



BIOTECHNOLOGY: A CATALYST FOR ECONOMIC DEVELOPMENT, IMPROVED NUTRITION, HEALTH AND WEALTH OF UGANDANS

For many decades, the world has been using biotechnology to improve human life. Advances in the science of biotechnology have allowed humans to make major breakthroughs that greatly improve the quality of life. For instance, Insulin which is used to treat diabetes, was previously manufactured from parts of animals such as a cow's pancreas. This was not a sustainable way to mass produce insulin and some people's bodies rejected animal-insulin which increased their sickness and led to death. But today, scientists are using biotechnology to produce larger amounts of better quality insulin to treat diabetes. Biotechnology is therefore helping us to prepare for and meet society's most pressing challenges by improving how we live, what we eat, and how we want our future to look.

LET US LEARN MORE ABOUT BIOTECH AND ITS USE...

WHAT is biotechnology?

Biotechnology is a process that uses biology to develop technologies and products that help improve our lives and the health of our planet (including plants and animals). Man has used biological processes of micro-organisms for over 6000 years to produce important products such as: medicines, alcoholic beverages, cheese, yoghurt, and yeast used to make bread. Modern biotechnology includes using newer tools like tissue culture and artificial insemination to produce vaccines and medicines to combat devastating and rare diseases, produce disease-free crops to feed large populations even in harsh climate conditions, and to reduce environmental degradation through cleaner energy and less carbon emissions.

WHAT are GMOs?

GMOs are plants, animals or microorganisms which have been improved using genetic engineering. Scientists can use genetic engineering to add or remove a gene(s) of a living thing so as to solve a health problem, make it survive in harsh conditions or improve its quality. GMOs are products of modern biotechnology.

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WHY is Uganda using genetic engineering?

1. Uganda is using modern biotechnology to improve nutrition, enhance food safety and quality and protect food crops from diseases that threaten our stable, affordable, and nutritious food supply. Genetic engineering for instance is being used to protect bananas (matooke) from Banana Bacterial Wilt (BBW) and cassava from Cassava Brown Streak Disease (CBSD). Uganda loses about \$300million annually in revenue from bananas due to BBW and about \$24million due to CBSD.
2. Uganda is using modern biotechnology called *tissue culture* to develop whole plants from single cells so as to ensure availability of large quantities of superior, clean planting materials for crops such as cassava, pineapples, coffee, and banana. In this way, farmers are able to have clean seeds or planting materials all year round and not only at particular seasons.

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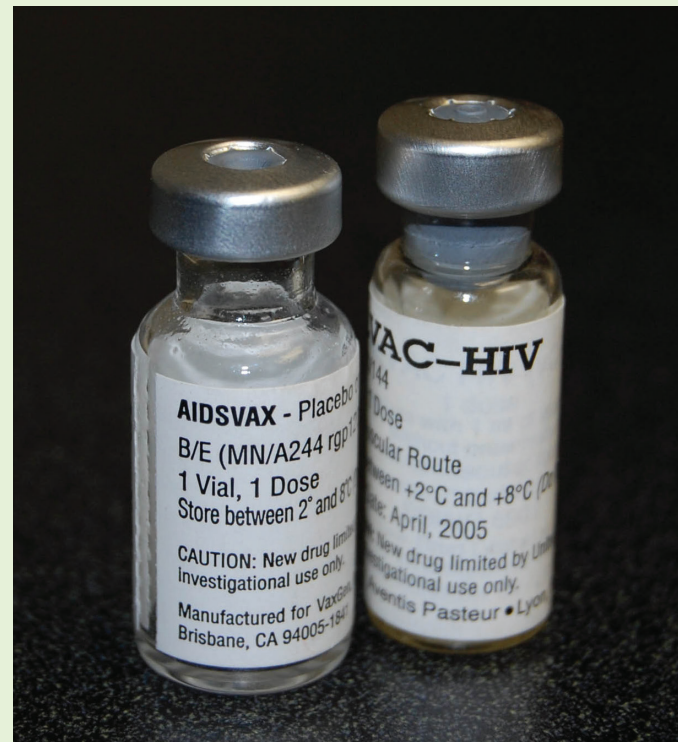
WHAT are other benefits of using genetic engineering?

Production of medical insulin: The Government of Uganda has licensed more than 50 medical drugs and more than 10 diagnostic kits that are products of modern biotechnology. The insulin used to manage diabetes, Hepatitis, and HIV vaccines contain ingredients of GMOs. But GM technology can be misused to cause harm and so we need these products to be adequately regulated so that Ugandans can only receive GMO products that are safe for them and the environment.

Biotechnology, produced by UBC and Partners



Diabetics medicine developed using GM technology.



HIV vaccine was developed using GM technology

HOW can biotechnology support social, economic, and environmental sustainability of agriculture in Uganda?

Biotechnology improves the safe and effective use of pesticides because some crops are improved with protein that protects them from certain insects. This reduces the amount of insecticide used on crops and reduces agriculture's carbon foot print as less carbon dioxide is released into the air and more retained in the soil. It is estimated that in 2014, biotech crops grown all over the world reduced carbon emissions equivalent to taking 12million cars off the road for one year. With less spraying, biotechnology conserves biodiversity as beneficial insects such as bees are not harmed. Biotechnology crops preserve and improve soil quality because farmers who plant them till the land less often or not at all.

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Biotech crops conserve biodiversity.

WHO is using genetic engineering tools in Uganda?

In Uganda, genetic engineering is being used by both public and private entities. In 2003, the President of Uganda, H. E. Yoweri Kaguta Museveni endorsed use of genetic engineering in Uganda when he commissioned the National Biotechnology

Laboratory at Kawanda. Researchers at the National Crops Resources Research Institute in Namulonge are using Genetic Engineering to protect plants from certain diseases, pests, and harsh weather such as drought. At the moment, only public researchers are allowed to use Genetic Engineering because they have legal permission through the National Biotechnology and Biosafety Policy of 2008. When this policy is made into a law, private companies will also use Genetic Engineering. However, companies such as Agro-Genetic Technologies (AGT)- the first private biotechnology laboratory are using other biotechnology tools such as tissue culture technology to increase the supply of clean planting materials.



H.E. Y. K. Museveni viewing through a microscope after officially opening the National Biotechnology Center at Kawanda, 2003.

Biotechnology, produced by UBIC and Partners



Bacterial wilt diseased banana causing Uganda an estimated annual loss of over 600 billion Shillings. Right: Bacterial wilt resistant banana tested at Kawanda

HOW will biotechnology benefit Uganda in the future?

In the future, scientists may be able to remove proteins that cause allergic reactions in foods such as soy, milk, and peanuts, making the food supply safer for individuals with allergies.

If Uganda embraces Genetic Engineering, our farmers will suffer less economic losses and food insecurity resulting from manageable problems such as pests, diseases and drought. Our local scientists have found that in some cases (including those shown in the pictures) products of modern biotechnology provide the best solutions to some problems today. We need to allow our farmers to access these products.

HOW can Ugandans access these useful genetic engineering products?

The National Biotechnology and Biosafety Policy was approved by Cabinet in 2008 from which an implementing law was drafted and its Principles were approved by Cabinet in 2011. The proposed law was tabled in Parliament in February 2013. Before the proposed law was passed by parliament, consultations were conducted by Parliament, with different stakeholders including regulators, scientists, community and religious leaders, media actors, farmers, women groups and the youth. Consensus from the consultations is that this law is necessary NOW.

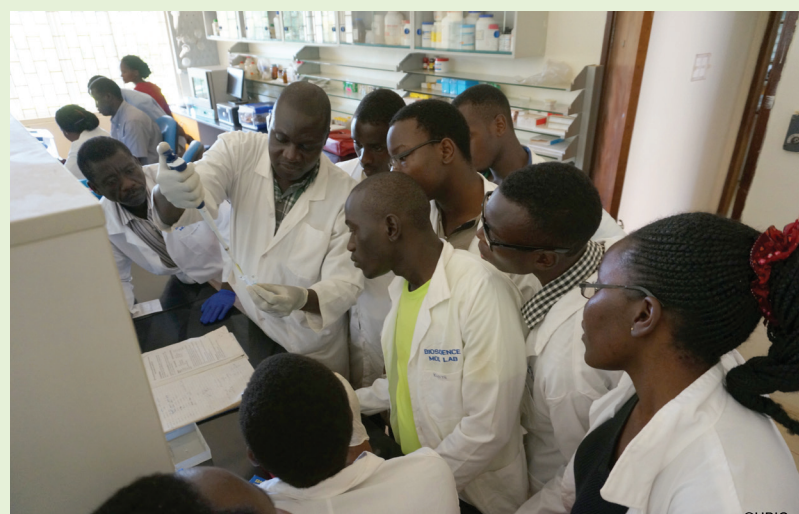
WHY do we need to regulate some genetic engineering tools?

The proposed Biosafety law will ensure safety checks of all GMO products developed in Uganda or imported into the country, to guarantee health of Ugandans. Uganda is the only country in Africa testing GMO crops without a law. Our neighbors

and major trading partners have put in place systems to regulate products of genetic engineering. The Government of Kenya has approved environmental release of GMO maize and GMO cotton. How will we prevent them from entering our porous borders?

The law will also give scientists permission to give farmers improved biotech crops, resulting from years of research and development. In the last 15 years, the Government of Uganda has spent more than 20 billion Uganda Shillings to build human and infrastructural capacity to use genetic engineering tools to transform the agricultural, human health, and industrial sectors, and to manage our environment. We need to use this capacity to improve our livelihood and increase Uganda's global competitiveness in science and technology.

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Young scientists that are training in biotechnology research and development, Oct 2015.



Uganda loses close to 90 Billion shillings in annual revenue to Cassava Brown Streak Disease



Brown Streak resistant GM cassava developed at NaCRRI - Namulonge

ARE the approved biotech/GM foods on the market safe for human consumption?

Yes. The World Health Organization (WHO), Food and Agriculture Organization (FAO), American Medical Association (AMA), European Food Safety Association and a broad range of other scientists agree that GM foods currently on the market are as safe as the non-GM foods. But we need our Government to regulate to ensure that all foods (GMOs or non-GMOs) on the market are safe to eat. The proposed Biosafety law will ensure that modern biotechnology products are tested and deemed fit for human consumption.

"The application of modern biotechnology to food production presents new opportunities and challenges for human health and development...improved quality and nutritional and processing characteristics, which can contribute directly to enhancing human health and development" - Department of Food Safety, WHO 2005

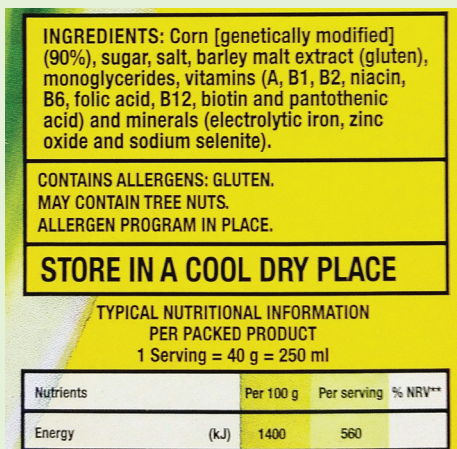
ARE we already consuming GMOs products in Uganda?

Yes. There are foods, beverages and drugs in our supermarkets, shops and pharmacies that contain GMOs ingredients. The proposed Biosafety Law will provide for a system to regulate them.

As Ugandans, let us support the passing of the proposed Biosafety Law so that we can hope for a brighter future, with sufficient food supplies, reduced disease burden, a cleaner and safer environment, and with a stronger economic competitive advantage.

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The Label shows that this cereal product contains 90% GM Maize. This photo was taken in one of the supermarkets in Uganda.

