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Biotechnology and the Africa hunger problem

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Kenya's Wangari Maathai, founder of the Green Belt Movement and first African woman to win the Nobel Peace Prize, recently joined the league of those calling for proper enlightenment on the issue of agricultural biotechnology. Godwin Nnanna examines the prospects and challenges of what many regard as the most controversial innovations in recent times.

The figures are frightening, the projections alarming, but experts say they are not intended to cause panic but to awaken policymakers and other stakeholders to the urgent need to check what might escalate beyond proportion if not addressed. As a recent study indicates, of the 800 million people living in Africa, more than 200 million are chronically under-nourished. About 40 million children are severally under-weight. Over 50 million people, mostly children, suffer from Vitamin A deficiency while 65 per cent of women of child bearing age are anemic.

The World Health Organisation (WHO) estimates that 11 children below the age of five die every minute from hunger. Every year, over a billion and a half suffer from hunger and malnutrition. In its 2001 report WHO stated that Africa suffers the world's highest rate of death from HIV/AIDS (81%), malaria (90%) and tuberculosis (about 23%). The Food and Agriculture Organisation (FAO) of the United Nations projects that by 2020, the agricultural labour force of the 10 most-affected African countries will have dropped to between 12 and 26 per cent. The 10 most-affected countries include Botswana, Kenya, Namibia, Malawi and Mozambique. Others are Central African Republic, South Africa, Tanzania, Uganda and Zimbabwe. What the above figures suggest is that agriculture which is Africa's largest employer of labour, faces serious threat now more than ever before. Africa's agricultural production is still highly labour intensive. Bulk of the production activities is still done through manual labour. With the threat posed by HIV/AIDS and other related diseases, experts warn that unless the continent put in place measures targeted at increasing yield even with lesser percentage of its workforce being engaged in agriculture, a major food crisis worse than the Zambian experience of 2002, might soon erupt. Zambia faced a major food crisis induced by erratic rains and other factors that put nearly 3 million people at risk of serious hunger.

Statistics from the United Nations Economic Commission in Africa (UNECA) hints that between 55 and 60 percent of the rural people in Sub-Saharan Africa are absolutely poor, subsisting on less than US \$1 per day. Against the backdrop of the facts and figures presented above, the issue of applying latest science and technology innovations to enhance Africa's agricultural yield has become a major discourse among political leaders, agricultural scientists, media practitioners and other stakeholders.

The biotech controversy

As Segenet Kelemu, senior scientist at the International Centre for Tropical Agriculture (CIAT) noted in her assessment of the controversy over biotechnology for the good of African farmers, "the front line of any successful assault on poverty must have a focus on agriculture."

With a population figure that is projected to rise to about 1,700 million by 2050, Kelemu says African countries will have to develop and implement strategies for increasing agricultural productivity. As she acknowledged, "agricultural productivity can be increased sustainably in numerous ways". One of such ways, she believes, is through the application of biotechnology. She said if properly integrated into traditional farming systems, biotechnology could make a difference in improving food security in the continent.

The Ethiopian scientist in an interview with Business Day said "I do not want to suggest in any way that agricultural biotechnology will, single-handedly, solve Africa's problems overnight by making Africans self-sufficient in food. Instead, what I want to convey is that because Africans heavily depend on agriculture, many African countries stand to benefit from technologies that can increase crop productivity, enhance nutritional quality, improve soil fertility and minimize forest destruction. In other words, agricultural biotechnology should be taken as a part of a comprehensive strategy to help solve Africa's complex poverty problems." As she further stated, a major advantage of agricultural biotechnology is that it often generates strategies for genetic improvement that can be applied to many different crops, animals, and beneficial organisms.

In the view of Kelemu, some of the oppositions to agricultural biotechnology stems from the fact that "a burgeoning gap exist between the fast-advancing modern tools of biotechnology and the general public's understanding of these tools and the processes involving them." A good number of Kelemu's colleagues share that view. That was the reason the International Institute of Tropical Agriculture (IITA) Ibadan in collaboration with the United States Agency for International Development

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(USAID) in May this year organized a stakeholders workshop in Abuja.

The workshop which drew participants from research institutes from across the continent and beyond, was well attended by journalists from both the electronic and print media. Its key aim as the theme (Facilitating Biotechnology in West Africa - Communicating issues to stakeholders) suggested was to make science and agricultural reporters aware of the advantages of modern biotechnology and why Africa cannot afford to neglect it. Just like Kelemu observed, UNECA advises that agricultural biotechnology should be but one part of a comprehensive and sustainable strategy to solve Africa's poverty problems. This, Peter Hartmann, Director General of IITA agrees. As Hartmann told Business Day in Abuja, "it might not be wise to just fold our hands and think that with biotech it is bye-bye to hunger in Africa, no. The application should be seen as one of the very strategic ways of addressing the problem."

Biotech in Africa

Presently, most of the plant biotechnology in Africa is being done in South Africa, Kenya and Egypt. However, things are picking up in West Africa as agricultural institutions in Ghana, Mali, Ivory Coast, Senegal and Nigeria, are conducting intensive research on it. The Olusegun Obasanjo-led government through the National Biotechnology Development Agency (NABDA) is also working out plans to inculcate biotech into the country's school curriculum. Chukwuemeka Omaliko, Director General of NABDA says it would begin as a post-graduate study in the universities after which it would gradually tilt down to other lower levels.

The Council for Scientific and Industrial Research in South Africa has genetically engineered maize with a gene isolated from beans to develop resistance to some fungal pathogen. According to Jennifer Thomson of the University of Cape Town, South Africa, "scientists in the Department of Molecular and Cell Biology at the university are working on maize resistant to the African endemic maize streak virus and tolerant of drought and other abiotic stresses. They are also investigating the use of transgenic tobacco to produce vaccine against HIV and human papilloma virus - the largest cause of cervical cancer in African women".

Also the Kenya Agricultural Research Institute (KARI) has reportedly conducted successful trials on sweet potatoes engineered to be resistant against the viruses that infect it. According to Joseph Wekundah, Executive Director of Biotechnology Trust Africa (BTA), biotechnology began formally in Kenya in the mid 1980s, when simple biotech applications were initiated at the University of Nairobi especially on tissue culture. Wekundah was one of the resource persons at the Abuja workshop in May.

Through some foreign collaboration, the Agricultural Genetic Engineering Research Institute (AGERI) based in Cairo, Egypt, has developed insect-resistant long-staple genetically modified cotton. Cotton is Egypt's most important agricultural export.

Private sector participation

Experts blame the poor involvement of the private sector in the biotech development in Africa as one of the greatest problems facing the resuscitation of the agricultural sector via the new innovation. They are of the opinion that if biotech must be relevant to Africa's economic development, the private sector must not only be involved but must play a leading role. Science and technology, they maintain, have been at the root of social and economic transformation witnessed by America and Europe over the years and the private sector has played a dominant role in promoting them.

Proponents of biotech integration in Nigeria agriculture have advised the federal government to encourage massive private sector involvement in agricultural biotechnology as it is currently doing in other sectors. As a large scale farmer himself, President Obasanjo thinks it is right to do so. In his Ota Farm, the president is already experimenting several biotech options as a source there told Business Day.

But how many of such large farms as the Obasanjo Farms in Ota, can the country boast of. Very few. As one participant at the Abuja workshop pointed out, "to make meaningful impact in Africa, biotechnology research must be pro-resource-poor farmers and pro-women and children. They also counsel that it must target crops that Africa farmers traditionally know how to grow." More than 90 per cent of the farmers in the country are peasant farmers consisting mostly of women and children.

Public/private sector partnership

According to Patricia Kameri-Mbote, David Wafula and Norman Clark, scientists at the African Centre for Technology Studies, Nairobi, Kenya, "the impetus for public-private partnerships for biotechnology is in broad terms a search for synergy in existing institutions and the direction of this towards common goals." The three scientists are authors of the publication *Public/Private Partnerships for Biotechnology in Africa: The future agenda*.

Among the benefits they believe public-private partnership can bring, is access to proprietary technologies and research infrastructure, enlarged managerial and technical expertise and enhanced intellectual capacity. "These arrangements allow the participants to benefit and complement each other on the basis of comparative advantages they possess. The public sector can, for instance, benefit from the specialist knowledge, know-how and patented intellectual property at the disposal of the private sector. At the same time the flow of information that public enterprises are repositories of, such as government policies having a direct impact on the operations of the private sector, is of immense importance", they noted.

Explaining the importance of such collaboration, they wrote that it would remove conflicts of interest that could discourage future investment in the sector. "For example, a seed producing company can be trying to increase seed sales at the same time as the government is interested in lowering such prices or subsidized government seed companies may sell their seeds

at less than real cost. Such measures can drive private firms out of business or at least discourage them from investing in research." Partnerships between public and private actors, they opine, should therefore be tailored to find common ground and to achieve a balance in the benefits the various participants gain from the relationship.

Commenting on why African leaders must look beyond the on-going controversy, Cyrus Ndiritu, a Kenya scientist, said the situation in Africa and Europe are far apart. As he stated: "there is overwhelming evidence that the needs and drive for biotechnology in Africa are quite different from those of industrial countries. Africa's agenda is based on the urgent needs for technological change to enhance food production and to alter the course of widespread poverty, hunger and starvation. The industrial countries are driven by market and profit. These distinctions must be understood and appreciated at the national, regional and global levels."

Bearing in mind the above factor, Ndiritu is of the opinion that "the question today should not be whether or not Africa requires biotechnology, but rather how Africa countries can be assisted to harness and safely apply biotechnology to support development." As he further maintained, "what Africa needs most at this time of intense European-American debated on developments and use of biotech, is the creation of widespread public and policymaker awareness and education on all facets of biotech and biosafety. This will enable the countries to make judicious decisions on the path to biotech use."

CIAT's Kelemu shares the concern of Ndiritu. She believes that "the current agricultural biotechnology debate is skewed towards concerns that do not necessarily include alleviation of hunger and poverty and increasing productivity - the major and daily concerns of African nations."

Challenges

The future presents a very formidable challenge for Africa. With about 70 per cent of its population engaged in agriculture and yet hunger persist, what happens in 20 years time when it is projected that that percentage would have been reduced by half by such factors as HIV/AIDS, migration and increased preference for white-collar jobs. Meeting the food needs of the continent's growing and increasingly urbanized population requires corresponding increases in agricultural productivity. This increase will have to be achieved with smaller labour force and the current land mass as there is no device for increasing the size of land. This, experts say, is Africa's greatest challenge in the battle against hunger and poverty.

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