

RUFORUM MONTHLY

Special Edition

African Universities Tackle the Continent's Agricultural Crisis

Partnership with American colleges, foundations, and government agencies provides money for modernization and research

Anthony Pariyo stands in a field of cassava plants and holds up a withered tuber the size of a large fist, which he has crumbled in half. "This is the cassava brown streak disease," he says, pointing out the large and moldy-looking brown spots that striate the starchy white flesh of the tuber, rendering it inedible. "Our cassava is getting knocked off by this new disease that no one understands," he adds, holding the stunted tuber up for his classmates and colleagues to inspect, before tossing it to the ground.

The mystery of cassava brown streak disease — why it spread to Uganda, and, more importantly, what to do about it — is a challenge that Mr. Pariyo, a Ph.D. student in a new plant-breeding program based at Makerere University here, is working hard to solve.

Such diseases are one of a plethora of problems confronting the roughly 70 percent of Africans who eke out their living from the soil. Africa is one of the only regions in the world where food security is diminishing rather than improving, thanks in part to the havoc raised by pests, population growth, depleted soil, and unpredictable weather patterns.

This crisis is forcing African universities to rethink the way they teach agriculture.

"Traditionally, agriculture curricula have not encompassed considerations like climate change and broader nutrition and food security, but now changing conditions and growing problems on the continent require that they do," says Agnes Mwangombe, a professor who directs a new doctoral program in dryland resource management at the University of Nairobi.



Those catastrophes are also prompting donors, who once spurned African universities in favor of other causes deemed more relevant, to underwrite new agricultural education projects that hope to produce the scientists and other experts needed to carry out critical research and development work.

These donor programs reflect another problem: There simply aren't enough scientists around to help farmers figure out ways to adapt to climate change, increase their yields on exhausted soils, or get their produce to distant markets.

Here at the National Crops Research Institute, where Mr. Pariyo is conducting his doctoral studies, researchers complain that they need three times as many scientists as now work here.

Copyright 2009, The Chronicle of Higher Education. Reprinted with permission

For more information about the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM), Contact: The **Newsletter Editor**, RUFORUM Secretariat, Plot 151 Garden Hill, Makerere University Main Campus, P.O. Box 7062, Kampala, Uganda. Fax: +256 414 534153; Tel: +256 414 535939; E-mail: secretariat@ruforum.org; Website: www.ruforum.org.

"It's a nightmare being a scientist in a country like this," jokes Richard Edema, who supervised Mr. Pariyo's master's degree and accompanies the group today, with a rueful shake of his head.

Decades of Neglect

The potential of African universities to contribute solutions to the continent's agricultural problems has long been hampered by underfinancing, rigid agriculture programs, and a lack of professors.

Older generations of academics once benefited from advanced training programs sponsored by the U.S. Agency for International Development, which helped to build up a cadre of scientists during the 70s and 80s. Such programs have been cut back sharply over the past 20 years, at the same time that African governments have scaled back their financing for universities.

Now, agriculture is emerging once more as a focus of renewed interest and investment in African higher education.

It is a key area, for instance, of the Africa-U.S. Higher Education Initiative, formed last year by the Association of Public and Land-Grant Universities and several partners, including the Forum for Agricultural Research in Africa, an umbrella organization promoting research and development in agriculture on the continent, to spur greater collaboration between African and American universities. The organization has been lobbying the U.S. government to increase financing for partnerships, with encouraging signs so far.

Addressing the Group of 20 in April, President Obama called on Congress to double spending on agricultural aid to developing countries to more than \$1-billion in 2010, emphasizing the potential of American land-grant universities to work with institutions in the developing world to help modernize agriculture and boost rural incomes.

Legislation sponsored by Sen. Richard G. Lugar, Republican of Indiana, and Sen. Robert P. Casey Jr., Democrat of Pennsylvania, which authorizes agricultural aid appropriations reaching \$2.4-

billion by 2014, also outlines a strong role for such partnerships. The legislation is now before the Senate.

Some African universities, meanwhile, have been building their own networks and pooling their limited resources to train more agricultural scientists and improve their responsiveness to the development needs of the continent — efforts that many African academics hope will be complemented and broadened by new overseas partnerships.

"We need to create science capacity and technology capacity that improves agriculture so that society benefits," says Montague Demment, who directs USAID's Collaborative Research Support Program in global livestock at the University of California at Davis and is associate vice president for international development at the Association of Public and Land-Grant Universities.

Connecting With Communities

The concept of the American land-grant universities, with their social mission of taking the problems of society and finding practical, scientific solutions, is still relatively novel in Africa, where universities have historically geared themselves to producing civil servants.

But a handful of new programs, such as the plant-breeding program in which Mr. Pariyo is taking part, are starting to redefine that role.

It is one of several new doctoral programs offered by the Regional Universities Forum for Capacity Building in Agriculture, a partnership of a dozen institutions across southern and East Africa that focuses on aligning universities with development needs in agriculture.

The organization, known by its acronym, Ruforum, has a track record of training master's-level students across the region since the early 90s, but it is now jumping to the next level to train new doctoral students before the present generation retires.

It began as a Rockefeller Foundation-financed project, called the Forum for Agricultural Resource Hus-

bandry, but became autonomous in 2004. It now receives money from the Bill & Melinda Gates Foundation, USAID, and other development agencies, as well as from subscription fees paid by member universities.

The organization recently started a program in dryland resource management at the University of Nairobi. Other doctoral programs in fisheries and aquaculture, soil and water management, and food science and nutrition are to begin later this year at universities elsewhere in Kenya, and in Malawi and Tanzania.

"We're building on a foundation," says Adipala Ekwamu, a professor of plant pathology at Makerere who coordinates Ruforum and was a beneficiary of the since-pared-down USAID scholarships, earning his doctoral degree in plant pathology from Ohio State University in 1992.

"In Africa, we lost investment in education," he says. "Now we are trying to rebuild using the aging population that was trained in the U.S."

Bolstered by these networks and international partnerships, Mr. Ekwamu and others want to see Africa achieve a transformation similar to the green revolution that swept India during the 1950s and 60s, as American land-grant universities focused intensively on helping to build up Indian agricultural education.

"Back then, people were saying, 'Let India go, it's a basket case. It's never going to feed itself.' But in the late 80s it became a net exporter of food," says Paul Gibson, an adjunct associate professor of plant breeding and statistics at Southern Illinois University at Carbondale who has worked overseas for many years and now teaches in Ruforum's plant-breeding program.

"Several factors had to come together, but without having the trained people, that would not have happened," he says.

The program, which is housed at an agricultural facility owned by Makerere University, brings to-

gether 16 master's students and 22 Ph.D. students from eight countries.

Cross-Continental Networks

One aim is to create a network of plant breeders on the continent, who will maintain the professional links they forge here throughout their careers. As daunting as the challenges are for scientists in comparatively well-resourced Uganda, they will be that much harder in places such as southern Sudan and Rwanda. Before coming here, says Maurice Mogga, he was the sole crop scientist on a research station in the southern Sudanese town of Juba. Since a shaky cease-fire halted a long and bloody civil war there in 2005, huge numbers of refugees have flooded back to the region from camps in Kenya and Uganda, and they are beginning to farm, putting great pressure on a young government that has little experience with agriculture.

Given vast differences in climate, rainfall, altitude, and diet in various countries and across the continent, the need for seed and plant varieties suitable to local conditions is enormous, says Innocent Habarurema, a master's student from Rwanda. But, he estimates, Rwanda has only five or six plant breeders to serve the whole country.

"I hope the knowledge I take from here allows me to be one of the pioneers," he says.

Not far outside Kampala, Uganda's capital, the challenges awaiting graduates become quickly apparent. Driving down a dirt road in the district of Kiboga, two hours away, Simon Byabagambi, who earned his master's degree through Ruforum, recites a litany of local environmental upheavals and catastrophes.

Farming around here is organic by default, since no one can afford fertilizers or pesticides. The soil is exhausted, and with starchy plantainlike bananas being the staple food in the region, crop diseases like banana wilt are rife.

RUFORUM wishes to extend its appreciation to the Chronicle for Higher Education and Megan Lindow for this story published in their publication. The publication shares our success stories, challenges and insight of the real issues that need to be addressed.

"Four or five years ago, those hills were covered in forest," Mr. Byabagambi points to distant slopes now patchworked with bananas and maize. The loss of trees, which retain moisture, now exacerbates a continuing drought.

Tensions between the growers who till the soil and the herders who graze their animals, meanwhile, are heating up as ever more land gets swallowed up by slash-and-burn farming techniques.

Yet in the midst of these problems, some areas are thriving. Mr. Byabagambi introduces a local farmer named Milly Nakasaana, who is happy to show off her two-acre plot, where she earns enough money growing bananas, cassava, maize, coffee, soya beans, and passion fruit to educate her children, plus two orphans she looks after.

Working with local government-extension workers and Mr. Byabagambi, a district supervisor, she says she has learned to control banana wilt by chopping out the plant's purple male stem, luring other pests away by planting tobacco and hot peppers, and spraying with a mixture of ash and urine. She packs the ground with leaves to keep the soil moist and to provide compost, and she has also bought a cow to provide manure.

She says she even recently used her land as security for a bank loan to start a business grinding maize flour.

Learning From Farmers

One professor working with Ruforum, Moses Tenywa-Makooma, is involved in building even stronger links with farmers.

He wants them to feed their knowledge back to the university so that it can inform the curriculum.

Some years back, he led a team to design a simple soil-testing kit, adapting the technology with help from farmers, who told him about local soil conditions. Now he is involved in designing a system that brings together farmers, academics, and nongovernmental organizations to tackle agricultural issues.

"We need to produce graduates who can think systematically and help communities identify and prioritize real needs," he says.

Mr. Pariyo's research, for example, involves using conventional methods to produce new varieties of cassava to resist diseases and offer better nutrition, a task for which he needs to work closely with farmers.

In one field, he has planted a patchwork of about 40 different cassava varieties, some selected for their disease or insect resistance, others for their quality roots. From this pool, he and another student are creating hybrids that combine the desirable traits of the various plants growing here without their susceptibilities to disease. Local farmers test his varieties in their fields.

Other researchers will be approaching the same task using biotechnology, which is still in its infancy in Uganda. A new lab with genetic-engineering capabilities is under construction at the National Crops Research Institute.

While the issue of genetic engineering has not been without controversy here, most students argue strongly in favor of it. Mr. Pariyo, for example, says the technology could halve the time it takes to produce disease-resistant cassava.

"Africa missed out on the green revolution, so we shouldn't miss out on the genetic revolution, too," he says.