



FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative

Feed the Future Innovation Lab for Climate Resilient Cereals

JULY 2024

In this edition:

This edition includes a spotlight on Tokuma Guta (EIAR), highlights from the recent trip to Senegal, several wheat facts and recipes, and an introduction to the post-docs and grad students working across CRCIL programs.

Monthly Newsletter

Thank you for reading the Climate Resilient Cereals Innovation Lab Newsletter. Each month, we'll bring exciting updates from our consortium partners while spotlighting different cereals. We'll report our monthly successes, recap recent activities and research outputs, and give you a sneak peek into the upcoming programming across our teams. Stay connected and informed with our newsletter as we journey towards a more resilient future together.

Meet Tokuma

Tokuma Guta works at the Ethiopian Institute of Agricultural Research (EIAR) and coordinates the Ethiopian National Sorghum and Millet Research Program. He focuses on enhancing sorghum and millet to withstand biotic and abiotic stresses, particularly related to climate resilience. This involves developing varieties that are drought-tolerant, disease-resistant, and nutritionally enhanced. By employing advanced breeding techniques and biotechnology, he works toward improving the genetic traits of these crops. He also collaborates with other researchers, agricultural experts, and local farmers to test and implement these improved varieties, ensuring they meet the practical needs and preferences of the farming communities. His work supports EIAR's mission of improving regional agricultural productivity and sustainability.



What do you see as one of the key challenges in the Climate Resilient Cereals space in Ethiopia?

One of the key challenges in the climate-resilient cereals space in Ethiopia is the limited access to advanced agricultural technologies and resources among smallholder farmers. Many farmers rely on traditional farming practices and lack the necessary knowledge, tools, and infrastructure to implement modern, climate-resilient agricultural techniques. This gap hinders the widespread adoption of improved crop varieties and sustainable farming practices that can mitigate the effects of climate change. Additionally, unpredictable weather patterns, such as prolonged droughts and erratic rainfall, exacerbate the vulnerability of cereal crops to abiotic stresses, leading to reduced yields and food insecurity.



Tokuma is the CRCIL Ethiopia Sorghum Lead

What are the opportunities that you see in Climate Resilient Cereals in Ethiopia

There are significant opportunities in the climate-resilient cereals space in Ethiopia. The development and dissemination of drought-tolerant, disease-resistant, and nutritionally enhanced cereal varieties can significantly improve agricultural productivity and resilience. By leveraging advanced breeding techniques and biotechnology, researchers can create crops better suited to withstand the harsh climatic conditions prevalent in the region. Furthermore, enhancing farmer education and extension services can facilitate the adoption of these improved varieties and sustainable farming practices. Strengthening collaborations between research institutions, government agencies, and international partners can also drive innovation and resource mobilization, ultimately supporting the development of a more resilient and sustainable agricultural sector in Ethiopia.

The Month of Wheat

This month, we look at one of the oldest cereals: wheat! This cereal provides us with bread, pasta, cakes, pastries, malt, alcohol, and more. Wheat was first harvested in the Middle East, sometimes called the “cradle of civilization” in the Euphrates and Tigris river valleys (near Iraq). Worldwide, this cereal provides approximately 20% of the caloric intake.

DID YOU KNOW?

- The bagel is the only bread product to be boiled before it is baked.
- Bread products that are refrigerated will go stale six times faster.
- 17,000 years ago, people chewed the kernels of raw, parched, or simmered wheat.
- Wheat starch is used as an adhesive on postage stamps.

CRCIL Visits Senegal

In early June, 13 members of the CRCIL team representing Clemson University, Cornell University/Breeding Insight, Delaware State University, Kansas State University, and RTI International, along with External Advisory Committee member Fetien Abera, visited CRCIL lead partner ISRA-CERAAS. At CERAAS headquarters, the team toured facilities, learned about key Target Product Profiles, tasted food products made with millet, sorghum, and wheat, and identified potential areas for CRCIL involvement. Cole Staudt, CRCIL business manager, and Dayne Hamrick, RTI International, presented compliance and MEL sessions to complement technical activities. The team saw impressive millet and sorghum breeding program activities at Bambey. Even though it was the dry season—not the typical time to grow these crops in Senegal—CERAAS was leveraging irrigation in the dry season to advance breeding material and perform targeted crosses, a common technique to reduce breeding cycle time by growing more generations per year. In addition to meeting with CERAAS, the team met with CORAF (West and Central African Council for Agricultural Research and Development) to learn about the wider West African regional consortium for agriculture research. As CORAF is headquartered in Senegal, it provides an excellent opportunity to expand CRCIL's reach by utilizing existing research partnerships and networks; for example, CORAF regional Centers of Excellence for rice and wheat are in Mali and Chad, respectively. Finally, the team headed to the north of Senegal and the Senegal River basin, St. Louis, to view rice and wheat-producing regions. While wheat is a relatively new crop in Senegal, rice improvement has been ongoing, and the team was able to visit an AfricaRice research center. The center had impressive technology for



Sourdough Bread

Submitted by: Sarah Keatley, Kansas State University

Ingredients:

- 800 grams flour
- 460 ml. water
- 10 grams salt
- 320 grams sourdough starter

Preparation

Mix ingredients. Knead the dough for approximately 10 minutes or until the dough stretches without tearing.

Allow the dough to proof for 3 hours in a warm setting.

Punch the dough down and divide in half. Gently form each half into a loaf shape—place in a flour-coated basket for 3 hours or overnight in the fridge.

Place a bowl of water on the lowest rack to increase the humidity in the oven and preheat to 450 degrees Fahrenheit.

Sprinkle your dough with flour and place on a baking sheet or in a dutch oven. Now is the time you can score your loaf of sourdough.

Bake for 30 minutes

Makes 2 loaves

The bread above was baked with millet flour from Senegal!

both double haploid and hybrid rice production. Combining the entire visit, Senegal is well positioned within the West Africa region to advance climate-resilient germplasm for CRCIL crops. The CRCIL team greatly thanks Dr. Aliou Faye, Dr. Jacques Faye, and the entire ISRA-CERAAS team, who made such an exciting and educational visit possible, laying the foundation for germplasm enhancement.



College of Agriculture



Cornell University



Post Docs and Grad Students of CRCIL

A diverse and growing team of postdocs and graduate students is helping to advance our germplasm enhancement research. These individuals are passionate about learning more and advancing the work already being done worldwide.

Clemson University

Cornell University

Cornell University

Louisiana State University

Delaware State University



William Stafstrom, PhD
Plant Breeding and Genetics



Meseret A. Wondifraw, PhD
Soil and Crop Sciences



Madhav Subedi, PhD
Plant Breeding,
Genetics and Genomics



Jomar Punzalan, PhD
Agronomy, Quantitative
Genetics and Plant Breeding



**Amaranatha R. (Amar)
Vennapusa, PhD**
Botany

CRCIL World Tour: Priming our Research

From April to June, the CRCIL Management Entity (ME) and US Collaborators from the Advanced Science Engine visited our Germplasm Enhancement Hubs in Bangladesh, Ethiopia, and Senegal. The ME would like to thank our in-country partners for all their time in planning, logistics, and hospitality. Without your help, these visits would not have been possible. The ME also realizes the dedication of US partners in making the trips to in-country partners, and we appreciate the efforts and insights that were provided and gained. As CRCIL matures, we expect to continue these activities as in-person meetings and first-hand experiences to view opportunities and challenges associated with cereal production in each country cannot be underestimated. The knowledge gained from visiting in-country partners and learning about production systems has been vital in targeting forthcoming requests for proposals to fill existing gaps in research and targeting locally appropriate climate-resilient germplasm. The ME believes that these visits will result in many new research collaborations and scientific discoveries both now and well into the future.

Delaware State University



Mekhai Abrams
Integrative Ph.D. Program in Agriculture,
Food, and Environmental Sciences



In the future, we will highlight outputs from the accelerating quick-win research projects.

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