

Reviving Rice Production in South Carolina

Clemson University makes strides with iCORP project

By Vikki Moran

Innovation and research are at the heart of progress, and institutions like Clemson University play pivotal roles in driving agricultural advancements. One such initiative making waves is the iCORP project, short for Increasing Coastal Organic Rice Production in South Carolina Using Salt-Tolerant Cultivars. This program bridges the gap between academic research and market application, helping researchers, scientists and entrepreneurs turn groundbreaking ideas into viable products and solutions.

Clemson is an integral part of the iCORP initiative, fostering collaboration among students, faculty and industry leaders. One project underway focuses on reviving rice production in South Carolina, a region with a rich but nearly forgotten history of rice cultivation. Leading this research are Brian Ward, Ph.D., assistant professor at Clemson's Coastal Research and Education Center, and Gursewak Singh, a Ph.D. candidate and iCORP researcher.

The History of Lowcountry Farming

Agriculture has been the backbone of South Carolina's economy since Colonial times, with the Lowcountry playing a pivotal role in early American farming. The region's flat, fertile wetlands and warm climate made it ideal for a variety of crops, including rice, indigo, cotton and tobacco.

Rice was introduced to South Carolina in the late 17th century and became a dominant cash crop by the 18th and 19th centuries. Enslaved Africans brought extensive knowledge of rice farming, including irrigation, planting and harvesting techniques, which



ABOVE: Dr. Brian Ward, assistant professor at Clemson University, inspects phenotypic off-types in a grower's rice field in Georgetown.



LEFT: Gursewak Singh, a Ph.D. candidate at Clemson University, evaluates root traits associated with salt tolerance in rice under flooded field conditions.

contributed to the industry's success. The demand for Carolina Gold rice made South Carolina a leading rice producer until the late 19th century, when economic shifts, hurricanes and the Civil War led to its decline.

Indigo, another major Colonial-era crop, was cultivated primarily for its deep blue dye, highly valued in European markets. After the Revolutionary War, cotton took center stage, especially with the invention of the cotton gin in 1793, which revolutionized textile production. The reliance on enslaved labor persisted, making cotton farming highly profitable until the abolition of slavery and the collapse of the plantation economy.

Lowcountry agriculture has diversified to include organic vegetables, soybeans, corn and specialty crops such as tea and pecans. Sustainable farming practices and research initiatives like the iCORP project help farmers adapt to climate change and environmental challenges.

Rice Production in South Carolina

Rice cultivation in South Carolina dates back to the late 17th century, when settlers discovered the region's coastal plains and abundant waterways provided the perfect environment for growing rice.

However, with the end of slavery, natural disasters and changing agricultural practices, rice production in the state declined dramatically by the early 20th century.

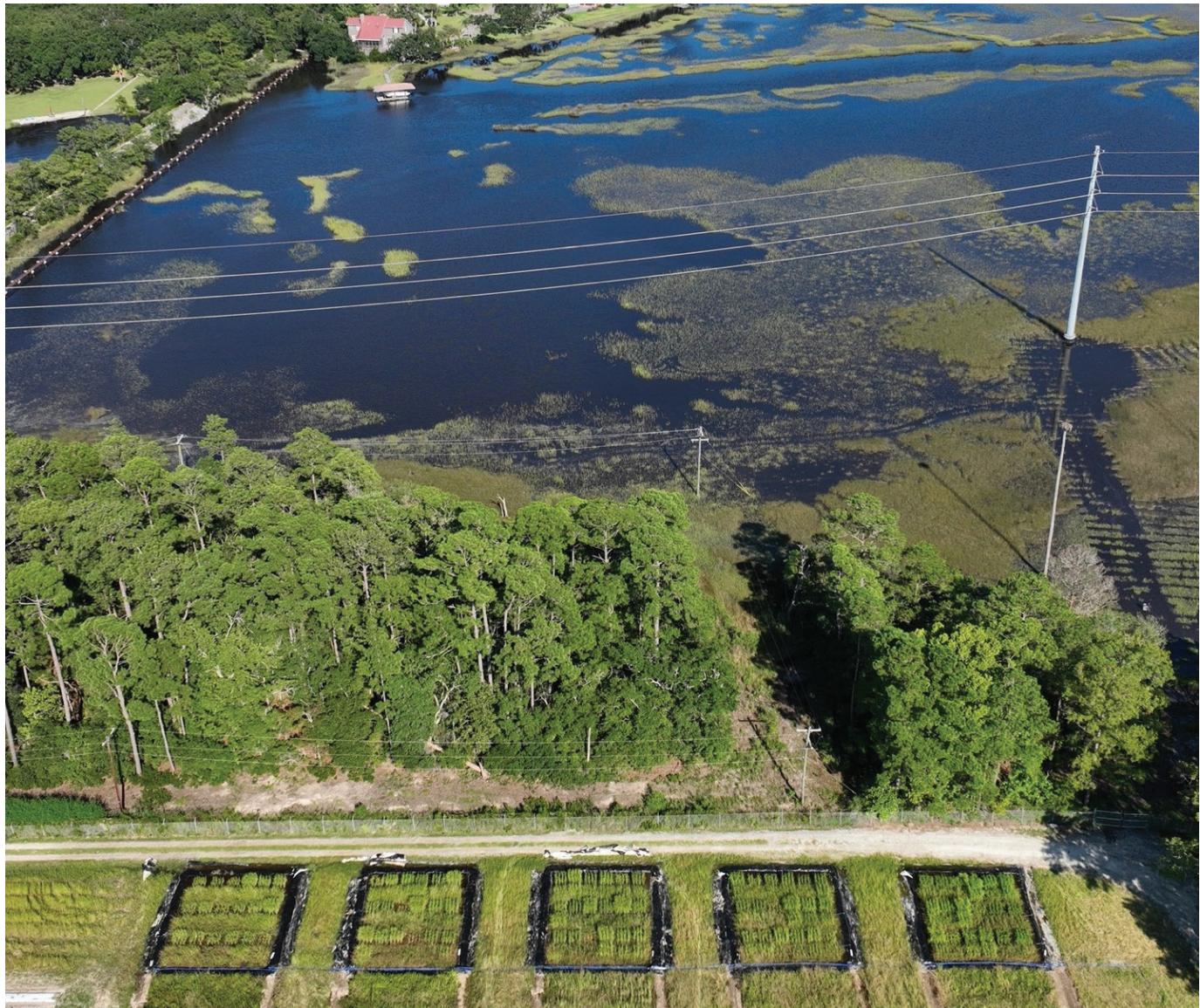
Today, researchers at Clemson are working to bring rice

farming back to South Carolina, using modern technology and sustainable practices to revive this once-thriving industry.

What is saltwater intrusion, and how does it affect Lowcountry crops?

Saltwater intrusion occurs when seawater moves into freshwater ecosystems, typically due to rising sea levels, storm surges, and human activities like excessive groundwater extraction and modification of watersheds with dammed river systems and the creation of the Intracoastal Waterway system. This process increases soil salinity, making it difficult for many traditional crops to grow.

In South Carolina's Lowcountry, saltwater intrusion threatens not only rice but also other staple crops such as corn, soybeans and various vegetables.



Salt-tolerant rice screening under natural field conditions in a partial saltwater agroecosystem uses brackish water from a tidal river in coastal South Carolina. PHOTOS COURTESY OF CLEMSON UNIVERSITY

As salt levels rise in the soil, plants struggle to absorb water, leading to reduced yields and lower-quality produce.

The iCORP project is combatting this issue by developing salt-tolerant rice cultivars, which could offer a sustainable solution for farmers facing these environmental challenges.

Brian and Gursewak shed light on their ongoing project, as well as their goals for rice production.

Q: What is the main goal of the iCORP project, and how does it aim to revive South Carolina's rice industry?

A: The iCORP project aims to revive South Carolina's rice industry by developing salt-tolerant, organically grown rice cultivars, enabling sustainable agriculture in coastal regions affected by saltwater intrusion.

Q: Why is rice an important focus for agricultural research and climate resilience efforts?

A: Rice research ensures food security, supports climate adaptation, and preserves heirloom and specialty rice varieties while promoting sustainable farming in changing environmental conditions.

Q: Why is the Lowcountry region particularly suited for rice cultivation, both historically and environmentally?

A: The Lowcountry's tidal irrigation systems, fertile flat wetlands and historical rice farming infrastructure make it an ideal environment for rice cultivation. It also comes to the muck soil as well, which adds terroir to the culinary flavors and aromatic notes.

Q: Why is Carolina Gold rice historically significant to South Carolina and the Southern culinary tradition?

A: Carolina Gold rice was a cornerstone of South Carolina's agricultural economy and is celebrated for its unique flavor and cultural heritage.

Q: How does saltwater intrusion affect the traditional rice-growing lands in South Carolina?

A: Saltwater intrusion degrades soil quality, limits freshwater availability and reduces crop viability.

Q: What are the advantages of growing salt-tolerant rice cultivars in coastal South Carolina?

A: Salt-tolerant rice cultivars enable sustainable farming on saline lands, improve soil restoration, and support organic rice production. Advantages of growing salt-tolerant rice cultivars in coastal South Carolina also offers reclamation of lands once



Manual weeding in maintained, weed-free plots helps assess the direct effects of salinity on weed seed bank dynamics and cultivar competitiveness.



Field evaluation of rice ratooning ability under salt stress conditions allows the study of varietal tolerance and regrowth potential.

suited and optimal for growing rice and truck crops, that are no longer suitable for agriculture. This work, along with other Clemson salt tolerant breeding programs in vegetable crops, may return these marginal lands to agricultural use.

Q: How does organic cultivation differ from conventional farming methods, and why is it particularly important for heirloom rice varieties?

A: Organic farming avoids synthetic chemicals, preserves genetic purity and enhances soil health, making it ideal for heirloom rice conservation. It also comes with challenges, like weed control, which saltwater may help control. With the lack of chemical control, integrated pest management is critical to optimizing plant health while reducing disease and insect damage.

Q: What potential economic benefits could the iCORP project bring to South Carolina's organic rice industry?

A: iCORP could expand organic rice production, create niche market opportunities and boost agritourism in South Carolina's coastal regions. These salt-tolerant Carolina Gold lines not only will stimulate organic production, but will also open thousands of acres of marginal land for both conventional and organic rice production. This translates into additional funding into the agricultural machine that is South Carolina agriculture. More acres regardless of organic or conventional productions strengthens South Carolina ag by additional state revenues from increased organic and conventional fertilizer, pest control, land leases, transport, machinery sales, etc.

Q: What are some of the biggest challenges the iCORP project faces in developing salt-tolerant rice cultivars?

A: Major challenges include breeding complexity, unpredictable climate impacts and the need for large-scale soil remediation.

Q: How might the research on salt-tolerant rice impact home gardeners in South Carolina who want to grow rice or other crops in coastal areas?

A: Home gardeners could cultivate salt-tolerant rice and other resilient crops, adapting to increasing soil salinity in coastal regions. Most importantly, is if land is marginal due to salts, and if rice is to be grown, using rice lines that are tolerant and certified seed is crucial.

Q: What are the potential health benefits of consuming organic, heirloom rice, like Carolina Gold, compared to conventionally grown rice?

A: Organic heirloom rice offers higher nutritional value, chemical-free cultivation, and a lower glycemic index than conventional rice.

Through Clemson University's iCORP initiative, researchers are paving the way for a rice farming revival in South Carolina. By blending historical knowledge with modern agricultural advancements, the project can reshape the state's farming landscape and reconnect the state with its rich agricultural heritage. ■

TOP 25 Rice-Consuming Countries

Rice is a staple food for billions worldwide, with consumption patterns varying by region. Below are the top 25 rice-consuming countries based on annual consumption in million metric tons.

China—147	Egypt—4.6
India—108	South Korea—4.3
Indonesia—37	Iran—3.9
Bangladesh—36	Mexico—3.5
Vietnam—22.5	Sri Lanka—3.2
Thailand—15	Nepal—2.9
Philippines—14.5	Madagascar—2.7
Myanmar—12.8	Malaysia—2.5
Brazil—11.5	Russia—2.4
Japan—8.3	Peru—2.3
Pakistan—7.5	Turkey—2.0
Nigeria—6.8	Colombia—1.9
United States—4.8	

Asian countries dominate rice consumption, with China and India alone accounting for over half of the world's total. Rice remains a primary dietary staple for much of Africa, Latin America and South Asia.

Figures based on data compiled from the U.S. Department of Agriculture and the Food and Agriculture Organization of the United Nations.



Gursewak conducts field assessments of rice growth and maturity traits as part of a salt-tolerance field evaluation study.