



**CARBON FOOTPRINT  
EVALUATION OF KERNZA BEER  
FOR FREE STATE BREWING**

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# EXECUTIVE SUMMARY

## WHY

- Kernza, a perennial grain, plays a vital role in carbon sequestration, reducing the need for annual seeding and tilling.
- In regions like Kansas and Nebraska, where over a century of wheat monoculture has depleted soil, Kernza cultivation offers a promising solution for soil restoration.
- Recognizing Kernza's potential, we are committed to comprehensive outcome measurement, essential for evaluating its effectiveness in challenging agricultural contexts.



## WHAT

- The Land Institute leads Kernza grain research, aiding farmers and co-ops in its growth.
- Sustain-A-Grain is Kernza's key aggregator in Kansas and Nebraska.
- Kernza's use in beer is favored due to its whole kernel malting, bypassing dehulling.
- Merge evaluated Kernza's carbon sequestration and performed a comparative LCA for Free State Brewing's Kernza beer.



## HOW

- Merge utilizes EarthOptics (EO) technology for precise soil sampling and mapping.
- Data gathered is key to calculating Carbon Intensity (CI) scores for Kernza and Barley.
- Focus on advanced Life Cycle Assessment (LCA) calculations and dashboard development.
- Plans to establish baselines for biodiversity and water quality are set for 2024.



## SCOPE

- Fall 2023 - Set baselines, modeled production scenarios.
- Conducted a comprehensive 'seed to 6-pack' Life Cycle Assessment (LCA) to evaluate environmental impact.
- Phase 2 will include assessments of carbon stock balance changes, along with detailed water and biodiversity analysis.
- Comparative analysis is grounded in widely recognized and publicly available data sources for accuracy and reliability.



# COMPARISON KERNZA, BARLEY



## FARM CARBON INTENSITY

WHEAT



Every bushel procured carries a carbon penalty.

BARLEY



Every bushel procured carries a carbon penalty.

KERNZA



Every bushel procured carries a carbon benefit.



## DISTANCE



600 mi.



800 mi.



1200 mi.



## BEER!

MKT BEER

0.25

kg-CO<sub>2</sub>e

BARLEY BEER

0.47

kg-CO<sub>2</sub>e

KERNZA BEER

-0.07

kg-CO<sub>2</sub>e

PLANET POSITIVE?



HOORAY BEER!

# WHAT WE FOUND, SO WHAT, WHAT NOW



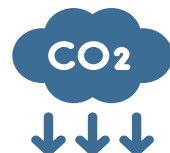
## WHAT WE FOUND

- **Carbon Capture:** Kernza's perennial system captures more carbon than standard rotations.
- **Planet-Positive Beer:** Kernza beer sequesters carbon, contributing positively to the environment.
- **Favorable CI Score:** Kernza shows a low environmental footprint when compared to other ingredients.
- **Economic Hurdles:** Despite its environmental benefits, Kernza's low yield increases procurement costs, surpassing fair market value compared to conventional wheat, even after accounting for carbon pricing.



## SO WHAT

- **Economic Paradigm Shift :** Are we ready to redefine 'fair market value' to include environmental sustainability?
- **Urgent Environmental Necessity:** Carbon sequestration isn't just beneficial, it's becoming increasingly crucial in the adaptation to a changing climate..
- **Disrupting Traditional Markets:** The eco-advantages of Kernza, particularly in beer production, have the potential to disrupt traditional agricultural markets, challenging consumers and businesses to prioritize planetary health over cost.



## WHAT NOW

- **Story Telling:** Continue building the case with data. Effectively communicate the ecosystem benefits of Kernza and other perennial crops.
- **Ecosystem Incentives:** Develop and provide financial incentives directed towards Kernza producers, reducing the required cost of procurement.
- **International Expansion:** Define Kernza cultivation for different climates and soils globally, expanding its access beyond current geographical limitations.



# WHAT CAN WE SAY WITH CONFIDENCE AND WHAT MORE NEEDS TO BE DONE



Kernza's ability to sequester carbon and improve soil health is a significant step forward in sustainable agriculture.

The growing interest in Kernza-based products, particularly in innovative markets like brewing, showcases its potential to transform agricultural practices.

Continued advancements in research are crucial to overcome current limitations in yield and cost, enhancing Kernza's viability and market competitiveness.

This was the baseline year; the delta will tell us more in Fall 2024.



# LEADERSHIP TEAM



**BETH  
ROBERTSON-MARTIN**

Co-Founder & CEO

Beth leverages a decade in food supply chain expertise. She enhanced sustainability at General Mills with brands like Annie's, and founded SHINE Sourcing to innovate in food sourcing. As co-founder and CEO at Merge Impact, she passionately connects brands with regenerative supply chains, advancing sustainability. Additionally, as president of the Xerces Society Board, she actively supports invertebrate conservation.



**BEN ADOLPH**

Co-Founder & CIO

Ben is a dedicated conservationist championing regenerative agriculture. Raised on an Illinois farm, his expertise spans agronomy and sustainability, focusing on plant nutrition, soil data, production analytics. Adolph's vision for a sustainable, transparent food system led to co-founding Merge, where he's redefining agricultural practices, empowering farmers, and transforming food production for a healthier planet and future generations.



**JONATHON PHILLIPS**

Head of Product

With over a decade of Agtech and GIS experience. Jon's expertise in gathering, verifying and analyzing agricultural data is complemented by his degree in Environmental Science and Restoration Ecology at the University of Illinois. Jonathon bridges technology with his passion for ecological preservation by enriching growers with practical insights for sustainable practices that not only benefit their bottom line but also contribute to the health of the environment.



[MergeImpact.com](https://MergeImpact.com)