Why I changed my mind about biotechnology for African countries

Michael J. Ssali

Michael J. Ssali

My wife and I are smallholder farmers in Lwengo District in southern Uganda. A hectare of our land is devoted to banana growing and 5 hectares are under what in our native Luganda language is referred to as *kolono* Robusta coffee. *Kolono* is our corruption of the word cloned, which means vegetatively produced from cuttings of one plant variety. Nine high-yielding varieties of Robusta coffee were identified in the 1980s by a Ugandan plant scientist, Kibirige Ssebunya, and were multiplied by cloning for distribution to farmers. That is how they got their *kolono* name. *Kolono* Robusta coffee varieties have since been much appreciated for their high yields and they are the preferred choice of many farmers.

Uganda is Africa's most important producer of bananas and globally is only second to India.

Coffee is our country's main foreign exchange earner, providing employment to about 6 million people directly or

indirectly. Bananas are a staple food crop in central and western Uganda. Statistically, our country is Africa's most important producer of bananas and globally is only second to India. In the eastern and northern parts of the country cassava is a major food crop.

When we had just set up our farm, about 30 years ago, we used to attend seminars organised by non-governmental organisations (NGOs), where we were usually taught about organic farming and the need for minimal use of agricultural chemicals as a way of sustaining the natural fertility of the soil and increasing crop production. We would also sometimes be warned about "fake" seeds – *ensigo enkolelele* – made by scientists and carrying the risk of causing cancers and depleting the soil. We were even warned that the these seeds were to be planted only once and that it would be useless to save seed from the harvested crop for replanting in the next season because the yields would be poor. The aim of the "fake seed producers", we were further told, was to keep us going back to the same people to buy seed every planting season. We had no understanding at all of genetics and plant breeding and it was quite easy to believe what we were told.[1] But we vaguely understood such seeds to be hybrid seed, tissue culture plantlets, genetically modified (GM) crops or biofortified seed, and we developed suspicions about their efficacy and safety.

We discovered that it was impossible to sustain or increase production on our farm due to challenges such as new crop diseases and extreme weather events.

Over the years, however, we discovered that it was impossible to sustain or increase production on our farm due to challenges such as new crop diseases and extreme weather events that drastically reduced crop yields.[2]

The banana bacterial wilt disease has reduced the value of Uganda's annual banana crop

from US$ 550 million to US$ 350 million, according to Jerome Kubiriba, head of the Banana Research Project. Cassava, also a staple food in East and Central Africa, is under attack by pests and diseases such as cassava mosaic disease and cassava brown streak disease caused by viruses and reducing yields to less than half their potential. Maize production has declined over the years due to prolonged drought, sometimes leading to crop losses of as much as 70 per cent. Other African food crops such as sorghum and groundnuts – as well as fodder grasses like Napier grass – are under attack from diseases and pests, and many such crops have been neglected by agricultural researchers, further aggravating the threat to food security.[3]

The decline in agricultural production is happening at a time when it is estimated that the world population will rise from the present 7.2 billion to 9.6 billion by 2050.

Coffee wilt disease has reduced Uganda's national Robusta coffee stock by 55 per cent according to Joseph Nkandu, Executive Director of the National Union of Coffee Agribusiness and Farm Enterprises (NUCAFE). The recently arrived coffee twig borer has caused a reduction of 3.7 per cent in the country's total coffee export and a loss of US$ 18.1 million in 2011 according to the Uganda Coffee Development Authority. The loss is a lot bigger today (in 2014), since the severity of twig-borer infestation is higher, at between 6 per cent and 12 per cent nationwide.

The decline in agricultural production is happening at a time when it is estimated that the world population will rise from the present 7.2 billion to 9.6 billion by 2050, and more than half of the projected extra 2.4 billion people will be in Africa. In Uganda, on average, every woman produces 6.2 children.[4] The continent's productive land is diminishing because of increased population pressure leading

Efforts to apply biotechnology for genetic transformation and improvement of crops to make them disease or drought resistant must be encouraged and supported.

to land fragmentation, deforestation, soil depletion, reduced fish stocks and conversion of wetlands.

These issues are not likely to be overcome by conventional farming practices. Africa must think about other options including the application of biotechnology for genetic improvement of its crops to produce the necessary amount of food for its rapidly growing population. Major food and cash crops, as in the case of Uganda, are set for total extinction unless rapid steps are taken to reverse the situation. This is an issue that gives ordinary African farmers like my wife and me sleepless nights, worrying about our dwindling crop. Efforts to apply biotechnology for genetic transformation and improvement of crops to make them disease or drought resistant must be encouraged and supported. The cloning of high-yielding Robusta coffee varieties in the 1980s had already increased production before the arrival of coffee wilt disease, and the recent identification through conventional plant breeding of wilt-resistant Robusta coffee varieties by the National Agricultural Research Organization (NARO), and their multiplication by tissue culture technology at AGT Laboratories in Uganda, is welcome news. The process must be hastened so that the plantlets are available to all interested farmers.

Genetic engineering by the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) to prepare drought-resistant maize is ongoing in Kenya.[5,6] GM research is also in progress to introduce genes that give resistance to the cassava mosaic and brown streak diseases and banana bacterial wilt disease but, unfortunately, due to lack of correct information and the

activities of some NGOs, most African governments are taking too long to accept GM technology and regulate its use in an appropriate manner.[7,8]

Most African governments are taking too long to accept genetic modification and regulate its use in an appropriate manner.

The British Secretary of State for Environment, Food and Rural Affairs, Owen Paterson, has said recently: "Used properly, the advanced plant-breeding technique of GM promises effective ways to protect or increase crop yields. It can also combat the damaging effects of unpredictable weather and disease on crops. It has the potential to reduce fertiliser and chemical use, improve the efficiency of agricultural production, and reduce post harvest losses."[9] Yet it is the words of a Brazilian soybean and maize producer that I prefer to end with because they come from someone who lives in a developing country which has adopted GM crops in a big way and who knows their value in a practical way: "A good night's sleep: the main benefit from biotechnology to myself."

References

1 Kingsbury, N. (2009) *Hybrid: The History and Science of Plant Breeding*. The University of Chicago Press, Chicago/London.

2 Cooper, P.J.M., Coe, R., Stern, R.D. (eds) (2011) Assessing and addressing climate-induced risk in Sub-Saharan Rainfed Agriculture. *Experimental Agriculture* 47 (2, suppl.): 179–410.

3 Okello, D.K., Monyo, E., Deom C.M.,Ininda, J., Oloka, H.K. (2013) *Groundnuts Production Guide for Uganda: Recommended Practices for Farmers.* National Agricultural Research Organisation, Entebbe.

4 Population Reference Bureau. http://www.prb.org
5 Association for Strengthening Agricultural Research in Eastern and Central Africa (2012) *ASARECA Annual Report 2011: Pooling Regional Resources to Feed Populations.* ASARECA, Entebbe, Uganda.
6 Association for Strengthening Agricultural Research in Eastern and Central Africa (ed.) (2010) *Snapshots of ASARECA Success Stories through Regional Collective Action in Agricultural Research for Development 2010.* National Agricultural Research Organisation, Entebbe.
7 The Panos Institute (2001) *Food for all: Can Hunger be Halved? http://panos.org.uk/wp-content/files/2011/03/food_for_allXrJWtw.pdf*
8 Biotechnology and Biosafety Law process in Uganda (ubbconsortium@gmail.com).
9 Paterson, O. (2013) The role that GM crops could play in tackling the global challenges of food security, climate change, hunger alleviation and the sustainable intensification of agriculture. Speech delivered at Rothamsted Research, Harpenden, Herts, 20 June.

***Michael J. Ssali**, as well as being a smallholder coffee farmer, is the Bureau Chief of the* Daily Monitor *in central Uganda, and writer of the weekly column "Farmers Diary".* Daily Monitor *is part of the Nation Media Group which runs a conglomeration of media houses in East Africa and has its headquarters in Nairobi, Kenya.*