

## What science is most needed to improve the quality of life in Africa?

Lauren Alston - Danville Park Girls' High School – Grade 10

We live in a world that has become an increasingly interdependent global village due to the advances in information and transportation technology. In this global village, millions have plenty of food to throw away while millions die because they have nothing to eat. In Africa this distinction is alarming as people who do have plenty of food watch hungry neighbours die helplessly. Africa's population is currently about 520 million and is anticipated to increase to 1.3 billion in the next 25 years. This present and growing population makes it hard to maintain adequate food production. The African continent is pleading for food relief; sadly productivity is low and poverty high. Agricultural biotechnology is the most needed science to improve the quality of life in Africa. Africa needs urgent intervention from this science to increase productivity in order to ensure food security and reduce poverty.

So what is agricultural biotechnology? Essentially it is a collection of scientific techniques used to improve plants. Based on an understanding of DNA, scientists have developed solutions to increase agricultural output through genetic engineering.

There is a need to eliminate the continuous cycle of hunger, malnutrition and death in Africa. Africa is endowed with great natural and human wealth that has yet to be used for the benefit of its people. Agricultural biotechnology can make a significant contribution towards increasing food production while preserving diminishing resources such as forests, soil and water. Biotechnology opens new opportunities to tackle problems that have led to declining harvests in farmers' fields in the centre of an increasing population.

Agricultural biotechnology will provide African farmers with alternatives for improving their food production. High tech seeds have transformed agriculture in the USA, helping to ensure a plentiful cheap supply of corn for food and fuel. These seeds require little water or fertilizer and could grow into a new "green revolution" for Africa. Agricultural biotechnology crops could enhance food production which the United Nations calculates must increase 70% by 2050 as the Earth's population grows.

In African villages, the reasons for limited crop production include pests, diseases, weeds, environmental degradation, soil nutrient depletion, low fertilizer inputs, inadequate food processing facilities, poor roads to markets, and a general lack of information to make science-based decisions about farming methods. For some of these problems, agricultural biotechnology is the most promising way to overcome these constraints. For example, an insect known as the *Maruca* pod borer is the major obstacle of increased grain production in Africa, often causing up to 100% crop failure. Many decades of conventional breeding efforts have failed to control this pest. However, recent research in US universities and at the International Institute of Tropical Agriculture based in Ibadan, Nigeria, shows that this pest can be controlled by applying biotechnology tools. This is just one of the myriad problems facing food production systems in Africa for which biotechnology can provide at least some solutions.

The use of genetically modified organisms or products of genetic engineering could bring about a true revolution in Africa. Several genetically modified plant crops are already in use or are vigorously being developed to address the problems that affect crops in Africa. These include cotton resistant to insects, virus resistant cassava, varieties of bananas that can withstand disease and incredibly vitamin A bio-fortified maize and rice as well as fruit that produces edible vaccines. Planting materials that are resistant to pests will minimize the use of chemicals which will reduce harmful pesticide residue and result in fewer farmers being exposed to poisoning. Genetically engineered crops require less water, are not prone to disease or the growth of weeds. There is the potential to double Africa's production of crops if viral diseases are controlled by using biotechnology.

The debate about agricultural biotechnology for Africa must be considered against the continent's needs for more food and the survival of its people. Africa currently imports 25% of its grain. The use of biotechnology to increase local grain production is far more preferable to dependence on other countries, particularly as the population growth in Africa exceeds food production. The inability to produce adequate food forces Africa to rely on food aid from other nations.

Africa's priority is to feed her people with safe food and to sustain agricultural production and the environment. Africa has missed the 'green revolution' which helped Asia and Latin America to achieve self-sufficiency in food production. Africa cannot afford to miss another major global technological revolution. Africa's crop production per unit area of land is the lowest in the world.

Policy makers in African governments must be educated concerning the need to support and invest in biotechnology research as the crucial impact is food self-sufficiency and improved living conditions for its people. It is critical though that scientific information reaches farmers in the rural areas and that agricultural scientists interact with farmers, empowering them and passing on knowledge of new technologies for sustainable food production. Biotechnology deserves support from all those who want to help African scientists and farmers to feed their own people. Richard Manning (Manning, R. 2000. *Food's frontier: The next green revolution*, New York: North Point Press.) makes a good point when he suggests that one way to feed the increasing world population is to help third world scientists to feed their own people.

Agricultural biotechnology field trials need to be done locally in Africa, to establish environmental safety under tropical conditions. All these issues mean that Africa must strengthen its capacity to deal with various aspects of biotechnology, including issues of bio safety, creating and sustaining seed gene banks, and encouraging the emergence of a local biotechnology private sector. The great potential of biotechnology to increase agriculture in Africa lies in its 'packaged technology in the seed', which ensures technology benefits without changing the local cultural practices of farmers.

Africa has many problems – a shortage of skilled people (especially in biotechnology), poor funding of research, lack of appropriate policies and civil strife. Nevertheless, countries such as South Africa, Egypt, Zimbabwe and Kenya are taking practical steps to ensure that they can use biotechnology for sustainable development. An agricultural biotechnology revolution is urgently required in Africa to help counteract famine, environmental degradation and poverty, improving the quality of life of its people. The needs of Africa and first world countries are different. First world countries have surplus food and have never experienced hunger, mass starvation and death on the regular scale we sadly witness in Africa. The priority of Africa is to feed her people with safe foods and to maintain agricultural production and the environment. Agricultural biotechnology in Africa – the welcome mat is out!