BIOTECHNOLOGY: DRIVING SOLUTIONS FOR SUSTAINABLE DEVELOPMENT

ABOUT US

The International Council of Biotechnology Associations (ICBA) is a coalition of non-profit, national biotechnology trade associations formed to promote public understanding of, and to advocate for, public policies that support the growth of the innovative biotechnology industries. The ICBA represents the global voice of the industry in international fora with the goal of promoting continued innovation in the human health, agriculture, and industrial and environmental sectors.

BIOTECHNOLOGY DRIVES SOLUTIONS FOR SUSTAINABLE DEVELOPMENT

Breakthroughs in biotechnology can:

- Cure once incurable diseases;
- Enable rapid response to health crises;
- Improve plant health to withstand environmental stress to enhance food security;
- Promote animal health;
- Address antimicrobial resistance;
- Reduce greenhouse gases; and
- Develop food ingredients that provide micronutrients and fortified food solutions to help end hunger.

The International Council of Biotechnology Associations (ICBA) partners with its national authorities and international organizations to unleash the tools of biotechnology to overcome global challenges.

ICBA Members:

Member Organization	Region/Market
Africa BIO	Africa
Association of Biotech-Led Enterprises (ABLE)	India
AusBiotech	Australia
Belgian Life Sciences Industry Association (Bio.be)	Belgium
BIO Deutschland	Germany
BioIndustry Association (BIA)	United Kingdom
BioPharmaChem Ireland	Ireland
BIOTECanada	Canada
Biotechnology Innovation Organization (BIO)	United States of America
Costa Rican Biotechnology and Medical Device Business Association (CRbiomed)	Costa Rica
Czech Bio	Czech Republic
EuropaBio	European Union
Finnish BioIndustries (FIB)	Finland
Foro Argentino de Biotecnologia (FAB)	Argentina
German Association of Biotechnology Industries (DIB)	Germany
Holland BIO	Holland

Member Organization	Region/Market
Hong Kong Biotechnology Organization (HKBIO)	Hong Kong
Hungarian Biotechnology Association	Hungary
Italian Association for the Development of Biotechnology (Assobiotec)	Italy
Japan BioIndustry Association (JBA)	Japan
Korea Biotechnology Industry Organization (KoreaBIO)	South Korea
NZBio	New Zealand
PeruBiotec	Peru
Portugal's Biotechnology Industry Organization (P-BIO)	Portugal
Spanish Bioindustry Association (ASEBIO)	Spain
SwedenBIO	Sweden
Swiss Biotech Association (SBA)	Switzerland
Taiwan Bio Industry Association	Taiwan
The Greek Initiative on the Bioeconomy	Greece

SDG 1: NO POVERTY

Biotechnology helps farmers increase their incomes and reduce their vulnerability to climate change.

To achieve NO POVERTY, biotechnology:

- Increases farm income through higher productivity and lower production costs; and
- Improves crop resiliency to climate change, enabling more stable farm incomes.

SDG 1: NO POVERTY
HOW IS BIOTECHNOLOGY CONTRIBUTING?

For subsistence farmers, poverty and hunger are directly linked. Agricultural biotechnology offers solutions that support both objectives.

- From 1996-2016, the net farm income gain from biotech crops was $186.1 billion, benefiting approximately 17 million farmers, many of whom are farmers.[1]
- In 2016, farmers in developing countries received $5.06 for each extra dollar invested in biotech crop seeds.[2]
- In India, insect resistant Bt cotton has yielded a 50% gain in profit among farmers and raised household income by 18%.[3]
- Bt eggplant varieties are helping farmers increase crop yields and triple their incomes. Bt eggplant helps farmers better protect their crops from fruit and shoot borer larvae and drastically reduces their need for pesticides.[4]

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SDG 2: ZERO HUNGER

Agricultural biotechnology is critical in helping to feed a growing world population.

To achieve ZERO HUNGER, biotechnology:

- Produces healthier and more productive crops;
- Reduces food waste by extending shelf life of produce; and
- Improves child nutrition through enhancing staple crops with increased amounts of essential vitamins and minerals.

SDG 2: ZERO HUNGER
HOW IS BIOTECHNOLOGY CONTRIBUTING?

Biotech crops with insect-resistant genes can be critical in combating pests that decimate crops.

- Bt maize: The Fall Armyworm, first detected in 2016 in West Africa, has the potential to cause extensive maize yield losses in 39 African countries, effecting over 300 million African farm families. Bt maize has proven effective in protecting against the pest in Brazil.[5]
- Bt cowpea: Scientists in Nigeria, Ghana and Burkina Faso are working to develop a Bt cowpea that is resistant to the pod borer insect, which can devastate up to 90 percent of a farmer's crop.[6]

SDG 2: ZERO HUNGER
HOW IS BIOTECHNOLOGY CONTRIBUTING?

Biotechnology is helping to produce more productive crops.

- Between 1996 and 2014, crop biotechnology was responsible for an additional 158.4 million tons of soybeans, 321.8 million tons of corn, 24.7 million tons of cotton lint and 9.2 million tons of canola without having to bring more land into agricultural production.[7]
- In 2016, farmers in Vietnam grew insect-resistant and herbicide-tolerant maize on 86,000 acres and realized increased yields between 16.5 and 25 percent compared to non-genetically modified (GM) varieties.[8]

Biotech crops can help farmers minimize losses associated with extreme weather events, particularly drought.

- The Water Efficient Maize for Africa (WEMA) initiative is developing drought-tolerant maize.
- The Catholic University of Santiago is developing drought-tolerant citrus and virus-resistant potatoes.

Reduce food waste by extending shelf life of produce.

- Non-browning apples and potatoes will contribute to reduced food waste.

SDG 2: ZERO HUNGER
HOW IS BIOTECHNOLOGY CONTRIBUTING?

Nutritionally enhanced GM crops can help to alleviate under-nourishment around the world.

- "Golden Rice," is helping to alleviate Vitamin A Deficiency (VAD) by genetically engineering the crop to provide an increased amount of beta-carotene. One serving of Golden Rice could provide half the required daily intake of pro-vitamin A for a one- to three-year-old child.[9]
- Through the Africa Biofortified Sorghum Project (ABS), an international public-private partnership, researchers are enhancing the bioavailability of iron and zinc, increasing the amount and stability of pro vitamin A (such as beta- Carotene), and improving the protein digestibility of sorghum.[10]
- The Banana21 initiative, a public-private partnership funded by the Gates Foundation, is working to develop a genetically engineered cooking banana with a three-fold increase in iron and a four- fold increase of pro-vitamin A.[11]
- Royal DSM, a Dutch biotechnology company, has been providing nutritionally enhanced protein powders to communities across sub-Saharan Africa.[12]

SDG 3: GOOD HEALTH AND WELL-BEING

Biotechnology plays a critical role in saving lives and improving the quality of life for populations across the globe.

To achieve GOOD HEALTH and WELL-BEING, biotechnology companies:

- Develop medicines to help people live longer, healthier lives;
- Produce vaccines and other tools to prevent and contain epidemics; and
- Detect and diagnose conditions sooner and with greater accuracy and precision.

SDG 3: GOOD HEALTH AND WELL-BEING HOW IS BIOTECHNOLOGY CONTRIBUTING?

Biotechnology research and development (R&D) has led to breakthroughs improving life expectancy and quality of life for the global population.

- Small- and medium-sized biopharmaceutical companies are at the forefront of the search for new cures and therapies. The current clinical pipeline is increasingly dominated by emerging companies that account for 73% of the current 6,984 global clinical-stage drug programs.[13]
- Today, 83% of children with cancer survive, compared to 58% in 1970.[14]
- Small- to large-sized biotechnology companies have made significant advances and continue to research and develop potential cures in the fight against HIV. Recent breakthroughs in the study of HIV include an immunotherapy, which uses the body's own immune system to fight the virus and a vaccine to keep HIV symptoms in check. Another approach was discovered by scientists at the University of Cambridge London and Imperial College in the "London Patient" case where they learned that by targeting the CCR5 gene mutation through stem-cell transplants, the patient was successfully cured of HIV.[15]

SDG 3: GOOD HEALTH AND WELL-BEING
HOW IS BIOTECHNOLOGY CONTRIBUTING?

Biotechnology therapies and vaccines have reduced the spread of infectious diseases and help to contain epidemics and pandemics.

- New genome editing technology has the potential to cure once incurable diseases. Biotechnology companies are researching methods to utilize this technology to cure diseases, such as Sickle Cell Disease, cystic fibrosis, muscular dystrophy and Huntington's Disease.
- Vaccines prevent approximately 10.5 million cases of infectious illnesses each year.[16]
- Oxitec, a British company, offers a technology to control the spread of a single species of insect, Aedes aegypti, the primary vector for dengue, chikungunya and Zika virus outbreaks around the world. In 2018, Oxitec began field trials in Brazil to address the challenge of Zika outbreaks in the region.[17]
- HIV/AIDS is no longer fatal. Today, a 20-year-old diagnosed with HIV can live well into his/ her 70s due to the development of antiretroviral (ARV) combination treatments.[18]

> **WORLDWIDE, 2.5 MILLION CHILD DEATHS ARE PREVENTED EACH YEAR THROUGH IMMUNIZATION.[19]**

SDG 3: GOOD HEALTH AND WELL-BEING
HOW IS BIOTECHNOLOGY CONTRIBUTING?

Biotechnology companies are working to deliver high-impact health technologies to countries across the globe to reduce inequities in health.

- The African Access Initiative (AAI) is a partnership of companies, governments, healthcare providers, and NGOs focused on sustainably expanding access to cancer medicines and technologies, improving healthcare infrastructure, and building clinical and R&D capacity in Africa.[20]
- Collaboration for Health is a collaborative project between biopharmaceutical companies and the Government of Papua New Guinea to build local capacity to fight the HIV epidemic.[21]

Biotech tests detect and diagnose conditions sooner and with greater accuracy and precision - helping improve patient prognoses.

- More than 1,200 biotech diagnostic tests are being used in clinics around the world.[22]
- Many tests require only a simple blood sample or mouth swab - eliminating the need for costly invasive surgery.
- Some tools are now portable, allowing physicians to conduct tests, interpret results, and determine treatment on-the-spot.

SDG 6: CLEAN WATER AND SANITATION

Biotechnology helps ensure availability and sustainable management of water and sanitation.

To achieve CLEAN WATER and improve SANITATION, biotechnology:

- Uses bacteria and plants for water purification; and
- Removes chemical contaminants from water.

SDG 6: CLEAN WATER AND SANITATION HOW IS BIOTECHNOLOGY CONTRIBUTING?

Biotechnology companies are developing new methods using biological processes to deliver clean drinking water to communities across the globe.

- The Safe Drinking Water Foundation in Canada designed a water treatment system that uses bacteria instead of chemicals to remove contaminants from water.[23]
- CustoMem, a UK company, created water filters utilizing proteins to filter polluted waters.[24]
- A collaboration project between Bridge Biotechnology and Adves Water is delivering safe drinking water to over 100,000 people in the Punjab province of Pakistan through Bridge Biotechnology's ESOL™ generator. This generator uses biological processes to produce electrolyzed water with germ-killing properties and is safe to drink.[25]
- Chitin, a marine resource, is used across the globe to treat drinking water due to its properties that enable it to attach itself to a variety of organic contaminants (bacteria, algae), minerals, metals, and oil. Chitin dramatically increases the effectiveness of filtration systems as it is able to capture fine particles and solved pollutant.[26]

Agriculture biotechnology contributes to global efforts to maintain clean waterways.

- No till agriculture enabled by herbicide-tolerant genetically modified crops reduces soil erosion, which can clog and pollute waterways.[27]
- Future nitrogen use efficient (NUE) genetically modified crops help reduce chemical runoff into waterways, while increasing yield by 115% more per acre.[27]

SDG 7: AFFORDABLE AND CLEAN ENERGY

Biofuels, a cleaner and more sustainable source of energy, are produced from a wide range of renewable biomass feedstocks and can contribute to the reduction of greenhouse gas emissions by substituting for hydrocarbons in transportation fuel.

Biofuels contribute to the REDUCTION of GREENHOUSE GAS EMISSIONS as:

- Countries and cities adopt them as a primary source of energy; and
- Companies commit to increased production and use of biofuels.

SDG 7: AFFORDABLE AND CLEAN ENERGY HOW IS BIOTECHNOLOGY CONTRIBUTING?

Countries and cities are increasingly using biofuels as a source of energy.

- Brazil is a leader in producing biofuels and has replaced almost 42 percent of its gasoline needs with sugarcane ethanol.[28]
- The Swedish city of Kristianstad uses biogas to generate electricity and heat and to fuel cars and municipal garbage trucks and buses.[29]

Global companies and institutions are committing to increasing the production and use of cleaner energy sources.

- Companies and institutions, such as Audi, DuPont, DSM, Joule, LanzaTech, Novozymes and Yale University, formed the below50 coalition to pledge a reduction in carbon emissions by 50% and to promote increased use of sustainable fuels.[30]
- Novozymes and CleanStar Ventures jointly established an integrated food-energy business in Mozambique to replace thousands of charcoal-burning cookstoves with cleaner ethanol stoves. [31]

SDG 8: DECENT WORK AND ECONOMIC GROWTH

Biotechnology innovations, such as medicines and agricultural products, present populations with opportunities for economic growth.

To achieve ECONOMIC GROWTH, biotechnology:

- Provides farmers with inputs to grow crops with higher yields and fewer inputs; and
- Contributes to healthier workforces.

SDG 8: DECENT WORK AND ECONOMIC GROWTH HOW IS BIOTECHNOLOGY CONTRIBUTING?

Countries and farmers growing GM crops have seen tremendous economic benefits.

- Over the last 20 years, crop biotechnology has stimulated economic growth in the 26 countries where the technology is used.[32]
- GM crops help alleviate poverty for millions of resource-poor farmers around the world (equaling approximately 65 million people total).[33]

Biopharmaceutical products have led to healthier workforces and economic development.

- A study conducted by The Global Initiative on Health and the Economy showed GDP loses between 6 and 10% across 19 countries due to absenteeism or presenteeism due to health-related issues. These numbers are projected to rise with the increase in chronic diseases.[34]
- Biologics have contributed to healthier and more productive labor forces due to less hospitalization, career interruptions and school and work absenteeism. Over a period of 2 years, a rheumatoid arthritis patient treated with a novel biologic product, remained in employment 31 weeks longer.[35]

SDG 9: INDUSTRY, INNOVATION, AND INFRASTRUCTURE

Research and development in the field of biotechnology is occurring across the globe empowering scientists to develop solutions to the most pressing global challenges.

To achieve inclusive INDUSTRY INNOVATION and INFRASTRUCTURE, biotechnology companies and countries are committed to:

- Constructing biotechnology parks;
- Investing in infrastructure to increase R&D capabilities; and
- Connecting to the international community to create opportunities for investment and partnerships.

SDG 9: INDUSTRY, INNOVATION, AND INFRASTRUCTURE HOW IS BIOTECHNOLOGY CONTRIBUTING?

The construction of biotechnology parks contributes to the global growth of the industry.

- BiotechTown in Brazil provides a space and resources for start-ups to expand their operations.[36]
- BioPark Mauritius was established as a dedicated space for R&D in the biotechnology sector in March 2015 to help invigorate biomedical research in Africa.[37]
- OneBio in Cape Town, South Africa provides a shared lab space and business advice for biotechnology startups.

Companies, multilateral institutions, foreign governments, and NGOs are investing in infrastructure to increase R&D capabilities in developing countries.

- The African Access Initiative (AAI) is a partnership of companies, governments, healthcare providers, and NGOs focused on sustainably building clinical and R&D capacity in Africa.[38]
- The Institute for Biotechnology Research (IBR) at the Jomo Kenyatta University of Agriculture and Technology (JKUAT) in Kenya is training the next generation of home-grown scientists.[39]

Researchers and start-up companies from across the globe are connecting with the international community for investment and partnership opportunities.

- The annual BIO International Convention provides an opportunity for start-up companies and researchers to showcase their research and foster ties with investors, companies, NGOs, and other researchers. BIO supports an annual program for start-ups from Turkey, the Middle East and North Africa to compete and attend the BIO Convention free of cost.

SDG 12: RESPONSIBLE CONSUMPTION AND PRODUCTION

Innovation in industrial biotechnology can contribute to the reduction of over extraction of resources and expedite efforts to responsibly use environmental resources. Industrial biotechnology applies life science tools, such as microbes and enzymes, to traditional manufacturing and chemical processes to produce cleaner, more sustainable products and materials.

To achieve RESPONSIBLE CONSUMPTION AND PRODUCTION, applications of biotechnology:

- Reuse materials destined for landfills to create new products;
- Use enzymes and other biological processes to create sustainable products; and
- Create environmentally sound processes to manage chemicals.

SDG 12: RESPONSIBLE CONSUMPTION AND PRODUCTION
HOW IS BIOTECHNOLOGY CONTRIBUTING?

Bioplastics, developed by biotechnology companies, can substitute for petroleum-based plastics, replacing waste destined for a landfill with biodegradable, compostable consumer products.

- In 2015, the Coca-Cola Company unveiled the world's first polyethylene terephthalate (PET) plastic bottle made entirely from plant materials. The bottle is made from renewable plant materials and is fully recyclable.[40]
- Danimer Scientific and PepsiCo worked together to create a bio-based and compostable snack bag for chips using resins that blend biopolymers and mineral filler.[41]
- Carbios SA, a French chemistry company that focuses on discovering and developing enzymatic bioprocesses applied to plastic and textile polymers, created a new generation of fully biodegradable plastics with a controlled lifespan, a process enabling infinite biorecycling of plastic waste.[42]
- Biotechnology company Aventium, which uses renewable chemistry solutions to develop efficient processes and products, partnered with the Paper Bottle Company in the Netherlands to replace traditional plastics with the world's first 100% recyclable and biodegradable paper bottle for carbonated drinks.[43]
- MarinaTex, an Australian startup, has developed an alternative to single-use plastics by using fish waste to create a bioplastic.[44]

SDG 12: RESPONSIBLE CONSUMPTION AND PRODUCTION HOW IS BIOTECHNOLOGY CONTRIBUTING?

Biotechnology companies are researching and developing new methods to reuse materials destined for landfills to create new bio-based products.

- Researchers at Berkeley National Laboratory have discovered a method to convert municipal solid waste (MSW) to chemical compounds that can be used as diesel fuel precursors. MSW is garbage that is produced everyday around the world in significant volumes. This process reuses materials traditionally destined for landfills to produce renewable chemicals to be used for a cleaner, energy source.[45]
- The Bayou Fuels Project in Natchez, Mississippi converts waste wood biomass into cleaner diesel for heavy trucks and sustainable aviation fuel. By processing waste from the paper and lumber industries, specifically to woody biomass forest residue that would otherwise rot on the forest floor or contribute to forest fires, this cleaner fuel can contribute to efforts to reduce greenhouse gas emissions.[46]

> **BIO-BASED PRODUCTS ARE DERIVED FROM PLANTS AND OTHER RENEWABLE AGRICULTURAL, MARINE AND FORESTRY MATERIALS. THEY PROVIDE AN ALTERNATIVE TO CONVENTIONAL PETROLEUM DERIVED PRODUCTS.**

SDG 12: RESPONSIBLE CONSUMPTION AND PRODUCTION HOW IS BIOTECHNOLOGY CONTRIBUTING?

Biotechnology companies are researching and developing methods to use enzymes to replace fossil-based ingredients in consumer products, including cleaning supplies.

- Novozymes uses enzymes in detergents so laundry can be washed at lower temperatures, which saves energy.[47]

Applications of biotechnology can help to ensure the environmentally sound management of chemicals.

- PIARCS, PBC's low cost technology uses biological process to remove phosphorous and nitrogen in wastewater treatment plants. Both chemicals have negative consequences for human consumption and the environment if untreated in wastewater treatment plants.[48]
- Phytonix, a biotech company, uses photosynthesis and cyanobacteria to produce renewable chemicals.[49]

SDG 13: CLIMATE ACTION

Agricultural and industrial applications of biotechnology are critical in combating and coping with the effects of climate change.

To combat and cope with CLIMATE CHANGE, biotechnology:

- Replaces traditional energy sources with cleaner fuel options;
- Reduces greenhouse gas emissions through the use of GM crops; and
- Provides solutions for subsistence farmers combating the effects of climate change.

SDG 13: CLIMATE ACTION
HOW IS BIOTECHNOLOGY CONTRIBUTING?

Global companies and institutions are scaling up the use of biofuels.

- The below50 coalition of global companies and institutions is dedicated to increasing the production and promotion of biofuels.[50]

Airlines are using biofuels as jet fuel to reduce carbon emissions from air travel by 60%.[51]

- In January 2018, Qantas Airlines successfully completed the world's first US-Australia biofuel flight realizing a 7 per cent drop in emissions along the route – with 10 per cent of its tank filled with the mustard seed-derived biofuel.[52]
- Virgin Atlantic and LanzaTech are collaborating to produce the world's first jet fuel derived from waste industrial gases from steel mills.[53]

SDG 13: CLIMATE ACTION
HOW IS BIOTECHNOLOGY CONTRIBUTING?

Biotech crops contribute to a reduction of greenhouse gases.

- GM crops use less land and less deforestation, reducing the use of fossil fuels for farm inputs and equipment, animal agriculture, land clearing and preparation, significant contributors to greenhouse gas emissions.[54]
- Biotech crops reduce the use of fossil fuels associated with fewer insecticide and herbicide applications.
- In 2014, 5.2 billion pounds of atmospheric carbon dioxide emissions were reduced by conservation tillage and decreased fuel use made possible by GM crops. That's equal to removing nearly 10 million cars from roads for one year.[55]

SDG 13: CLIMATE ACTION
HOW IS BIOTECHNOLOGY CONTRIBUTING?

Biotech crops help farmers adapt to the effects of climate change.

- The Water Efficient Maize for Africa (WEMA) program develops and deploys maize varieties that yield 29 to 35 percent more grain under moderate drought conditions than currently available varieties. The project is helping farmers across sub-sahara including Zimbabwe, Zambia, Mozambique, Kenya, Tanzania and South Africa.[56]
- Scientists at University of California Davis are using genome editing technology to develop lettuce that is drought resistant.[57]

SDG 14: LIFE BELOW WATER

Innovation in biotechnology can contribute to efforts to conserve and sustainably use ocean resources.

To PRESERVE MARINE ECOSYSTEMS, biotechnology:

- Uses genomic sciences to provide new foods and food production methods;
- Safeguards ecosystems at risk; and
- Reduces nutrient run-off into waterways.

SDG 14: LIFE BELOW WATER
HOW IS BIOTECHNOLOGY CONTRIBUTING?

Innovation in food production from the sea, known as the "blue revolution," uses genomics, technologies, and recombinant DNA technology to address overfishing.

- AquaBounty has developed genetically modified salmon, trout and tilapia grown in fish tanks, contributing to the reduction of overfishing.[58]
- Marine-derived biosensors help to monitor marine environments by revealing the presence of an element, molecule, or organism of interest.[59]

Marine biotechnology can play an important role in safeguarding ecosystems from direct and indirect threats.

- In 2011, a team at the Virginia Institute of Marine Science reported the creation of a portable biosensor that could detect marine pollutants, including oil, much more quickly and cheaply.[60]
- DNA-based monitoring tools can also validate the identity of species and alert to the presence of invasive species.[61]

Agricultural biotechnology can reduce nutrient runoff into waterways that threatens marine life.

- Herbicide-tolerant crops allow greater adoption of no-till practices, reducing soil erosion and nutrient runoff.
- PivotBio uses biotechnology to develop microbes that improve crops' ability to fixate nitrogen, reducing the need for synthetic nitrogen fertilizer.[62]

SDG 15: LIFE ON LAND

Agricultural biotechnology innovation contributes to the protection of terrestrial ecosystems and biodiversity.

To PRESERVE LIFE ON LAND, biotechnology:

- Preserves water and topsoil through sustainable farming;
- Enables more precise pest control, better preserving biodiversity;
- Uses less land to farm crops resulting in less deforestation and the preservation of biodiversity; and
- Can save vital trees and crops at risk of extinction.

SDG 15: LIFE ON LAND
HOW IS BIOTECHNOLOGY CONTRIBUTING?

GM crops support more sustainable farming that preserves water and topsoil.

- Herbicide-tolerant GM crops enable farmers to apply conservation tillage. Less tilling means less soil erosion as well as improved moisture retention.[63]

Insect resistant crops enable more precise pest control, better preserving biodiversity:

- Bt eggplant: pesticide use on GM eggplants was reduced by as much as 92 percent.[64]
- Multiple studies have shown that Bt crops do not have a negative impact on non-target organisms.[65]

GM crops use one-fifth less farm land to produce food. This means less deforestation and preservation of biodiversity.

- From 1996-2015, the 574 million tons of productivity gained through biotechnology has saved 174 million hectares of land from being ploughed and cultivated.[66]

Biotechnology researchers have helped to save trees and crops at risk of extinction.

- Researchers at the State University of New York (SUNY) College of Environmental Science and Forestry developed a GM version of the chestnut tree, which can save the American Chestnut, a tree species decimated by a fungal infection. This biotech solution can also support species that rely on the tree for survival.[67]
- Scientists at Cornell developed the Rainbow Papaya, a GM crop that can tolerate the ringspot virus, which nearly wiped out the crop in the 1990s.[68]

SDG 17: GLOBAL PARTNERSHIPS FOR SUSTAINABLE DEVELOPMENT

Biotechnology companies, NGOs, research institutions, multilateral institutions, and governments are creating global partnerships with countries, companies, and researchers across the globe.

Biotechnology companies are creating GLOBAL PARTNERSHIPS to:

- Transfer biotechnology innovations for sustainable growth; and
- Build innovative biotechnology sectors to equip local scientists with the knowledge and tools to develop solutions to societal challenges.

SDG 17: GLOBAL PARTNERSHIPS FOR SUSTAINABLE DEVELOPMENT
HOW IS BIOTECHNOLOGY CONTRIBUTING?

Biotechnology companies, international institutions and global research centers are partnering to strengthen R&D capabilities and transfer technologies to assist in sustainable growth.

- The Water Efficient Maize for Africa (WEMA) project utilizes technology made available royalty-free to local seed companies so they can offer drought-tolerant hybrids to farmers.[69]
- The Centre for Tropical Livestock Genetics and Health (CTLGH), a partnership between the Roslin Institute and Royal (Dick) School of Veterinary Studies at the University of Edinburgh, Scotland's Rural College and the International Livestock Research Institute in Kenya and Ethiopia, is working with farmers in developing countries to grow hardier and more productive animals with modern gene-editing techniques.[70]
- Merck supports the BroadReach Institute for Training and Education (BRITE) by funding the Management and Leadership Academy (MLA) program in Zambia. Since 2011, over 700 healthcare workers have been trained with the goal of empowering them to transform the delivery of healthcare in their own country.[71]

SDG 17: GLOBAL PARTNERSHIPS FOR SUSTAINABLE DEVELOPMENT HOW IS BIOTECHNOLOGY CONTRIBUTING?

- Sanofi Pasteur entered into a technology transfer agreement with Biovac, a South African developer and manufacturer of vaccines, to entrust Biovac with late stage manufacturing of a finished vaccine product for sale and distribution.[72]
- Bio Ventures for Global Health along with pharmaceutical companies are providing fellowships and equipment donation to build capacity for research in LMICs. BVGH recently delivered equipment to a researcher at the University of Buea in Cameroon working on onchocerciasis drug discovery projects.[73]

SDG 17: GLOBAL PARTNERSHIPS FOR SUSTAINABLE DEVELOPMENT HOW IS BIOTECHNOLOGY CONTRIBUTING?

- Novozymes, a Danish biotech company, is partnering with the NICE Group, one of China's largest detergent companies, to collaborate on a R&D project to create more concentrated formulas of NICE's products. This will save massive amounts of transportation and packaging energy outputs.[74]
- WIPO Re:Search allows organizations to share their Intellectual Property, compounds, expertise, facilities, and know-how royalty-free with qualified researchers worldwide working on new solutions for neglected tropical diseases (NTDs), malaria, and tuberculosis.[75]
- Novozymes started the Sustainable Bioenergy Accelerator with the UN Food and Agriculture Organization (FAO), Roundtable on Sustainable Biomaterials (RSB), and other organizations. This group works to accelerate the use of sustainable bioenergy for power and fuel.[76]

ENDNOTES

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