Pocket K No. 30

Contributions of Agricultural Biotechnology to Alleviate Poverty and Hunger

Introduction

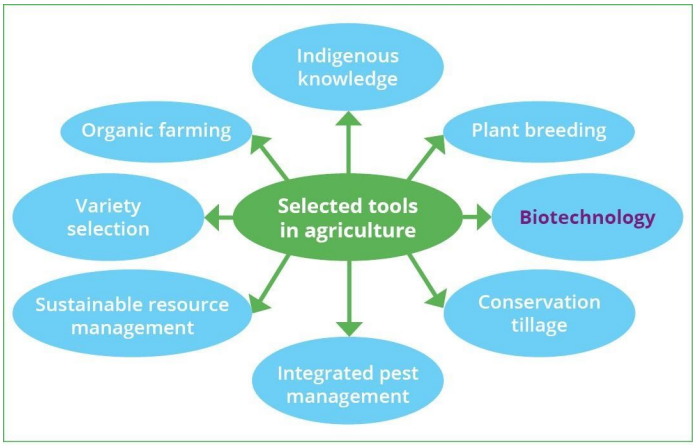
In 2018, the number of chronically undernourished people in the world is estimated to have increased to 821.6 million, up from 811.7 million in 2017, according to the Food and Agriculture Organization of the United Nations (FAO). The 2030 Agenda for Sustainable Development and the UN Decade of Action on Nutrition 2016–2025 call on all countries and stakeholders to work as one to eliminate hunger and malnutrition by 2030.

Agriculture remains predominantly traditional and majority of African countries exhibit a high dependency on food aid, which accounts for a quarter of all global food aid shipments. Reversing this trend requires strategic interventions that would dramatically raise agricultural productivity while taking into consideration realities and diversity of Africa's farming systems.

Stark Reality of Hunger and Poverty Status

- Global hunger affects 1 in every 9 people.
- In 2018, 149 million children (under 5) were undernourished.
- Hunger has increased in many countries where the economy has slowed down or contracted, mostly in middle-income countries.
- Hunger is on the rise in almost all African subregions, making Africa the region with the highest prevalence of undernourishment, at almost 20 percent.
- Hunger is also slowly rising in Latin America and the Caribbean, although its prevalence is still below 7 percent.
- In Asia, Western Asia shows a continuous increase since 2010, with more than 12 percent of its population undernourished today.

Which way out?



Selected tools used to improve agricultural productivity: Biotechnology is one among several tools available to complement but NOT to replace conventional agriculture

Agriculture accounts for 70% of full time employment, 33% of total GDP and 40% of total export earnings in Africa. Yet, productivity level of most crops fall below global averages. At the onset, African farmers face a multitude of highly complex and interrelated problems.No single approach will provide solutions to the declining agricultural productivity trends.

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Conventional crop improvement ALONE will not cause a dramatic "quantum jump" to bridge the huge food deficit and poverty face of Africa.

A successful strategy should have MULTIPLE APPROACHES that address principal factors in the food, feed, fiber and fuel availability MATRIX. These include: good governance, improved infrastructure, farmer education, improved seed quality and delivery systems, inputs, market access, fair trade and appropriate technologies that integrate proven indigenous knowledge practices with emerging technologies such as modern biotechnology.

The Case for Modern Agricultural Biotechnology

Biotechnology enables diverse applications in agriculture, health, industry and the environment. Overwhelming evidence demonstrates that biotechnological tools — tissue culture, genetic engineering and molecular breeding (marker-assisted selection) continue to provide promising opportunities for achieving greater food security while improving the quality of life. Biotechnology however is not a magical bullet. A high quality seed requires good agronomic practices, appropriate inputs and support services for the farmer to reap benefits. The comparative advantage of currently available biotech crops is the built-in defense against insects and tolerance to weed killers making them suitable for the average farmer. The technology is scale neutral and with proper stewardship, even the very small farmers benefit.

Global Status and Trends in Modern Biotechnology

Globally, in 2018, biotech crops occupied 191.7 million hectares, grown by ~17 million farmers in 26 countries (21 developing and 5 developed countries). The global area under biotech crops has increased from 1.7 million hectares in 1996 to 191.7 million hectares in 2018 (a ~112-fold increase).

Other global milestones:

- The net farm economic benefit in developing countries in 2016 was US$18.2 billion.
- An 18.3% reduction in environmental impact of insecticides and herbicides has been recorded in 2016.
- Two European countries – Spain and Portugal continued to grow commercial biotech crops in 2017.

Experiences and Evidence from Africa

As of 2018, South Africa, Sudan, and eSwatini were the African countries with commercialized biotech crops.

Country	Biotech Crop Area (hectares)	Commercialized Biotech Crops
South Africa	2.7 million	maize, soybean, cotton
Sudan	24,000	cotton
eSwatini	250	cotton

Biotech cotton, maize, and soybean occupied 2.74 million hectares of land in South Africa in 2018, a slight increase from the reported biotech crop area of 2.73 million hectares in 2017. Average biotech crop adoption increased marginally at 96% in 2018.

Sudan has been planting Bt cotton since 2012. Some 243,000 hectares of Bt cotton were planted in 2018, up from 192,000 hectares in 2017. This was a major breakthrough in the cotton industry of the country because cotton production has been declining in the past couple of years due to bollworm infestation.

Health Benefits of Biotech Crops

Besides reduction in pesticide residues, biotech crops have potential to increase the nutritional value of foods and enhance human health in various ways:

- Lower levels of infestation by insects reduces fungal and mycotoxin in maize.
- Nutritionally enhanced rice for beta carotene, would provide an alternative source of vitamin A to save millions of children who go blind every year.
- Biotech processes can reduce presence of toxic compounds - e.g. cyanide in cassava.

Environmental Benefits of Biotech Crops

- Global cumulative reduction in pesticides usage is estimated at 671 million kg of active ingredients for the period 1996-2016. This has contributed to reduction of pesticide residue in foods and minimized impact on non-target organisms.
- Increased productivity per unit of land, minimizing encroachment into marginal lands, destruction of forests and pollution of freshwater resources.

Progress of Biotech Crop Research in Africa

In 2018, a total of 13 countries in Africa sustained various activities from planting, evaluating trials or granting approvals for the general release of various biotech crops. Other research highlights in 2018-2019:

- Nigeria became the first country in the world to approve biotech cowpea
- The Kingdom of eSwatini (former Swaziland) started commercial planting of IR (Bt) cotton on an initial launch of 250 hectares.
- Two more countries – Ethiopia and Nigeria gave environmental release approvals for Bt cotton (Ethiopia) while Nigeria approved cotton and cowpea
- Malawi had also given environmental release approvals and working towards commercialization of biotech cotton.
- Kenya approved Bt cotton for commercial planting in December 2019.

Safety of Biotech Crops

With over a decade of production and consumption, biotech food and feed products depict a history of safe use with no credible evidence of risks to human health or the environment. This has been confirmed by a number of reputable independent scientific bodies such as the National Academies of Sciences, Engineering, and Medicine (U.S.), Research Directorate General of the European Union, the French Academies of Sciences and Medicine and the British Medical Association.

In May 2004, the Food and Agriculture Organization (FAO) of the UN reported: "to date, no verifiable untoward toxic or nutritionally deleterious effects resulting from the consumption of foods derived from genetically modified foods have been discovered anywhere in the world."

Moving into the Future

Responsible and safe deployment of modern biotechnology can significantly enhance prospects for alleviating poverty and hunger in Africa. To realize the technology's potential however, African governments should create an enabling policy environment and conducive institutional arrangements for investment in R&D and commercialization of these products. Mechanisms to facilitate access to proprietary technologies and to invigorate the public sector towards development of products relevant to local conditions should be strengthened.

One of the major constraints to acceptance of modern biotechnology in Africa is misinformation. This continues to influence adoption and policy choices. Generation of accurate and science-based information is therefore crucial to informed decision-making, which would lead to greater appreciation of the contributions of biotechnology to food security and wealth creation.

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Production of this Pocket K is a collaborative initiative among the National Council for Science and Technology (NSCT), Ministry of Agriculture, Program for Biosafety Systems (PBS -IFPRI) and ISAAA *Afri*Center.

Updated February 2020