

AGRICULTURAL INNOVATION



Innovation is key to improving environmental, social, and economic sustainability of agriculture and food systems.

- Innovative and creative solutions are necessary for food systems to keep pace with evolving needs and challenges, enhancing the health of the planet and the wellbeing of current and future generations.
- Innovation must be supported by sound science and data to reap meaningful benefits.
- Innovation enhances existing approaches and delivers new ways to grow and use food and fiber. It is critical to achieving sustainable food systems.
- By leveraging evidence-based innovation and sound science, we can expand the toolbox for food systems stakeholders to achieve sustainability and resilience.
- Innovation needs to be inclusive, ensuring that small and underprivileged farmers, fishers and ranchers have equitable access to all available tools.
- Modern production tools and emerging digital technologies help farmers produce enough to feed a growing global population while reducing their environmental footprint and building climate resilience.
- Public/private partnerships—especially those that include producers and food systems stakeholders—play a critical role in developing place-based, scalable solutions.
- Innovative approaches to preventing and reducing food loss and waste are critical to addressing the climate crisis and improving food security.
- Both the public and private sectors play a critical role in delivering innovations to the marketplace. Multisectoral partnerships can advance the development and implementation of solutions for meaningful and lasting benefits.
- With sound science and data to support decision making, farmers, fishers and ranchers can adopt with confidence production methods that support climate-smart agriculture.

“To be effective our approaches must be innovative, as innovative as our farmers and as dynamic as the shifting context of the environment in which they operate.”

*U.S. Agriculture Secretary Tom Vilsack
Global Food Security Symposium,
May 11, 2021*

Innovation means applying new processes, introducing new techniques, or establishing successful ideas to create new value.

Supplemental irrigation.

Across dry regions in West Asia and North Africa, supplemental irrigation innovation helps farmers use only the minimum amount of water required to stabilize rainfed crops and increase yields when rainfall is insufficient to promote healthy plant growth. The system locates water sources, fine-tunes when and how much to irrigate, and promotes best agronomic and diversification practices for cropping systems. Supplemental irrigation is responsible for an increase of more than 30 percent for wheat production in Syria, growing from two to four tons annually over 10 years. Farmers in Morocco and Turkey can now plant their crops earlier, doubling water productivity and yields. In Yemen, supplementary irrigation has helped increase sesame productivity by up to 120 percent. In sub-Saharan Africa, Burkina Faso and Niger launched supplementary irrigation programs, and the FAO Global Alliance for Climate-Smart Agriculture (GACSA) now promotes supplemental irrigation.



<https://www.cgiar.org/innovations/irrigation-for-smallholder-farmers/>
Photo by ICARDA.



<https://www.cgiar.org/innovations/climate-smart-maize/>
Photo by P. Lowe/CIMMYT.

Drought tolerant maize.

More than 200 drought-tolerant maize varieties have been developed by CGIAR and released by public and private sector partners across 13 countries in sub-Saharan Africa. These varieties can ensure food security, bolster climate resilience and grow the livelihoods of resource-constrained farmers. They were bred through the genetic selection and testing of maize lines that survive and yield grain under stress of drought and nitrogen-depleted soils. These varieties give at least 25-30 percent greater yields than conventional varieties in drought-prone environments, especially when water deficit happens at the flowering stage, and reduce downside risk to farming communities.

AI-powered mobile apps for pests and diseases.

Banana crops are prone to damage by several types of pests and diseases. Once the pest or disease afflicting a crop is identified, swift and targeted action can reduce the extent of outbreaks and potentially save entire harvests. The smartphone app, called Tumaini – which means “hope” in Swahili – helps banana farmers scan plants for signs of five major diseases and one common pest. Farmers use the app to upload a photo of an affected crop, which is then scanned for symptoms of pests and diseases using image-recognition technology, drawing on a dataset of more than 50,000 images. Tumaini records the data, including geographic location, and feeds it into the database. The app then provides a diagnosis and recommends steps to address the affliction. Tested in Colombia, the Democratic Republic of the Congo, India, Benin, China, and Uganda, the Tumaini app has so far demonstrated a 90 percent success rate in detecting pests and diseases. The work is a step toward creating a satellite-powered, globally connected network researchers who developed the technology.



<https://www.cgiar.org/innovations/tumaini-an-ai-powered-mobile-app-for-pests-and-diseases/>
Photo by CIAT.