



## **Transforming Agriculture, Perennially**

April 29, 2021  
Secretary Tom Vilsack  
U.S. Department of Agriculture  
1400 Independence Ave., S.W.  
Washington, DC 20250

Submitted via [regulations.gov](https://www.regulations.gov)

**RE: U.S. Department of Agriculture “Notice of Request for Public Comment on the Executive Order on Tackling the Climate Crisis at Home and Abroad” 86 Federal Register 99 (March 16, 2021) [Docket Number: USDA–2021–0003]**

Mr. Secretary,

Thank you for the opportunity to comment on the nation’s climate-smart agriculture strategy to the U.S. Department of Agriculture (USDA), within the broader framework of President Biden’s Executive Order on Tackling the Climate Crisis at Home and Abroad for climate change mitigation and resilience.

The Land Institute is a nonprofit agricultural research organization based in Salina, KS, leading a long-term research initiative to develop the world’s first perennial grain crops. The initial conceptual and scientific groundwork for this effort was laid in the 1980s and 1990s, and since the mid-2000s the pace of the research outputs has accelerated substantially. Over the last three years, the world’s first two meaningful perennial grain crops have entered pilot-scale production: Kernza® perennial grain in the U.S. and perennial rice in southern China. The products of a Land Institute-led consortium and a Land Institute-sponsored project, respectively, these two crops are the first two meaningful perennial grain crops in the history of agriculture.

Kernza®, specifically, is the trademark name for the grain of intermediate wheatgrass (*Thinopyrum intermedium*). Today, this ecologically beneficial perennial grain has already made its way into the commercial supply chain in small niche markets in the US. Most recently, the KernzaCAP was funded as a USDA National Institute of Food and Agriculture Agriculture and Food Research Initiative - Sustainable Agricultural Systems Coordinated Agricultural Project (CAP) grant at \$10 million for 5 years to support national-scale research and deployment of Kernza on the landscape and into the food system. The project has brought together the nation’s existing Kernza network of 35+ researchers, supply chain stakeholders, and end users to work in a coordinated fashion for on-farm trials across the US, with extensive efforts across the supply chain from germplasm development to commercialization. We represent 65 licensed Kernza growers and 17 other supply chain stakeholders in this submission. We appreciate the opportunity to provide comment for Docket Number: USDA–2021–0003.

Society is faced with the challenge of producing and equitably distributing enough food and fiber to support a growing and increasingly food insecure global population. This challenge is compounded by the fact that natural resources needed for agriculture are deteriorating and climate change is affecting yields and production stability.<sup>1,2</sup> Much of the US, for example, is already experiencing yield declines and other climate related disruptions to agriculture.<sup>3,4</sup> Agriculture and associated land use changes contribute 25% of global GHG emissions and 10% of emissions in the US.<sup>5,6</sup>

Soil carbon sequestration is the most beneficial sink of carbon emissions for the U.S. climate change mitigation portfolio, and current grain crop production acreage is the prime candidate for major sequestration opportunities. U.S. grain crop agriculture is based on crops that are shallow-rooted annual plants grown in low-diversity monocultures that have lost between 20-70% of the soil carbon that existed pre-European settlement. The native grasslands and forests that sequestered that carbon to start with were composed of deep-rooted perennial plants growing in high-diversity mixtures of multiple species. While discussions of soil carbon sequestration often emphasize uncertainty, it is unambiguous in the scientific literature that the highest levels of carbon sequestration achievable occur when lands previously planted to annual crops are converted to continuous perennial vegetation. In other words, we now have actionable knowledge that perennializing the agricultural landscape is the single most effective thing we can do for carbon sequestration.

In addition to providing a major carbon sequestration opportunity, perennial polyculture grain cropping systems have the potential to substantially reduce emissions of the potent greenhouse gas (GHG) nitrous oxide from agricultural soils, and to reduce carbon dioxide emissions from farm equipment operations and the synthesis of inputs, especially nitrogen fertilizers. In addition to their climate change mitigation benefits, perennial grain crops can also make major contributions to increasing agriculture's adaptation to climate change, as well as reducing soil degradation, reducing negative water quality impacts, and reducing agricultural pesticide use. Results achieved to date demonstrate that a suite of perennial grain crops can be developed to replace the bulk of current U.S. and global grain crop production, resulting in transformational increases in carbon sequestration – but at current levels of investment, full deployment is decades away.

Decisive action by the federal government is now warranted to accelerate perennial grain crop research and development by increasing public funding and stimulating private investment, by concurrently leveraging *existing* policies and programs and developing *new* strategies to sequester carbon, reduce greenhouse gas emissions, and ensure resiliency to climate change through perennial grains adoption.

### ***1. Climate-Smart Agriculture and Forestry Questions***

*A. How should USDA utilize programs, funding and financing capacities, and other authorities, to encourage the voluntary adoption of climate-smart agricultural and forestry practices on working farms, ranches, and forest lands?*

*1. How can USDA leverage existing policies and programs to encourage voluntary adoption of agricultural practices that sequester carbon, reduce greenhouse gas emissions, and ensure resiliency to climate change?*

A primary goal of the KernzaCAP is to inform the federal policymaking process of our on-farm and other research findings, thereby providing agencies with key data for perennial grains support products within the existing federal Agriculture Improvement Act of 2018 ('Farm Bill') policy framework, including Title I (Commodity Programs), Title II (Conservation), and Title XI (Crop Insurance).

#### *Title I (Commodity Programs)*

Title I of the Farm Bill provides robust support for recognized program commodities. The Price Loss Coverage (PLC), Agriculture Risk Coverage (ARC), and the Marketing Assistance Loan Program as statutorily mandated first in the 2014 Farm Bill and reauthorized in the 2018 Farm Bill provide critical price and revenue protection to de-risk crop production in the US. Commodity support tailored for perennial grains production, specifically intermediate wheatgrass growers for Kernza grain production, should be included in the next and forthcoming reauthorization of our federal agricultural omnibus policy framework.

Given the growing number of intermediate wheatgrass producers for Kernza grain, the USDA Farm Service Agency (FSA) recently took important steps to provide guidance to state offices for proper crop report filing of intermediate wheatgrass acreage. Within Minnesota, for example, an April 8, 2021, state FSA training for all county office staff clarified the option to report the intermediate wheatgrass crop as grain when grown for Kernza. We appreciate and thank you for the Department's efforts for crop reporting guidance for Kernza grain production.

#### *Title II (Conservation)*

“Regenerative agriculture” includes those farming systems that move carbon dioxide out of the atmosphere and into plants and soil. In addition to the potential for removing some carbon dioxide from the atmosphere, these systems improve productivity, environmental quality, soil health, and reduction of impacts from climate disruption.<sup>1,4,7,8</sup> Existing, high-profile nutrient management concerns and water quality issues within the Mississippi River Basin disproportionately impact poor communities underscore the urgency for conservation practices adoption that comprehensively achieve these stated benefits in addition to carbon sequestration.

We appreciate President Biden's interest in expanding the Conservation Stewardship Program (CSP) to achieve carbon sequestration goals through public and private collaboration. As a voluntary, working lands program, the CSP is well-positioned to provide the delivery of meaningful large-scale change. Previously, the adoption of intermediate wheatgrass into USDA Natural Resources Conservation Practices (NRCS) Conservation Practice Standards (CPS) contour buffers, filter strips, and cross wind traps (CPS 332, 393, and 589C, respectively) in Minnesota in 2015 was intended to aid in buffer law compliance. We are working with USDA NRCS staff for perennial grains inclusion within appropriate CPS and Technical Notes (TN) on a state-specific basis, where farmers are planting Kernza grain-producing IWG varieties and on-farm trials are underway.

#### *Title XI (Crop Insurance)*

Over 90% of the acreage planted to major field crops in the US invest in USDA Risk Management Agency (RMA) and Federal Crop Insurance Corporation (FCIC) insurance products. This risk protection program serves a vital role in national food security; moving forward, this program could also function to provide coverage of perennial grain crops that can contribute important ecosystem services with grain production for food production.

Initial conversations with RMA have helped us to understand the roles of growers and partners in working with RMA to develop crop insurance policies, the variety of insurance policies that can be developed by the Agency, as well as the need for multiple years of location, yield, and price data. KernzaCAP partners have facilitated dialogue between Kernza grain growers and RMA state and federal offices, and a Subject Matter Expert has been designated within RMA. Because Kernza is produced by small numbers of acres of intermediate wheatgrass and is a perennial, RMA indicated a designation as a specialty crop is likely to be needed for product development.

#### *2. What new strategies should USDA explore to encourage voluntary adoption of climate-smart agriculture and forestry practices?*

In addition to the support depicted in response to Q1, the U.S. government can further accelerate perennial grain crops research and development through creation of a major federal research and development funding initiative. We believe this is the single most effective measure possible for soil carbon sequestration and reduction of GHG emissions from agriculture – and arguably the single most effective and appropriate negative emissions strategy in any sector.

Work to evaluate the carbon sequestration potential of Kernza across a wide range of soils in the US soil inventory is being carried out by Stephen Ogle's lab at Colorado State University (CSU). The model will also predict nitrous oxide emissions under different management regimes as well as nitrogen dynamics of Kernza in future climate change scenarios. In 2022, Dr. Ogle's Kernza soil carbon model will be used by Keith Paustian's lab, also at CSU, to add Kernza to the USDA's COMET-Farm carbon calculator. This calculator can be used by farmers to predict site specific carbon sequestration, and could be used to obtain carbon credits (if available).

Specifically, we propose that Congress and federal agencies:

- Recognize perennialization of the agricultural landscape as a lead strategy for soil carbon sequestration and reduction of GHG emissions from agriculture and **set a goal to bring total U.S. public and private investment in perennial grain crop research to at least \$100 million per year within five years.** (For comparison, research investment for annual grain crops U.S. each year is measured in billions.)
- Establish major dedicated public funding for perennial grain crop research:
  - o Allocate a substantial amount of funding for dedicated perennial grain crop research within major competitive grant programs that target agriculture and applied biology, including those administered by the USDA National Institute of Food and Agriculture and the National Science Foundation.
  - o Establish dedicated research programs for perennial grain programs within federal agencies conducting research relevant to agriculture, including the USDA Agricultural Research Service and the USDOE ARPA-E initiative.
  - o Encourage Hatch Act and Smith-Lever Act institutions in the states to establish dedicated research in perennial grain crops.
- Encourage major investments in perennial grain crop research through dedicated funding within the multi-agency Small Business Innovation Research program, the Foundation for Food & Agriculture Research, and any other relevant programs.
- Launch a major federal initiative to incentivize conversion of a substantial fraction of current U.S. grain crop production acreage to permanent perennial pasture or rangeland. These perennial agricultural systems have similar ecosystem services benefits to future perennial grain crops and are available now. Acreage goals should be set with reference factors such as grain crop acreage most susceptible to soil degradation, and total demands for food and feed grains in the economy.
- Incorporate into any perennial grain crop research initiative a substantial component funding expanded research in current and novel agroforestry crops, which are also perennials that could produce substantial nutritious food items while delivering high levels of ecosystem services.

- Make commitments and investments in perennialization of US agricultural landscapes akin to USDA's renewable energy portfolio, such as a perennial grain-equivalent to USDA's Renewable Energy Development Grants to fund site assessment and technical assistance. This will accelerate adoption and implementation of climate-smart technologies on agricultural lands.

Critics of decisive action on climate change sometimes contend that because approaches based on innovation cannot be deployed instantly, only incremental changes to existing practices should be considered. We argue that to disregard the need for serious R&D into transformational change because it cannot be deployed instantly ignores the hard lessons of the last 30 years on climate change. The best time to fund research into transformational technologies like perennial grain crops was decades ago – the second-best time is now. The U.S. climate change mitigation portfolio must include a mix of decisive actions that can be performed now and decisive investments into transformational change – such as developing perennial grain crops.

Ultimately, the outreach channels and relationships must be developed overall and aggressively before delivering specific program support to specific audiences/groups.

Thank you again for your consideration of our efforts for perennial grain development, and the manner in which they tie directly into the Administration's climate-smart agriculture framework.

Best regards,



Tessa Peters, Director of Crop Stewardship  
Email: [peters@landinstitute.org](mailto:peters@landinstitute.org)

On behalf of 82 licensed Kernza® users, including:

Jade Estling, Estling Farms, Inc., Kernza® Grower  
Ben Penner, Ben Penner Farms, Kernza® Grower  
Doug Michael, Columbia County Bread, Kernza® food manufacturer  
Christopher Abbott, Perennial Pantry, Kernza® food manufacturer  
Casey Bailey, Kernza® Grower  
Nicole Tautges, Michael Fields Agricultural Institute, Kernza® Grower  
Luke Peterson, A-Frame Farm, Kernza® Grower  
Joshua Svaty, Free State Farms, Kernza® Grower  
John Niedermaier, Brewery Terra Firma, Kernza® food manufacturer and grower  
Chris Wiegert, Healthy Food Ingredients, Kernza® processor  
Jim Ristau, Stau-haus Malt Co., Kernza® food manufacturer and grower  
Jeff Reed, Reedfly Farm, Kernza® Grower  
Whilden Hughes, W. Hughes Farms, GP, Kernza® Grower  
Clint Jessen, Jessen Wheat Company, Kernza® Grower  
BJ McNeil, Rocking Z Acres, Kernza® Grower  
George Coleman, Dermedics Laboratories, Kernza® distributor