African women are leading biotechnology advance across the continent

Women researchers are strongly influencing the adoption of agricultural biotechnology in Africa.

“As African women, we are the ones who suffer most whenever drought and food shortages strike, despite the availability of technological solutions to these problems,” said Dr. Felister Makini, deputy director general in charge of crops at the Kenya Agricultural and Livestock Research Organization (KALRO).

“We are looking for new solutions and how we can use technology to give our people and ourselves better and improved crop varieties to fight hunger and improve the quality of living,” said Dr. Priver Namanya Bwesigye, who leads Uganda’s banana research program at the National Agricultural Research Laboratories (NARL) at Kawanda. “We also need varieties that can give us more in terms of nutrients.”

Throughout Africa, women are in labs developing crops that produce high yields and can tolerate or resist disease, as well as healthier, more productive livestock. They are also found in meeting rooms and gardens informing the public about their innovations and how these improved crops can aid the fight against hunger across both the continent and the globe.

“It is time to tell the public about the positive side of biotechnology,” said Professor Caroline Thoruwa, chairperson for African Women in Science and Engineering.

In Uganda, where bananas are an important staple food and cash crop, Bwesigye is in charge of developing varieties that offer farmers better options.

She and her team are using the tools of genetic engineering to develop banana varieties that are resistant to nematodes, bacterial wilt and weevils. The most advanced of these genetically modified varieties is a banana biofortified to provide vitamin A. It should reach farmers immediately after Uganda implements a legal biosafety framework guiding the use of GMOs.

“We have trialled the technology in multiple locations — all the four banana planting regions of Uganda — and it will be ready by the time we have a legal framework,” Bwesigye said. “We have to do this [multi-location field trials] before we can give it to the farmers. We want to be sure that different farmers across the country can plant the variety and have similar results. In this case, all the banana yields should be rich in pro-vitamin A.”

But Bwesigye’s program does much more than develop improved bananas using biotechnology. It also employs conventional plant breeding tools to produce heartier varieties, including a banana resistant to black sigatoka disease. When she’s not in the lab, Bwesigye conducts extensive outreach to farmers and young people to explain agricultural biotechnology and why Uganda, Africa and the world need this tool.

Dr. Barbara Mugwanya Zawedde is also championing the adoption of agricultural biotechnology in Africa. She’s currently director for research at Uganda’s Zonal Agricultural Research and Development Institute in Mukono, which is under the jurisdiction of the National Agricultural Research Organization (NARO).

But before that, she was the coordinator for the Uganda Biosciences Information Center (UBIC) — NARO's knowledge and information-sharing hub. It champions an appreciation of modern biosciences research for agricultural development and works to educate stakeholders on the importance of biosafety.

In that role, Zawedde engaged religious leaders, local communities, farmers, extension agents, legislators, public ministries, "women in agriculture," students and others to raise awareness about new technologies and their safety.

After earning a doctorate in plant breeding, genetics and biotechnology from Michigan State University, Zawedde returned home to Uganda in 2013 to discover "we had gaps in communication as well as in regulation," she recalled.

So, she worked with Dr. Yona Baguma, now deputy director general for NARO, to set up the biosciences information center. Their goal was to "bring to the fore these new technologies that people were not talking about" and to emphasise the importance of regulating them.

"The regulatory framework [we have been calling for] is not just for the introduction of these new technologies, but for their regulation as well," Zawedde said.

To an extent, Zawedde and UBIC have been successful.

Parliament passed the National Biotechnology and Biosafety Bill on two occasions, though President Yoweri Museveni has yet to sign it into law. Additionally, more Ugandans now appreciate the science and what it can do to improve their lives. Biotechnology and biosafety elements also have been included in the country's school curriculums.

"It will be easier to adopt these technologies [once we have a regulatory framework] because more people today understand these technologies and how they can help improve agriculture and food security in Uganda and the region," Zawedde said

Similarly, the Women in Biosciences Forum is working in Kenya to make everyone sure knows about the value of biotechnology and the role that women are playing to advance the science.

"We need to raise the status of women in biotechnology and also encourage women to network in order to achieve the noble goal of sharing their science," Thoruwa said. "Women must be involved for Africa to advance in agri-biotech."

Several African countries have approved the cultivation of GMO crops and others have conducted trials for GM crop varieties. But in many of the countries that are conducting research, GM seeds have yet to reach farmers and consumers because the political leadership is swayed by opposition and remains "afraid" to adopt biotechnology, the women scientists observed.

“We need to speak with one voice and advocate for a predictable policy environment,” said KALRO’s Makini.

“The detractors will always be there,” Bwesigye said. “But we need to understand that these technologies, pretty much like everything else in life, have advantages and disadvantages. We just have to harness the advantages.”

One such advantage is being able to develop a staple food crop, like a banana, that delivers vitamin A, a crucial nutrient that is lacking in almost 30 percent of Uganda children below the age of 5. “It is a no brainer,” Bwesigye said about the value of adopting the pro-vitamin A banana.

Despite the political obstacles, Bwesigye and her colleagues remain undiscouraged. Zawedde said that women will continue to conduct communication and outreach, calling on governments to give farmers a chance to plant some of these improved crops.

“We only need awareness, awareness and more awareness,” Bwesigye said. “Then mind-sets will change and adoption of these technologies will be easier.”

This article originally ran at the Cornell Alliance for Science and has been republished here with permission. Follow the Alliance for Science on Twitter @ScienceAlly