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African solutions urgently sought for agricultural revolution

Professor Richard Mulwa knows his way around scientifically modified seeds - also known as genetically modified organisms (GMOs). In his laboratory at Egerton University in Kenya, the professor, who has genetically modified grapes, is currently researching ways to curtail naturall occurring cyanide in cassava grown in the cooler temperatures of Kenya's highlands.

By Hans Wetzels 3 Jan 2018

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"If we can isolate the genetic pathway in the plant responsible for producing the poison, we can also devel edible cassava for higher altitudes," he told Africa Renewal in an interview.

"That could open a whole new range of possibilities for farmers in the highlands," the professor explained the sedate atmosphere of his laboratory, which contrasted sharply with the streets clogged with the noisy minibuses known as matatus outside the university gates.

Maize is Kenya's most important staple, but frequent droughts resulting from climate change are affecting production. An increase in the production of cassava, a second staple, could prove a lifesaver. "Cassava i a good crop to have because it survives very well in dry circumstances," Professor Mulwa says.

GMOs were introduced in 1996 by the American chemical giant Monsanto, which had managed to make maize seeds resistant to pests and soybeans resistant to a weed killer called glyphosate. Glyphosate kille all weeds in farmlands sown with the treated soy. Within a decade global GMO acreage increased a hundredfold. But consumers began to get worried about genetic tinkering with their food. And farmers planting in neighbouring fields saw their crops die as sun-dried glyphosate blew over from treated farms tc untreated ones.

Professor Mulwa's efforts to genetically modify cassava were hindered by a 2012 Kenyan government ba on GMOs after consumers raised concerns. "We just finished our research in the lab and want to continue testing it in the field. Our work has stalled," complained Professor Mulwa. Earlier in 2017, Kenya's National Biosafety Authority had announced field trials for GMO crops, defying the health ministry. The task force

formed by the government to investigate the safety of GMOs would like the ban lifted on a case-by-case basis.

Green revolution

The Intergovernmental Panel for Climate Change (IPCC), which assesses climate science, notes that climate change effects in the coming decades could be worsened by exponential population growth. Afric population of approximately one billion is expected to double by 2050, according to UN figures. By 2040, example, Kenya's population alone is forecast to increase from 45 million to 80 million. A growing populati requires greater agricultural output.

To address an anticipated shortfall in agricultural productivity, African leaders committed in 2003 - through the Comprehensive Africa Agriculture Development Programme (CAADP), a continental master plan - to invest 10% of national budgets in the agricultural sector. Countries agreed to spend more money on rural development, reliable electricity systems in the countryside, better irrigation, storage facilities and quality infrastructure to connect farmers to local markets.

But more than a decade after adopting CAADP, only nine of Africa's 54 countries have lived up to their commitments. The failure to invest in agriculture creates an opportunity for companies such as Monsanto, Bayer and others, argues Stephen Greenberg, a research coordinator at the Johannesburg-based African Centre for Biodiversity (ACBio).

At the World Economic Forum in Davos, Switzerland, in 2016, billionaire philanthropist Bill Gates suggeste that GMO technology could kick-start "an agricultural revolution" in Africa. However, developing GMOs is a highly specialised and costly business. Currently, a handful of multinational companies (Monsanto, Bayer, Syngenta, Dow Chemical, DuPont and BASF) monopolise the industry. Referred to as "the big six," these companies are beginning to make inroads into developing countries, including in Africa.

The first major effort to introduce GMOs in Africa took place in the year 2000. A showcase project led by a Monsanto-trained Kenyan biotechnologist, Florence Wambugu, was initiated by the World Bank, the US government and Monsanto itself. The goal was to develop a virus-resistant sweet potato. After three years field trials, the genetically modified potatoes proved no less vulnerable to viruses than the untreated ones.

Adding insult to injury, a conventional breeding programme in Uganda yielded virus-resistant sweet potato much faster and for far less money. In early 2004 the UK-based journal New Scientist dubbed the effort a "Monsanto failure."

After several years of experimenting, the next big African GMO project was announced in 2008 in the Ugandan capital, Kampala. Under the moniker WEMA (Water Efficient Maize for Africa), several internatior scientists teamed up with national research institutes in Kenya, Mozambique, South Africa, Tanzania and Uganda. WEMA helps develop drought- and insect-resistant genetically modified maize suited for East African conditions.

Monsanto donated the genetic material, and the African Agricultural Technology Foundation (AATF), a Nairobi-based NGO funded by the Rockefeller Foundation, USAID, Syngenta and PepsiCo, coordinated t project. The Bill & Melinda Gates Foundation also invested $85m in the development of WEMA.

Kenya sees up to $90m in postharvest losses each year, says WEMA project manager Sylvester Oikeh,

adding, "Making WEMA maize widely available is our answer to African farmers calling for innovative solutions to these issues."

Currently, GMOs are being grown in only four African countries: Burkina Faso, Egypt, South Africa and Sudan.

In 2015 ACBio published a critical report on WEMA. Its researchers concluded that the drought-resistant maize Monsanto had donated to the project had delivered no meaningful results in North America, where it sold under the name DroughtGard.

Adopting hybrid maize varieties (the conventional drought-tolerant maize and the GM variety) is a good ide but farmers must lead the way, experts advise. "Many answers are to be found in farmers' knowledge of, f example, how to create healthy soils that store more water under drought conditions," notes Lim Li Ching, senior researcher for Third World Network, an international network of organisations that produces and analyses policies on ecological sustainability.

Simultaneously, the insect-resistant trait Monsanto also donated to WEMA underperformed so heavily in South Africa that it was silently withdrawn from the market.

South African farmers have been cultivating GMO maize for two decades now, Greenberg explained. Currently, almost 90% of all maize grown in the country is genetically modified. "Farmers are running into trouble because insects become immune to the GMOs. But the market has become so monopolised over the years, the farmers have no option left besides waiting for Monsanto to develop a new GMO."

An unprecedented wave of consolidation

The first batch of experimental WEMA maize was harvested in Mozambique in August 2017. The pressure to introduce standardised GMO crops in the huge and largely unserved African food market will not lesser now that the big biotechnology companies are merging into global behemoths, ACBio fears.

Already Monsanto and the German chemical giant Bayer are exploring a $63.5bn merger.

Taking a leaf from the merger activities of the big six, the Chinese conglomerate ChemChina announced i 2016 the acquisition of the Swiss company Syngenta, and DuPont and Dow Chemical have also begun merger talks. It is an unprecedented wave of consolidation that both EU and American regulators are scrutinising.

In February 2017 ACBio released a study on the Monsanto-Bayer merger to highlight possible consequences for African farmers. "If smallholders collectively switch to generic GMO maize, African agriculture and biodiversity will suffer, and [it will] eventually limit farmers' options because of the strong market dominance of a few big players," maintained Greenberg.

"Especially when seed prices start to rise, that will heavily affect small farmers while failing to address the underlying problems of rural poverty. But Monsanto can make a lot of money by selling this kind of high-technology agriculture to as many farmers as possible."

Unfounded fears

Professor Mulwa says that while consumer fears about GMOs may be unfounded, there is room for criticis

of the approach of the GMO tech giants.

GMO technology should be strategically embedded in local agriculture, he advises. "I am of course pro-GMO. From a scientific perspective, farmers have a lot to gain from GMO technology. But as a scientist, I am bound by ethical standards, not corporate interests. I go out into the field and talk to farmers. I want to solve problems by using biotechnology," says Mulwa.

The adoption of GMO technology in Africa may, therefore, depend on whether the tech companies are in t profits without regard to Africa's food security. "That is an important distinction. I think GMO development should be taken out of the hands of those powerful companies. As most things in life, GMOs can be used for good or for bad," concludes Mulwa.