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Report Highlights:

The Government of Ethiopia (GOE) has made significant advancements in its ability to evaluate the safety of crops produced using the tools of biotechnology. This has resulted in the GOE approving to grow one product (insect protected cotton). The only GE crop at commercial stage is Bt cotton, which was approved for commercialization in 2018. There are other crops that are being researched in Ethiopian laboratories and in confined field trials (CFT). Like the rest of the world, Ethiopia has been experiencing the unprecedented social and economic negative impact of the COVID-19 pandemic. The effect of recurrent drought has also affected crop performance and health of livestock. The civil war in the Tigray region is negatively impacting economic growth through lowering agricultural production, foreign direct investment, tourism, and exports.

EXECUTIVE SUMMARY

Ethiopia has the second largest population in Africa with an estimated 115 million inhabitants in 2020. Agriculture is at the heart of the Ethiopian economy, accounting for about 35 percent of the country's GDP and employing 85 million Ethiopians or 74% of the country's inhabitants. Moreover, more than 60% of all Ethiopia's exports are generated from the agricultural sector. Future economic growth is expected to hinge heavily on the country's manufacturing sector, especially the agro-processing, textile and apparel, and leather industries.

Given the current low-tech farming methods in Ethiopia, it is impossible to increase production using conventional agricultural practices to meet future food and agricultural input demand. Despite pressing food needs, the country is still dependent on traditional/conventional agriculture and takes little advantage of its rich endemic genetic resources e.g., indigenous drought resistant grains. In 2018, the GOE permitted commercial cultivation of GE cotton and CFT of GE maize for five years. Cotton producers look to GE cotton to solve the shortage of raw material to meet the high demand for cotton lint from textile factories and the GE maize to overcome food security challenges.

The GOE plans to use agricultural biotechnology as a tool to achieve food security and increase employment opportunities in the country. In 2018, the GOE started the TELA project to produce locally adapted genetically engineered maize varieties to be insect and drought resistant. In November 2020, the Ethiopian Institute of Agricultural Research (EIAR) submitted a dossier application for environmental release of TELA maize, which is pending approval by the National Biosafety Advisory Committee (NBAC). Ethiopia's biosafety law requires mandatory labeling of products containing GE products or ingredients.

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CHAPTER 1: PLANT BIOTECHNOLOGY

PART A: PRODUCTION AND TRADE

- a) PRODUCT DEVELOPMENT
- b) COMMERCIAL PRODUCTION
- c) EXPORTS
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a) PRODUCT DEVELOPMENT

Progress on WEMA -TELA Maize

Maize is one of Ethiopia's most important cereals in terms of production and is grown by about 8 million farmers. A primary challenge of the Ethiopian maize value chain is access to high quality maize seeds, which substantially impacts the productivity of small land holder farmers.

The Water Efficient Maize for Africa (WEMA) project is a public-private partnership that works to develop and deploy royalty-free, drought-tolerant and insect-pest protected (climate-smart) maize varieties to Ethiopian farmers through conventional breeding, marker-assisted breeding, and genetic engineering. The EIAR carried out the tests as part of regulatory approval process for farmers to grow specific genetic strains commercially.

The WEMA project aims to increase yield stability, protect harvests, and promote farmers' investment by embracing best management practices. The project is coordinated by the African Agricultural Technology Foundation (AATF) in partnership with the EIAR. The main aim of the trial is to determine how well the GE- maize resists drought and insects. The progress of the research was supervised by the NBAC of the country.

Progress on False Banana Plants (Enset)

The EIAR is working closely with the International Institute of Tropical Agriculture (IITA) on wilt-resistant enset (False banana), which is from the botanical family of banana trees, but it is grown for its stem and bulb. Unlike banana trees where the fruit is consumed, for the Enset plant, the pseudo stem, and the underground corm (bulblike base of a stem) are the edible parts. Approximately 20 percent of the total population (over 22 million people) depend on it. It is domesticated in Ethiopia and primarily cultivated in the southern and south-western regions of the country where it is a culturally and agriculturally symbolic crop, providing food security, cash income, animal feed, as well as preventing erosion and soil loss on the steep slopes of the highlands. The plant is considered extremely drought tolerant and adapts to different soil types. Since enset flour is rich in starch but not in other essential nutrients, an enset-based diet needs heavy supplementation of nutrients.

Enset production is threatened by bacterial wilt disease, and the EIAR/IITA project seeks to develop resistant varieties through modern agricultural biotechnology. The Enset plant can withstand long periods of drought, heavy rains, and flooding, which normally devastates other crops. However,

bacterial wilt is devastating the onset, hence threatening food security for over 22 million people who depend on it as a staple food. Thirty years of research efforts by the national system to control bacterial wilt of onset using conventional techniques could not succeed due to the absence of resistant clones in the genetic base of the crop.

b) COMMERCIAL PRODUCTION

The GOE started GE crop official research in 2015 after the GOE passed the amendment to Biosafety Proclamation No.896/2015. In 2018, the Government of Ethiopia authorized cultivation of GE cotton by granting official approval for environmental release. In 2019/20, Ethiopian farmers planted Bt cotton seed from JK Agri Genetics Ltd., from India on around 300 ha in the western and northern parts of the country. In 2020/21, farmers preferred buying cheaper GE seeds informally at the Sudan border, and they planted it in 7,100 ha without any official seed certification process. Ethiopian farmers took this action due to the low cost of Sudanese cotton seeds and FOREX shortages in Ethiopia, making it difficult to import cotton seed from JK Agri Genetics Ltd., India.

c) EXPORTS: The country does not produce any GE crops for export.

d) IMPORTS: Ethiopia imports processed biotech products such as soybean and corn oils, alcoholic beverages, as well as breakfast cereals made from GE ingredients. Currently there are no imports of GE grains or oilseeds. With respect to non-food products, Ethiopia imports GE cotton from India and the United States.

e) FOOD AID: Ethiopia is one of the major food-aid-recipient countries in Africa. The food aid commodities that contain GE ingredients, like corn soy blend (CSB) for school feeding and humanitarian programs are allowed into the country under a special GOE-issued waiver.

f) TRADE BARRIERS: Foods containing GE ingredients must carry a label. The purpose of labeling is to enable consumers to make informed choices on products to be purchased. The biosafety law requires mandatory labeling of all products of agricultural biotechnology to protect the consumer right to know. Foods containing GE ingredients must carry a label with the following statement ‘Genetically Modified Food’.

m) INTERNATIONAL TREATIES and FORUMS: Ethiopia is a member of several international organizations that deal with plant protection and plant health, including the International Plant Protection Convention (IPPC) or the Codex Alimentarius (Codex). Ethiopia’s WTO accession process started in January 2003 more than a decade ago. Ethiopia is currently in the third phase of the WTO accession process, where the terms of accession will be drafted. Generally, these international frameworks seek to protect the environment and human health without hindering international trade and aim to be transparent and in harmony with international trade regulations based on science.

PART B: POLICY

a) REGULATORY FRAMEWORK

The Environment Forest and Climate Change Commission (EFCCC), under the Prime Minister's office, is the competent authority within the GOE that is responsible for the biosafety proclamation, which is the overarching legislation governing the use of GE technology in Ethiopia. EIAR, which is housed under the Ministry of Agriculture (MOA), provides technical expertise to support the research and development, biosafety assessments, and field trials, as well as enforcing the proclamation provisions and implementing regulations. The Ethiopian Biotechnology Institute (EBTi), which is housed under the Ministry of Innovation and Technology (MIT), and the Ministry of Trade and Regional Integration also play a role in shaping the country's biotech regulatory framework. After the amended Biosafety Proclamation of 2015 was signed by the President of Ethiopia, the government subsequently revised the proclamation's underlying implementing directives to spell out specific requirements regarding the research and application of the technology. These legal changes were due to a strong political push from top officials, especially from the Prime Minister's Office, with the expectation that biotech cotton would boost local production to satisfy the increasing demands from the growing textile and apparel industry.

b) APPROVALS

In 2019/20, the two Bt-cotton hybrid varieties seed (JKCH 1947, JKCH 1050), which obtained official approval in 2018, were sourced from JK Agri Genetics Ltd. from India. In 2020/21, no Bt-cotton seed sourced from JK Agri Genetics Ltd due to FOREX shortages in the country and expensive JK Agri Genetics Bt-cotton seed. A five-year approval from 2018/19 up to 2023/24 for CFT of insect resistant and drought tolerant maize (WEMA/TELA) was obtained from NBAC and planted early September 2018/19 for the first time.

c) STACKED or PYRAMIDED EVENT APPROVALS

The NBAC approval for WEMA-TELA stacked maize involve more than one trait for both insect resistance and drought tolerance. The amended Biosafety Proclamation of 2015 directives does not clearly indicate the process for stacked event approval.

d) FIELD TESTING:

The third round of CFT of TELA maize has shown promising results. The trial results are in the hands of the NBAC to obtain the final approval.

e) INNOVATIVE BIOTECHNOLOGIES

There is no regulatory policy in Ethiopia for innovative biotechnologies such as genome editing. There is research interest, and the country needs capacity building on genome editing for research. Tissue culture and molecular characterization are the most common activities that many institutions and companies are using. Recently, the EBTi, Ethiopian Academy of Sciences (EAS) and Beijing Genomics Institute Group (BGI) a genome sequencing or DNA sequence company signed a tripartite agreement focusing on BGI-Africa (African genomic institute as a branch of BGI) in Addis Ababa. The EBTi facilitates the establishment and formation of

mutually beneficial cooperative projects between Ethiopia institutions and BGI. The program will help the country have ownership rights to the data from materials of animal, human, plant, or bacteria which are sequenced in the country.

f) COEXISTANCE:

Ethiopia does not have a special policy on coexistence between GE crops and conventional crop.

g) LABELING AND TRACABILITY

Foods containing GE ingredients must carry a label with the following statement: ‘Genetically Modified Food’. The purpose of the labeling is to enable consumers to make informed choices. The biosafety law requires mandatory labeling of all products, which is to protect the consumer’s right to know.

h) MONITERING AND TESTING

Ethiopia does not have uniform monitoring and testing mechanisms to detect GE products.

i) LOW LEVEL PRESENCE (LLP) POLICY

Ethiopia has no low-level presence policy.

J) ADDITIONAL REGULATORY REQUIREMENT

After GE crop approval is given by the Environment Forest and Climate Change commission, the crop will also need to meet the requirements of other existing laws related to the seed system in Ethiopia. Seed variety registration and release are required by the National Variety Release Committee (NVRC), housed in the MOA, before GE seeds can be officially released to the farmers. The Committee is composed of breeders, agronomists, crop protection specialists, and socio-economists representing different research institutions and user organizations.

K) INTELLECTUAL PROPERTY RIGHTS (IPR)

The Ethiopian Intellectual Property Office (EIPO) oversees Intellectual Property Rights (IPR) issues. There is an established legal system for the protection of intellectual property rights in Ethiopia as a member of the World Intellectual Property Organization. However, the country has yet to sign several major international IPR treaties. Therefore, IPR protection of commercially planted GE crops is uncertain in the country.

L) CARTAGENA PROTOCOL RATIFICATION

Ethiopia ratified the Cartagena Protocol on Biosafety (CPB) on May 24, 2000. The Environment Forest and Climate Change Commission is the Competent National Authority (CNA) and contact point for the Cartagena Protocol and oversees national biosafety regulations.

m) INTERNATIONAL TREATIES and FORUMS

Ethiopia is a member of several international organizations that deal with plant protection and plant health, including the International Plant Protection Convention (IPPC) or the Codex. The Government of Ethiopia applied for membership into the WTO in January 2003. Now Ethiopia is in the third phase of its WTO accession process.

n) RELATED ISSUES

FAS Addis Ababa is not aware of any trade barriers due to biotechnology issues. Ethiopia imports cotton and processed agricultural products such as soybeans and corn oils, as well as breakfast cereals made from GE ingredients.

PART C: MARKETING

a) PUBLIC/PRIVATE OPINIONS:

Debate on biotech crops and bio-engineered foods remains contentious, political, emotional, and not based on science. Some non-governmental organizations engage in targeting consumers with negative, baseless messaging. The experience, and challenges regarding GE crop development in 2019/20 in Ethiopia shows that there is a need to bring researchers and scientists together to overcome anti-GE activities especially through awareness creation. This awareness creation campaign should target Ethiopian consumers and politicians informing them about the benefits of the technology. Ethiopian agricultural research scientists, farmers, university professors and students, seed companies, and other pro-biotech non-governmental organizations should continue to provide science-based messaging. The GOE sees biotechnology as a tool to grow the rural economy and to promote agro-industry.

b) MARKET ACCEPTANCE:

FAS-Addis Ababa is unaware of any recent marketing studies that have evaluated Ethiopian public attitudes towards products derived from GE products.

CHAPTER 2: ANIMAL BIOTECHNOLOGY

PART D: PRODUCTION AND TRADE

a) PRODUCT DEVELOPMENT:

In Ethiopia, there are Animal Reproductive Biotechnology (ARB) and Animal Health Biotechnology (AHB) research like embryo transfer, reproductive synchronization, on quality of semen and sex sorting to get bulls or heifers. Ongoing biotechnology activities for enhancing livestock productivity continue among scientists at the Ethiopian Institute Agricultural Research (EIAR), International Livestock Research Institute (ILRI), and at the National Veterinary Institute (NVI) on the following areas:

1. Adopt and demonstrate animal reproductive biotechnology tools for genetic improvement and multiplication of improved dairy cattle breeds to increase milk yield supply and farmers income.
2. Detection of selected signatures for trypanosome tolerance traits/genes in Ethiopian cattle.
3. Genome-wide association studies for egg production, egg quality and natural antibody traits in indigenous chickens in Ethiopia.
4. Harnessing fecundity and muscle growth genes to improve the productivity of indigenous sheep in Ethiopia using genomic approaches.
5. Other related animal biotechnology research includes development of vaccines and diagnostic kits.

There are no GE animals under development in Ethiopia.

b) COMMERCIAL PRODUCTION: N/A

c) EXPORTS: N/A

d) IMPORTS: N/A

e) TRADE BARRIERS: N/A

PART E: POLICY

a) REGULATORY FRAMEWORK: No clear regulatory framework exists to govern the use of animal-related biotechnology. The current regulations appear to primarily deal with plant-based biotechnologies.

b) APPROVALS: N/A

c) INNOVATIVE BIOTECHNOLOGIES: N/A

d) LABELING AND TRACEABILITY: N/A

e) ADDITIONAL REGULATORY REQUIREMENTS: N/A

f) INTELLECTUAL PROPERTY RIGHTS (IPR): Refer to corresponding section in plant biotechnology section.

g) INTERNATIONAL TREATIES and FORUMS: Ethiopia is active member of the World Organization for Animal Health.

PART F: MARKETING

a) PUBLIC/PRIVATE OPINIONS: N/A

b) MARKET ACCEPTANCE/STUDIES: N/A

CHAPTER 3: MICROBIAL BIOTECHNOLOGY

PART G: PRODUCTION AND TRADE

a) **PRODUCTION DEVELOPMENT:**

There are three microbial biotechnology programs which are in progress funded by the GOE and donor support under the National Agricultural Biotechnology Center (NABC).

1. **Food Microbial Biotechnology.** The main objective is to develop tools for modernization of traditional fermented foods and beverages and improvement of the nutritional values of food products using microbes.
2. **Feed Microbial Biotechnology.** Application of Microbial Technologies for improvement of feed utilization and digestibility.
3. **Agro-Industrial Waste Utilization using Microbial Biotechnology and** produce and characterize enzymes from white rot fungi that improve the delignification of wood chips and reduce the chemical and energy consumption.

b) **COMMERCIAL PRODUCTION:** Not applicable

c) **EXPORTS:** Ethiopia exports beer, wines, spirits, ethyl alcohol, and vinegar in small volumes which may contain microbial biotech derived ingredients.

d) **IMPORTS:** Ethiopia also imports different wines, spirits, and ethyl alcohol which may contain microbial biotech derived ingredients. Some local bakeries also use imported ingredients for coloring, flavoring and sweetening ingredients for ice cream and cake production which may have microbial biotech derived ingredients.

e) **TRADE BARRIERS:** N/A

PART H: POLICY

a) **REGULATORY FRAMEWORK:** The same as for plant biotechnology.

b) **APPROVALS:** Not different from that of plant biotechnology approval process.

c) **LABELING AND TRACEABILITY:** Similar as for plant biotechnology.

d) **MONITORING AND TESTING:** Similar as for plant biotechnology.

e) **ADDITIONAL REGULATORY REQUIREMENTS:** Similar as for plant biotechnology.

f) **INTELLECTUAL PROPERTY RIGHTS (IPR):** The same as for plant biotechnology.

g) **RELATED ISSUES:** N/A

PART I: MARKETING

a) **PUBLIC/PRIVATE OPINIONS:** N/A

b) **MARKET ACCEPTANCE/STUDIES:** N/A

Attachments:

No Attachments