Kernza plantings help protect vulnerable drinking water sources (Reilly et al. in prep).

With long roots and long growing seasons, perennials help maintain soil carbon and nitrogen stocks and support pollinators ([Glover et al. 2010](#)).

A study in Michigan found that Kernza reduced nitrate concentrations in soil water by up to 86% compared to annual wheat ([Culman et al. 2013](#)).

A study on loam soils in Minnesota found that fertilized Kernza reduced nitrate leaching by 95% compared to fertilized corn ([Jungers et al. 2019](#)).

In sandy soils in Central Minnesota, fertilized Kernza reduced average nitrate concentrations in soil water by 77 to 96% compared to fertilized corn and unfertilized soybean (Reilly et al. in prep.).



Photos by Evelyn Reilly

Green Lands Blue Waters is a vision for productive, profitable agriculture in the Upper Midwest based on the straightforward concept of getting as much value as possible from farmlands by growing crops that keep the soil covered year-round—what we call farming with Continuous Living Cover. The values from the crops we promote can be measured in yields and farm profits; but also as reduced risk, improved outlook for long-term productivity from the soil, more jobs, more wildlife, cleaner water and resiliency in the face of a changing climate.