



Perennial Rice

Proving the Potential of Perennial Grain Agriculture

OVER 70% OF THE FOOD CALORIES THAT FEED HUMANITY come from annual grain crops, which occupy 60–80% of global croplands. However, annual grain dominance may be changing.

With support from The Land Institute, researchers in China's Yunnan Province developed a new high-yielding, long-lived perennial rice in a relatively short two-decade timeframe, achieving comparable yields to annual rice varieties. The crop's development was backed with scientific expertise and seed funding from The Land Institute and a global network of researchers.

"Since perennial rice can produce yields over eight consecutive harvests similar to annual rice, this is direct evidence that developing perennial versions of grain crops is feasible," says Lee DeHaan, PhD, Director of Crop Improvement and Lead Scientist of the Kernza® Domestication Program at The Land Institute. "This evidence provides a clear reason to vastly increase research investment in ongoing work to develop perennial versions of crops like wheat and sorghum."

**"One of the most important reports
in modern agriculture"**

—JERRY GLOVER, NATIONAL GEOGRAPHIC SOCIETY EXPLORER
in reference to the perennial rice study published in *Nature Sustainability* (Nov. 2022)

Rice feeds four billion people and is the grain most consumed by humans—the third largest cereal grain crop after corn and wheat worldwide in metric tons. But annual grain agriculture comes at an ecological and economic cost, compromising ecosystems and forcing ever-higher inputs of chemical fertilizers, pesticides, fossil fuel energy, and labor to maintain yields.

The growing perennial grain agriculture movement is shifting this paradigm to address some of the food system's most pressing challenges.



Dr. Fengyi Hu, Yunnan University, leads perennial rice research in China. The new grain crop offers significant environmental, economic, and social sustainability impacts, and is now being grown in Southeast Asia and parts of Africa.



8 HARVESTS

over 4 years

1 TON OF CARBON

accumulated by soils
per hectare per year

60%

reduction in labor

50%

savings with less seeds,
fertilizer, and other inputs

17% - 161%

increased farmer profits
compared to annual rice

The research shows that perennial rice crops have advantages over annual rice crops:

- **Long-Lived Production:** Perennial rice produced grain for eight consecutive harvests over four years from a single planting.
- **Comparable High Yields:** Average perennial rice yields were equivalent to annual rice, with 6.8 tonnes per hectare per harvest of perennial rice versus 6.7 tonnes of replanted annual rice for each perennial rice regrowth cycle.
- **Significant Carbon Sequestration:** By switching from annual to perennial rice, soils accumulated almost a tonne of organic carbon per hectare per year, 0.81 Mg organic carbon ha⁻¹ yr⁻¹.
- **Labor and Inputs Savings:** Farmers used nearly 60% less labor and spent almost 50% less on seed, fertilizer, and other inputs for perennial rice than annual rice. Significantly, this reduction in labor, often done by women and children, can be accomplished without substitution by fossil fuel-based equipment.
- **Improved Farmer Livelihoods:** Farmer profits from perennial rice ranged from 17% to 161% above annual rice.

The Land Institute's scientific expertise and collaborative, networked approach is catalyzing grain agriculture's perennialization globally. Besides perennial rice, our work on wide hybrid crosses of annual wheat and sorghum with their perennial relatives show promise for adoption by producers and food markets.

With your support, we're confident these grains and more will reach high yields—with robust ecological and social benefits—and move to farms, tables, and plates in the coming decades.

Now is the time to vastly increase research investment.

You can help make this perennial vision
a reality by donating today!

